SURVEY METHODS FOR ASSESSING FREIGHT INDUSTRY OPINIONS

Final Report

SPR 328

by

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16. Abstract

Freight transportation concerns and issues have received increasing attention during the 1990s. Public sector agencies use various methods to identify locations where improvements are needed to facilitate freight movements. Concerns and needs regarding improvements have been based on a blend of modeling, technical data and estimates, reviews of plans and other documents, personal observations, and public input. Various observers believe information from these sources should be combined with more specific information from shippers and motor carriers moving freight. There has been little definitive research done, however, on how best to survey the freight community.

In order to establish the most effective means of gathering perceptions of infrastructure problems encountered by the freight industry on the state highway system and supporting road network, the Oregon Department of Transportation (ODOT) sponsored research on a methodology for conducting surveys of shippers and motor carriers. A series of pilot studies resulted in the development of a telephone survey methodology capable of yielding a 60% response rate. To demonstrate this methodology a full-scale survey was also conducted with a statewide sample of nearly 3,600 firms. This surveying effort achieved a 61% response rate and yielded over 2,200 problem descriptions, locations and information on the impacts of the problems on freight operators. Analysis of the data showed minimum levels of non-response bias and a fairly balanced response rate from all regions of the state. The research report also discusses possible approaches for further analysis of the survey data and potential uses for freight transportation planning purposes.

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APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	645.2	millimeters squared	mm^2
ft^2	square feet	0.093	meters squared	m^2
yd^2	square yards	0.836	meters squared	m^2
ac	acres	0.405	hectares	ha
mi^2	square miles	2.59	kilometers squared	km^2
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.028	meters cubed	m^3
yd^3	cubic yards	0.765	meters cubed	m^3
NOTE: Volumes greater than 1000 L shall be shown in m^3.				
		MASS		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg
		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5(F-32)/9	Celsius temperature	°C

APPROXIMATE CONVERSIONS FROM SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
		AREA		
mm^2	millimeters squared	0.0016	square inches	in^2
m^2	meters squared	10.764	square feet	ft^2
ha	hectares	2.47	acres	ac
km^2	kilometers squared	0.386	square miles	mi^2
		VOLUME		
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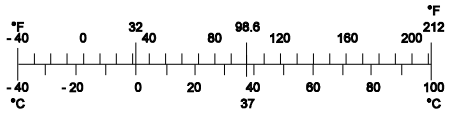
L	liters	0.264	gallons	gal
m^3	meters cubed	35.315	cubic feet	ft^3
m^3	meters cubed	1.308	cubic yards	yd^3
		MASS		
g	grams	0.035	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams	1.102	short tons (2000 lb)	T
		TEMPERATURE (exact)		
°C	Celsius temperature	1.8C + 32	Fahrenheit	°F



* SI is the symbol for the International System of Measurement

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DISCLAIMER

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1.0 INTRODUCTION AND BACKGROUND

Freight movement is an increasingly significant activity in Oregon. The movement of goods by truck along Interstate 5 (north and south) and along Interstate 84 (east and west) serves local, state, regional, national, and international markets. Goods moving between and within cities in Oregon serve local firms, as well as the needs of consumers. Various estimates indicate that freight transportation accounts for between five and 15 percent of the national and state's economy, depending on the type of measurement used (*Oregon Department of Transportation 1999*).

Two critical elements in a successful freight system are accessibility (ability of freight haulers to serve a location) and mobility (ease of freight movements from one location to another). Congestion and poor physical condition of the road network are frequently cited as impediments to freight movement. Continued population growth and economic development contribute to increased traffic volumes on the existing road network, leading to congestion in urban areas throughout the state. Deteriorating pavements, bridges, and poor roadway geometry have also been cited as factors that reduce freight mobility (see *Oregon Department of Transportation 1999*).

The impact of such problems on "day-to-day" freight operations is best understood by members of the freight community coping with these problems. As one of the next steps in a more comprehensive approach to freight planning, *Freight Moves the Oregon Economy* calls for a user survey to gauge customer satisfaction with Oregon's freight transportation system (*Oregon Department of Transportation 1999*). Indeed, the Transportation Equity Act for the 21st Century (TEA-21) calls for more involvement by the freight industry in transportation planning. Although the Oregon Department of Transportation (ODOT) has conducted previous surveys for freight planning, the responses have not been broadly representative of the industry statewide. Thus, the need identified by ODOT was for a broad-based survey of the freight community, concerning their perceptions of problems and needs of the freight transportation system in Oregon. Little is known, however, about the most effective survey methodology to gather information from the freight community. Freight surveys conducted in Oregon and elsewhere have had generally low response rates, which have limited the usability of their results.

Transportation researchers have conducted surveys to learn about travel patterns, especially for passenger travel. The Federal-Aid Highway Act of 1962, the key early legislation for promoting transportation planning, required urban area planners to use the "3 C's" – a comprehensive, continuing, and cooperative style of transportation planning. The scope of the legislation covered the movement of both persons and goods, but little progress was made regarding goods. Weiner states that data on commodity movements were considered too difficult to obtain (*Weiner 1997*).

In recognition of the need for information for commodity movement planning, a conference on Urban Commodity Flows was organized to develop techniques to forecast urban commodity

movements and to identify and investigate the problems of urban commodity flow. At the same time, some members of the research community pointed out the need for a more fundamental understanding of commodity movements and the environmental forces that drive them. It became apparent that the various viewpoints from planners, shippers, government agencies, freight carriers and citizens, were all decidedly different. This lack of a shared vision made it difficult to sustain substantial research regarding freight movements and freight industry needs.

One of few documented efforts to develop an effective methodology for gathering information from the freight community is found in the Highway Research Board proceedings (*Highway Research Board 1970*). It includes a paper describing a research project to test response rates to increasingly more complex survey instruments for collecting truck type-commodity data. The investigators concluded that a mail survey using a mail or phone reminder procedure plus follow-up produced the highest number of valid responses. They found the reduction in response rate not excessive when more detailed and complex questions appeared on a survey instrument.

Unfortunately, this finding regarding survey length may have encouraged freight industry researchers to attempt to gather too much information from a population of potential respondents who are busy trying to make a living and see time as money. With disagreement among researchers on what they should be asking, and little evidence of freight community members' inclination to take the time to participate in a meaningful way, improving the methodology for gathering information received little attention.

In *Freight Matters*, Cambridge Systematics pointed out that states may understand motor carriers from an engineering and regulatory perspective, but they seldom see trucking operations as a tightly integrated part of logistics operations: "Few state DOT staff members have seen their roads from the cab of a commercial truck or from a motor carrier manager's office" (*Cambridge Systematics 1993*). Concerns about levels of understanding and knowledge regarding trucking operations also were voiced at the Freight Transportation Modeling Workshop (*Jack Faucett Associates 1999*). It was noted that data collected through shipper surveys are limited by the fact that the survey respondent often knows very little about the nature of the trucking operations that pick up and deliver the freight.

Lau noted a lack of understanding of appropriate surveying techniques targeting freight community members (*Lau 1995*). He reviewed survey instruments and methodologies and provided recommendations for future survey efforts. His focus, however, was on gathering data for modeling rather than identifying problems encountered en route.

According to a study conducted by the Freight Stakeholders National Network, freight transportation needs are not well understood at the local and regional level. Nearly two-thirds (62%) of metropolitan planning organizations (MPOs) had no active interface with the freight community (*Freight Stakeholders National Network 1997*).

Recent changes in manufacturing practices (Just-in-Time manufacturing) and consumer desires (e-commerce and direct sales) have directed new interest in an understanding of freight movements. Delays, due to congestion, poor road conditions or other problems, are occurring in new locations, while at the same time, changes in movement patterns may be leading to new delays yet to be recognized by planners. Efforts to learn about these problems from the freight

community increase the urgency of establishing a successful method of gathering the right information from the right person(s) in the right way.

As users of the infrastructure system, freight community members provide a unique perspective on various aspects of the problems they confront on an everyday basis. Capturing their perspectives, based on their experiences, would provide information that, combined with other available data, would help establish the costs of current conditions and the benefits of future improvements. What has been lacking, however, is a reliable method to make contact with the freight community to gauge their views. Making this contact requires sensitivity to the industry and an appreciation for what freight community members can contribute to our understanding of the needs of the freight network in Oregon and throughout the nation.

1.1 RESEARCH OBJECTIVES

The objectives of this study were threefold:

1. To investigate the nature of past attempts to contact the freight community through various survey techniques;

2. To research various survey methods and approaches, in order to develop a methodology that would be capable of gathering representative information from freight system users about problems they encounter en route; and

3. If a workable methodology could be developed, to demonstrate it in a statewide survey of shippers and motor carriers to gather information on their perceptions of transportation-related problems while en route in Oregon.

Chapter 2 of this report reviews past efforts to collect information from the freight community regarding infrastructure problems. Chapters 3 and 4 describe the development and pilot testing of freight survey methodologies, to collect information on problems that freight system users encounter en route. Chapter 5 discusses the full-scale testing of a selected methodology. Chapter 6 summarizes the work offers some conclusions that may be drawn from this research effort.

2.0 PAST EFFORTS IN CONDUCTING FREIGHT SURVEYS

Little has been written regarding freight community surveying efforts. There is a large body of literature, however, on the topic of survey research in general. The four general approaches or types of survey methods used to gather information from survey respondents include: in-person interviews; computer-aided telephone interviews, mail-out/mail-back surveys, and combinations of these deployment methods. Table 2.1 highlights the advantages and disadvantages of these methodologies.

Table 2.1: Advantages and disadvantages of survey methods

Methodology	Advantages	Disadvantages
Interview– In-Person and/or Telephone ***Purposeful Sampling***	"High" response rate resulting from purposeful sampling Relatively easy to make follow-up contacts May provide more detailed, direct information than written formats Flexibility – can obtain useful information throughout interview process beyond structured questions	More costly and time consuming per respondent than other methods Infeasible for a large sample size Potential for lack of uniformity among interview structures/ content Purposeful sampling (as opposed to random) may limit statistical analysis possibilities Limited calling hours (business hours) Typically requires callbacks Respondent availability issues - limited phone time if respondent is busy
Interviews – Computer-Aided Telephone (CATI) ***Random Sampling***	Less costly than in-person interview methods Uniform interviewing technique (scripted questionnaire) Increases the feasibility of random sampling, offering statistical analysis benefits	Limited calling hours (business hours) Typically requires callbacks Respondent availability issues - limited phone time if respondent is busy Provides less detailed information than longer structured interviews
Mail-out/ Mail-back ***Random Sampling***	Least costly method Uniform survey method Facilitates broad sampling; larger and more representative sample than in-person interviews	Typically lower response rates than with other methods Difficult to ensure that the "right" individual will complete survey More difficult to control for non-response bias Difficulty in interpreting meaning of non-responses (interpreted to mean lack of "problems" vs. no interest in responding No opportunity to correct any misunderstanding of questionnaire instructions
Mail-out/mail-back with Telephone Follow-up ***Random Sampling***	Can provide an improved response rate over mail-out/mail-back alone Uniform survey method Telephone follow-up can provide opportunity to clarify responses and questionnaire instructions when necessary	Telephone follow-up increases the cost and time involved in survey process Telephone follow-up is not possible for non-respondents if anonymity is promised

Table 2.2 is a summary of recent surveying efforts using four common methodologies: personal interviews, telephone surveys, mail-out with telephone follow up; and mail-out/mail-back instruments.

Table 2.2: Comparison of survey methods used

Methodology	Location	Sponsor(s)/Authors & Year	Response Rate
Interviews – In-Person and/or Telephone ***Purposeful Sampling***	OR	ODOT; Cambridge Systematics (1995)	N/A*
	OR	Port of Portland (1995)	
	OR	ODOT, et al.; CH2M HILL et al. (1997)	
	OR	Metro; Port of Portland; Cambridge Systematics (1998)	
	OR	ODOT; DKS Associates (1999)	
	NY	Morris, et al. (1998)	
	KY	Kentucky Transportation Cabinet; Aultman-Hall, et al. (1999)	
Interviews – Computer-Aided Telephone (CATI) ***Random Sampling***	CA	California Department of Transportation; Regan & Golob (1999)	22.4%
	Australia	New South Wales Roads and Traffic Authority; Hensher & Golob (1999)	43%
Mail-out with Telephone Follow-up ***Random Sampling***	PA	Southwestern Pennsylvania Regional Planning Commission (1996)	4 – 9%
	WA	Puget Sound Regional Council (1994)	N/A**
Mail-out-Mail-back ***Random Sampling***	MA	MA Motor Transportation Association; Central MA Regional Planning Comm.; American Trucking Assoc. Foundation, Inc. (1997b)	11%
	MD	Baltimore Metropolitan Council; American Trucking Assoc. Foundation, Inc. (1997a)	13.1%
	NY	Capital District Transportation Committee (1995)	24%
	CA	Metropolitan Transportation Commission; Katz, Okitsu & Associates (1999b,c)	7.98 – 8.53%

* not applicable; purposeful sampling method used ** information not available

2.1 IN-PERSON INTERVIEWS

2.1.1 Examples of Oregon Surveys

Notably the most expensive method per response, in-person interviews have been used with freight community leaders and major commercial firms. Oregon has conducted a number of in-person surveys since 1995. The participants in these efforts have included: regional shippers and industrial users of the Southwest Oregon transportation system; freight movement businesses

from the Portland metro area; ship, rail and truck operators and manufacturers; and companies using truck services. The number of participants ranged from eleven to seventy-two, with many of the surveys being conducted over the telephone. For example, the Southwest Oregon Freight Movement Study reviewed the shipping practices, economic trends, and commodity flows in Coos, Curry, Douglas, Jackson, Josephine, and a portion of Klamath Counties (*Cambridge Systematics 1995*). Regional shippers, representing major industrial users of the transportation system in southwestern Oregon, were asked a set of open-ended questions, in-person or by phone. For example, participants were asked:

"Do infrastructure constraints affect the movement of your freight by trucks?
Do any policy/regulatory constraints affect the movement of your freight by truck or rail?"

Although the survey effort did not use random sampling (eleven respondents), the consultants surmised that similar firms in the region viewed the operating conditions in the same way as the respondents. The responses were combined with constraints in the regional highway system already identified through discussions with ODOT personnel familiar with the highway operations in the region. According to the report, few freight capacity constraints existed; however, there were other identified constraints, which pertained more to safety issues. The report contained milepost-specific descriptions of infrastructure problems developed using the interview results and the review of existing and available information.

Under the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA), states were mandated to develop an Intermodal Management System (IMS). While this directive was later made voluntary, a report outlining an IMS was produced for Oregon (*CH2M Hill et al 1997*). As part of this effort, ODOT, the Port of Portland, Portland Metro, and a consultant team led by CH2M Hill conducted stakeholder interviews to identify existing intermodal needs. Approximately 80 intermodal users and freight handlers around the state participated. Fifty percent of the interviews were conducted over the phone, with the remainder conducted in-person. The responses were aggregated into key factors affecting intermodal performance, including time, reliability, safety, cost, and connectivity. Specific lists of public and private infrastructure needs were developed.

As part of the I-5 Trade Corridor project in the Portland-Vancouver area, a survey was conducted by DKS for ODOT, in June of 1999 (*DKS Associates 1999*). Sixty-one Portland-area businesses participated in an in-depth, structured survey to gain information about freight and goods movement in the region, primarily intra-city movements. The businesses included 39 manufacturers, 11 distributors and 11 carriers. They were chosen to get a broad geographic coverage of the metropolitan region, with roughly one-third located along the I-5 corridor. As part of this survey, a set of questions was asked pertaining to perceptions of existing infrastructure.

2.1.2 Examples of Other Surveys

Morris focused attention on urban freight mobility problems related to time, costs, and barriers within the Central Business District in New York City (*Morris, et al. 1998*). The project included a freight mobility interview that included questions on transportation barriers. The interview sample consisted of individuals with extensive knowledge of a particular industry-

sector's transportation systems, plus a larger population of logistics, distribution, and transportation managers, selected from a list of major trade associations and programs serving the logistics community.

The Kentucky Transportation Cabinet enlisted the services of the University of Kentucky to develop a method to evaluate access for large trucks between intermodal sites and the National Highway System. A letter and local area map were faxed to a sample of facilities managers prior to the telephone interviewing process (*Aultman-Hall, et al. 1999*). Information was collected on routes connecting to the National Highway System and on locations and times of traffic problems. The data from the surveys were fused with civil engineering details on road sections identified as problematic (*Aultman-Hall, et al 1999).*

2.2 SURVEYS USING COMPUTER-AIDED TELEPHONE INTERVIEWS

Using the telephone in a more structured format, including the use of computer technologies, is normally considered less expensive than in-person interviews, yet still maintains control over the interviewing process. In 1998, researchers at the University of California at Irvine, conducted a telephone survey on impacts of traffic congestion with a sample of 5,258 firms, comprised of California-based for-hire trucking companies and private fleets, and large national carriers with operations in California. A total of 1,200 firms responded, giving their perceptions of traffic congestion's impact on firm operations, a 22.4% response rate. The response categories were in a scalar form (i.e., not a problem, minor problem, significant problem, or major problem) to a set of conditions. The emphasis was on the use of electronic communications to mitigate the effects of congestion rather than to identify specific problems en route (*University of California 1998; Regan and Golob 1999*).

In New South Wales, Australia, the Roads and Traffic Authority engaged the Institute of Transport Studies (ITS) at the University of Sydney to conduct a telephone survey to collect the views of road users on how the system was meeting their needs (*Hensher and Golob 1999*). The questions regarding problems included identifying two problem areas by location, nature and extent of each problem. The survey included scalar response categories for indicating opinions on a list of infrastructure and transport policy options and on how helpful infrastructure improvements would be to their operations. The survey also asked the respondents to list routes they would like to see improved. The sample of 150 firms was pre-specified as a stratified random sample drawn from ITS's own metropolitan area industry database. According to the authors, the response rate was 43% from the subset of individuals contacted. The authors also reported that from the original database, 248 calls had no answer and 112 firms refused to participate.

2.3 MAIL-OUT/MAIL-BACK WITH TELEPHONE FOLLOW-UP

Using a combination of techniques has also been attempted to gather information from the freight community. The Southwestern Pennsylvania Regional Planning Commission and Development Council conducted a mail survey of 1,500 companies (700 freight service

providers and 800 area manufacturing firms) in 1995 (*Southwestern Pennsylvania Regional Planning Commission 1996*). The participants were asked about "*major bottlenecks, congestion points and other problems ... that cause delay, accidents or missed connections."* They were also asked about access problems into and out of industrial locations. Another question asked what the company considered as its most important problem in freight transportation, alluding to a broader scope of issues, such as labor costs and regulations. The initial response rate was 4%, prompting the survey administrators to make a series of follow-up phone calls to approximately half of the non-respondents. A second mailing to firms that agreed to participate resulted in a 9% response overall.

The Puget Sound Regional Council conducted a mail survey of shippers in 1994, with telephone calls to clarify answers and increase the number of responses. (Actual response rates were not available.) The instrument contained (a) a list of twenty-one freight transportation problems, with check boxes to indicate if these conditions were perceived as a problem; and (b) a scale of importance of the problem in the future. The problems were general rather than site-specific (*Puget Sound Regional Council 1994*).

2.4 MAIL-OUT/MAIL-BACK

One example of a mail-out/mail-back survey used to contact freight community members is the survey conducted in Worcester County, Massachusetts, jointly by the American Trucking Association (ATA) Foundation, the Massachusetts Motor Transportation Association, and the Central Massachusetts Regional Planning Commission. This survey effort was conducted to support the update of the regional Transportation Plan, required under ISTEA (*American Trucking Associations Foundation 1997b*).

Respondents were asked to list their preferred truck routes by name, and the location and type of structural impediments they encountered. The survey also requested specific information about difficulties encountered when making downtown deliveries, including the location and problem type. At the end of the survey, respondents were asked about future freight movement and commodity flow plans, including potential changes in company size and use of the system. The sample of 158 trucking companies was compiled by the ATA Foundation. The survey achieved an 11% response rate, with 18 firms participating (*Coogan 1996*).

The Baltimore Metropolitan Council and the ATA Foundation jointly sponsored a survey to quantify and analyze motor carrier/freight movement operational characteristics, including perceptions of problems (*American Trucking Associations Foundation 1997a*). A seven-page questionnaire was mailed to a stratified, randomly selected sample of 470 private and for-hire motor carriers based in the Baltimore area. After an additional follow-up, a 13.1% response rate was obtained. The location and type of structural impediments to freight movement were collected.

The original methodology called for an on-site interview; however, most of the subjects requested mail or telephone interviews instead. A total of 51 interviews were completed for the study. Survey completeness was a serious problem, as certain questions were not answered due

to lack of information, proprietary concerns, or both. Attempts to collect the missing data required a substantial number of telephone follow-up calls.

In 1999, the Metropolitan Transportation Commission in Oakland, California, conducted a two-part survey. One part was developed as a public sector questionnaire regarding perceptions of freight; the other surveyed the local trucking industry (*Katz, Okitsu & Associates 1999c; Katz, Okitsu & Associates 1999b*). The trucking questionnaire listed all the major routes and requested indications of whether they were heavily used, and whether problems were typically encountered along them. Information about the nature of any problems encountered was also sought. Respondents were asked to circle the five worst routes listed. Of the 363 surveys mailed, 31 were returned and 29 were usable, for an effective response rate of 8%. A series of questions regarding intra-city concerns (e.g., parking facilities, and truck stops along the I-880 corridor) was also included in the survey. It is interesting to note that although routes with problems were listed by both the public sector (planning staff for local cities and counties) and truckers, there were differences in their perceptions:

> *"One type of conclusion is that the two sets of respondents perceive 'problems' differently in general. Staff may have based some of their nominations of 'problematic' roadways not because of analytic activities, such as traffic counts or a review of truck accidents, but because of the record of complaints by spokespersons for businesses or neighborhoods. On the other hand, the trucking industry's representatives, including drivers and dispatchers, may view the same roadways in a totally different way. 'Truckers' may possess direct experience with the operational characteristics of the roadways in question, they may have different attitudes about congestion, they may not see trucks parking on the roadway as a problem, and/or they may perceive intersections with tight radii as limiting their use of designated truck routes.*
>
> *The second type of conclusion is that, even when staff and 'trucker' appear to be nominating the same locations, they may not be nominating the same problems or applying the same feelings of intensity about the problems. For example, trucking industry representatives may want to have an intersection widened to accommodate turns by trucks, but staff may view trucks traveling through that intersection as the reason why they have to consider widening or re-striping lanes." (Katz, Okitsu & Associates 1999a:26)*

This difference in the perceptions of freight industry respondents and planners underscores the value and importance of including freight industry perspectives in the planning process. Without them, investments made in the freight transportation system may fail to address the concerns of the users of that system.

The Capital District Transportation Committee (CDTC), the metropolitan planning organization for Albany, Rensselaer, Saratoga, and Schenectady Counties in New York state, conducted a freight community survey to determine if goods movement issues previously identified by their Goods Movement Task Force were shared concerns. A sample of 469 firms was compiled from a number of sources to roughly approximate a representative mix of national goods movement volumes. A two-page questionnaire listed previously identified issues, and respondents were asked to rank these issues based on how critical they thought each issue was to their business

activity. Respondents were also asked to indicate the two most important issues on the list. Next, respondents were asked to indicate levels of support for a list of possible actions previously identified by the CDTC Goods Movement Task Force. The respondent was also given directions to add any additional issues of concern not previously listed and/or to identify specific transportation system deficiencies that they felt impacted goods movement, attaching maps or additional paper, if necessary. A final question inquired about the respondents' level of interest in participating in future CDTC planning efforts, including remaining on the mailing list, participating in one-shot focus groups, etc. A total of 111 surveys were returned, for a response rate of 24% (*Capital District Transportation Committee 1995*).

2.5 OTHER RELEVANT SURVEYING EXPERIENCES

A survey effort undertaken by the University of Washington attempted to better understand intra-city freight movements (*Washington State Transportation Center 1997*). This approach utilized four focus groups of four to eight truck drivers, in a guided group interview/discussion. The intent was to gain participants' insights about what design, regulatory, enforcement, or management factors facilitated or impeded their operations in Seattle, Washington and the surrounding suburban areas of King County.

Concerns over response rates extends beyond freight community researchers. Passenger travel researchers have recently explored ways to increase response rates. At the 1999 National Personal Travel Survey (NPTS) Conference in Washington, D. C., several presentations suggested new approaches to encourage participation. For example, Moritz and Brog suggested the survey respondent be treated more like a valued customer instead of an experimental research animal. Survey instruments and methodologies should place as little burden on the respondent as possible. Their recommended design is a written survey instrument that is easy for the survey participant to answer. They recommend telephone contacts be used only to motivate participants (*Moritz and Brog 1999*).

Moritz and Brog designed a special survey instrument for a household, with additional written questionnaires for each household member. The respondent was asked to answer the questions in his/her own words. Although the focus of these new designs has been for passenger travel, many of the lessons learned are important to consider when surveying a commercial sector, such as the freight community (*Moritz and Brog 1999*).

Other industries need to obtain information from commercial establishments. For example, researchers in the energy industry needed to understand how commercial establishments perceived the marketing possibilities for solar energy in the commercial sector of the economy (*Asher and Keating 1981*). The methodology employed was an unstructured, on-site interviewing process that allowed the respondents to "freely express themselves in their own language." This particular method was thought to be the most effective means for uncovering new approaches to a problem. For example, the respondents may not always be able to tell the interviewer what they want, but can always recount their own experiences, attitudes, opinions and concerns.

The research team conducted a number of informal telephone interviews as part of the process of gathering recent survey information from MPOs and state planning staff. During this retrieval process, Gerald Rawling of the Chicago Area Transportation Study described the public relations aspects of a freight survey deployment. He remarked on the importance of advertising the survey prior to deployment (*Rawling 1999*).

In a discussion with planning staff at the Central Massachusetts Regional Planning Commission regarding the Worcester, Massachusetts survey, it was noted that specific infrastructure problems identified by survey respondents had subsequently been corrected (*Rydant 1999*). However, there was no follow-up mechanism to relay these successes to the participating firms. Although these firms would know of the changes through their use of these corrected facilities, it might be advantageous for future surveying efforts to explicitly consider a feedback mechanism (e.g., newsletter, follow-up postcard, etc.) to demonstrate the use of survey results where appropriate.

No previous research investigated for this study explicitly recommended testing various methodologies to identify the key determinants of participation, although many indicated concerns over the effect of low response rates or incomplete survey responses in their findings. Clearly there are trade-offs to be considered between obtaining "high" response rates from a few individuals and achieving a somewhat lower response rate from a larger group. However, according to Dillman, there is a survey practice, the total design method (TDM) that can routinely produce response rates of 74% and never less than 50%, even for written surveys (*Dillman 1978*). For this effort, not only is a good response important to ensure a representative set of opinions from the freight community, the instrument must be capable of capturing detailed information sufficient for planning purposes. In fact, none of the survey techniques reviewed appeared to address the level of specificity of problems encountered equally from all types and/or sizes of firms.

2.6 SUMMARY

The research team investigated the nature of numerous previous attempts to survey the freight community. Although a number of these previously deployed surveys produced information on infrastructure problems and customer satisfaction, no specific survey methodology or instrument proved to be particularly effective in obtaining information from freight community members. Response rates ranged from 8% to 24% for written survey deployments and 24% to 43% (with some uncertainty on calculation techniques) for phone surveys. Thus telephone surveys produced better response rates; however, the information gathered did not include detailed descriptions of infrastructure problems.

Thus, for the most part, response rates have been low. It is not clear why some freight community members were willing to participate and some were not. Some of the previous efforts mentioned attempts to deal with non-response bias, but no specific information was found to explain the motivations for participating or not participating in a freight survey effort. A limited review of other survey research literature offered some insights on possibly important elements in effective methodologies: minimize the burden on respondents; treat them as valued customers; provide them the opportunity to respond in their own language; communicate to respondents about the survey effort both prior to deployment and afterwards. Finally, it was

apparent that carefully developed survey methods such as Dillman's, were capable of yielding response rates in excess of 50%. Whether such a method could be adapted to a survey of freight industry representatives had yet to be tried.

3.0 SURVEY INSTRUMENT AND METHODOLOGY DEVELOPMENT

To obtain additional guidance on how to conduct a "successful" survey of the freight community, a consultant was hired to learn first-hand from a small sample of freight community members their preferred surveying technique. In addition, a freight consultant was hired to review the numerous survey instruments gathered from previous deployments, and to do a critical analysis of the questions used and the length of each survey. The findings from these efforts were used to develop a pilot survey instrument to be tested in a variety of formats to establish the most effective survey instrument and deployment methodology. Key to the investigation were a comparison of response rates and ensuring an adequate level of detail in responses to accurately describe an infrastructure problem.

3.1 FREIGHT INDUSTRY INTERVIEWS

To gather insights from freight community members on what type of survey methodology they thought would be the most successful, the consultant conducted a series of structured interviews. Specifically, these interviews focused on what survey techniques are preferred by freight shippers and motor carriers for gathering information about infrastructure problems en route in Oregon. The consultant contacted 17 shipper and carrier firms, four trade associations and two freight brokers. The sample selected for exploring methodological issues was fairly representative of the types of firms that use the highway freight system. In this group were firms that travel on the highway system in all parts of the state. There were large and small firms, national, regional and intrastate, and at least one from each industry segment identified in *Freight Moves the Oregon Economy* (*Oregon Department of Transportation 1999*). The firms included a variety of shippers and carriers, several less-than-truck-load (LTL) carriers, and one inter-modal operator. (See Appendix A).

The consultant informed the interviewee that her job was to gather information about how best to survey the industry about their perceptions of infrastructure problems on the freight transportation system. The interviewee was then asked to

- Describe their firm's operations in Oregon,
- Discuss the value of a survey on infrastructure conditions and problems,
- Identify who should be interviewed in the industry,
- Identify who in the firm would be best to respond to a survey,
- Discuss how best to survey these individuals, and
- Identify other segments or firms in the industry that ODOT should include in a survey.

In the interviews, the consultant identified a range of freight shipper firm types with respect to perceptions of problems moving freight in Oregon. For example, some firms were not concerned with infrastructure problems because they contracted out all their transportation services, either

directly or through a third party. These firms therefore had no need for a transportation manager or dispatcher in-house. A few shipping firms used "continuous flow management" and were concerned with any and all impediments to freight movement, including infrastructure problems. Shippers with in-house fleets had transportation managers or dispatchers, while some shippers used a combination of in-house and contract services.

The consultant found that across a wide range of for-hire motor carriers, there appeared to be little difference in perceptions of how to effectively gather information on infrastructure problems. No distinction could be made on the basis of industry type or firm size. However, most of the firms that were interviewed expected that there would be differing perceptions among motor carrier firms, depending on the volume of freight moved on various transportation facilities. For example, some firms run only locally, with trips made in less than a fifty-mile radius, while others rely almost exclusively on the interstate system.

When freight firms were asked about the best way to interview them, the most common response was to use a written survey. The perception was that this approach would allow for the greatest flexibility for respondents in scheduling when they could take time to answer the questions. Phone interviews, on the other hand, would require specific appointments and may interfere with job obligations.

Some firms have more than one plant or distribution center across the state, with possibly different perceptions of infrastructure problems at the different sites. Some interviewees suggested a strategy of providing firms with several survey instruments, to be distributed internally to various knowledgeable individuals, in order to identify the range of perceptions. Interviewees believed that this "cooperative" survey distribution method would increase the likelihood that persons with knowledge of infrastructure problems would receive and respond to the survey. This approach, however, may contribute to a bias in the data; any responses obtained in this manner would need to be coded and tested to identify possible bias.

The structured interviews revealed internal linkages of information flows from the drivers to the transportation managers/dispatchers. If these links were currently functional, then the transportation managers/dispatchers would have reliable information on infrastructure problems. If this information were not being transmitted, however, the surveying effort might be a way to move this information forward; or it may be required to survey drivers directly.

In several of the firms, the first telephone contact was a receptionist who knew the appropriate person(s) to be interviewed. In other cases it was necessary to track down the appropriate person through a series of calls. It was not clear whether this initial contact point was more or less efficient depending on the firm size or type of business.

The following points are a summary of the consultant's findings:

- Many firms within the freight industry believe that ODOT is taking a positive step in its effort to obtain information from firms about problems with the highway infrastructure, and that they would be willing to cooperate with ODOT in order to ensure that the survey is a success.

- ODOT must make a special effort to be open about how the survey is being implemented and how the results will be used.

- The survey should focus on obtaining information from those firms that have direct knowledge of the problems on the infrastructure system; i.e., most carriers (common and contract) and those shippers with in-house transportation services or that contract but track the flow of all shipments.

- Within the firms, the individuals who are viewed as having the relevant information for the survey are those who work most closely with the system; i.e., dispatchers and drivers.

- The design of the survey needs to address the needs of small firms with one central facility and larger firms with terminals or dispatch facilities throughout the state.

- The survey should come in the form of a written survey that can be distributed internally if necessary to different terminals or sites.

- The survey should provide a mechanism for gathering basic information on problems with the infrastructure from one group (i.e., dispatchers and drivers) while providing an opportunity for transportation managers and owner/CEO's to comment on business implications.

- The survey should be written with clarity and brevity.

- The sample should be selected to satisfy the requirements of representation rather than scientific analysis.

The members of the freight community contacted through this effort expressed their willingness to cooperate with future efforts to conduct a survey. Their responses indicated their concern that the survey method use their time effectively. They also wanted to make sure that the survey strategy worked for a variety of firm types and circumstances.

3.2 SURVEY INSTRUMENT ANALYSIS

A second consultant reflected on previous experiences with surveying freight community members, reviewed freight survey instruments used in previous deployments, and proposed a variety of potential survey questions and formats for gathering information from the freight community. In addition, the consultant developed a conceptual framework for the types of information that could be collected and various question formats. This framework is included as Appendix B.

The consultant identified the following key elements to include in the survey instrument design:

- **Introductory Material -** Companies involved in freight movement are often anxious to cooperate if they feel that the information they provide will result in significant

improvements.

- **What problems does the company experience in truck shipments - what kind, where and when?** This is the core content of the survey and may require probes for answers in several different approaches.

- **What is the company able to do to compensate for the problems? -** This is a follow-up question to determine how much the company can do to avoid problem areas, particularly those like traffic congestion that are limited to certain times of the day or days of the week.

- **How much impact does the problem create for the company? -** The companies should be asked to give their own assessment of the impact of impediments on their business.

- **What kind of company is being surveyed? -** It is important to know what type company is being interviewed when the results are extrapolated to the industry as a whole. It is also important to sample from the full range of shippers and carriers.

- **What is the company's level of use of trucks? -** The results from a particular company should be weighted by how much trucking they do on Oregon's highways.

The consultant's review of many question formats in past survey efforts helped the research team identify some pitfalls to avoid in developing an effective survey instrument. Some questionnaires were very lengthy, with numerous pages of fill-in blanks or check boxes on problem types. Some open-ended surveys had areas too small to write out responses regarding the location of specific problems. Some of the surveys used technical jargon regarding the types of problems encountered. Thus the challenge was to design an instrument that would yield specific information on the nature and location of infrastructure problems, while not being too lengthy or cumbersome for the respondent.

3.3 PILOT SURVEY DESIGN

From the findings of the interviews with freight firms and the review of survey instruments, the research team developed a pilot survey instrument, incorporating the following design elements:

- Focus on a narrow area of inquiry.
- Keep the length of the questionnaire short.
- Use simple language and question format.
- Provide sample responses to help the respondent understand what is being asked.
- Communicate with respondents about the survey beforehand to engage their interest and support for the effort.

A two-page questionnaire was designed, which contained a small number of open-ended questions, aimed at identifying problems perceived by freight shippers and motor carriers. The

instrument asked for the following information (see Appendix C for a copy of the Round One pilot survey instrument):

- *A description of the problems encountered,*
- *The location(s) where the problems occur,*
- *Time(s) of day and time(s) of year when the problems are worst, and*
- *Any actions taken to address or avoid the problems.*

The research team developed six deployment methodologies and systematically tested the performance of each method:

Type 1 – mail-out/mail-back questionnaire, with three follow-up mailed reminders;
Type 2 – mail-out/mail-back questionnaire and map of major Oregon highways, with three follow-up mailed reminders;
Type 3 – post card invitation to participate; positive responses were sent mail-out/mail-back questionnaire and three mailed follow-up reminders;
Type 4 – post card invitation to participate; positive responses were sent mail-out/mail-back questionnaire with map of major Oregon highways and three mailed follow-up reminders;
Type 5 – telephone invitation to participate; positive responses were sent mail-out/mail-back questionnaire and three mailed follow-up reminders; and
Type 6 – telephone survey, with call-backs (three to five attempts).

The sampling frame was derived from the Oregon Employment Department's "ES202" database. This database allowed a variety of characteristics to be used to classify firms by type of business, size of firm, and urban/rural location.

Six random samples were extracted from the sampling frame, stratified to contain the same mix of firms, by industry type, in each sample.

3.4 SAMPLING FRAME AND INSTRUMENT DESIGN CHANGES

The proportion of undeliverable addresses with the ES202 database was unacceptably high (about 12%), and the response rates with five out of the six survey methods proved to be unacceptably low (less than 20%). Thus three additional pilot surveys were conducted, using two other sampling frames – the ODOT Motor Carrier Transportation Division truck registration database and the ODOT Driver and Motor Vehicle Services Division Commercial Driver License (CDL) database. Each list was current within a month or less of the survey deployment, while the ES202 database was at least 6-9 months old. The three additional pilot surveys also tested two deployment methods, as follows:

Type 7 – telephone survey of a random sample of names from the ODOT Motor Carrier Transportation Division truck registration database.
Type 8 – mail-out/mail-back questionnaire and two mailed reminders and a final telephone reminder sent to a random sample of names from the ODOT Motor Carrier Transportation Division truck registration database.

Type 9 – mail-out/mail-back questionnaire and three follow-up reminders sent to a random sample of names from the ODOT Driver and Motor Vehicle Services Division CDL database.

Based on experience in the first six pilot surveys, some small modifications were made to the questionnaire design, and several background information questions were added regarding the truck type used, the length of the trip from the firm, the size of firm and the type of firm (carrier or shipper) where the respondent was employed. (See Appendix D for Round Two pilot survey instrument.)

4.0 PILOT SURVEY RESULTS

4.1 RESPONSE RATES

In all, nine pilot surveys were deployed (see Table 4.1). Questionnaires that were returned as undeliverable, firms with telephone numbers no longer in service, or firms that indicated they were not moving freight in Oregon, were subtracted from the original number of deployed surveys, with the remaining surveys deemed as the "qualified deployment." Within the qualified deployment, the research team defined the following non-response categories: refusal to participate; no response to a mailed questionnaire or phone call (after five call-backs); lost survey, unable to respond; and failure to return questionnaire after agreeing to participate. Qualified responses included participants who described specific problems and those who said that they had no problems to report.

Table 4.1: Effective response rates

	Deployment Type								
	1 Mail	**2 Mail w/ map**	**3 Post Card/ Mail**	**4 Post Card/ Mail/ map**	**5 Phone /Mail**	**6 Phone**	**7 Phone**	**8 Mail/ Phone**	**9 Mail**
A. Sample Size	100	100	100	100	100	50	149	100	100
B. No Longer in Business/Undeliverable	11	16	10	12	7	2	17	1	15
C. Don't Ship	2	5	8	8	9	13	9	16	4
D. Qualified Deployment (A- (B+C))	87	79	82	80	84	35	123	83	81
E. Refused	---[a]	---[a]	---[a]	---[a]	14	4	6	6	---[a]
F. No Response or Unsuccessful callback/voicemail	74	70	74	74	22	0	38	26	71
G. Reported Lost/ Unable to respond	---[a]	---[a]	---[a]	---[a]	---[a]	---[a]	---[a]	22	---[a]
H. Agreed but Failed to respond	---[a]	---[a]	3	3	32	10	---[a]	2	---[a]
I. Qualified Responses (D – (E+F+G+H)	13	9	5	3	16	21	79	27	10
J. Reported No Problems	3	1	0	1	8	10	37	11	2
K. Reported Problems	10	8	5	2	8	11	42	16	8
L. Effective Response Rate (I/D)	15%	11%	6%	4%	19%	60%	64%	33%	12%

[a] Not Applicable

The effective response rate was calculated by dividing the number of qualified responses (I) by the number of qualified deployed surveys (D). The two telephone surveys (Types 6 and 7) produced response rates of 60% and 64%, respectively. These results were much better than the telephone survey responses in the Irvine (22%) or the ITS (43%) deployments (See Table 2.2).

Using a telephone call first, and then following up with a mailed survey (Type 5) yielded a 19% effective response rate. Mailing the survey first, and then following up with a telephone call (Type 8) yielded a 33% response.

The direct mail-out/mail-back surveys (Types 1, 2, and 9) produced an average response rate of 13%. This rate is similar to the surveying efforts by the Baltimore Metropolitan Council (13%) and Worchester, MA (11%), slightly more than the Southwestern Pennsylvania (9%) and the Oakland efforts (8%), and less than the CDTC survey (24%) (See Table 2.2).

The pre-survey post card screening approach (Types 3 and 4) was the worst performing methodology, yielding a 5% average response rate.

An analysis of the first round pilot survey responses showed that, on average, response rates did not vary by more than about 2% by firm size. With respect to the location of the firm, the average response rate was higher from those in metro counties than from those in non-metro counties.

4.2 PILOT SURVEY INSTRUMENT PERFORMANCE

For all pilot survey methods, respondents provided detailed information on the kinds of problems they (or drivers in their firms) encountered en route. Although there were only a small number of written responses, the information that was provided was extensive. The addition of a map appeared to make no measurable difference in the level of detail provided on the problem location or problem description.

The kinds of problems mentioned by respondents included not only physical barriers and impediments to smooth freight movement but also problems related to other issues, such as regulations, taxation and enforcement. While these topics were not central to the purpose of the survey, they provided some indication of how prominently these other freight issues figure in freight community member's perceptions, relative to infrastructure problems. The types of problems most often mentioned tended to vary, depending on the location of the firm. For example, as one might expect, congestion problems were cited more often by firms in urban areas than be those in rural areas.

4.3 METHODOLOGY ISSUES

A major issue for any surveying effort is the need to minimize respondent burden. The written survey required not only that the potential participant be interested in contributing, but that they were able to do so before more pressing needs took their attention away from completing the task. It is often thought that non-respondents are unwilling to participate. There is evidence in the results of the Type 5 pilot survey, though, that a substantial proportion of freight community

members (32%) actually wanted to participate, since they initially agreed to respond to the survey; but then they were unable or unwilling to do so for some reason. The more complicated the level of respondent responsibility, the less likely even willing participants will be able to complete the task of providing the required information. Thus one reason for the better performance of the telephone method is the chance for the respondent to perform the task of providing the information orally without further burden.

Telephone surveys can also provide immediate clarity on the purpose of the survey and the uses of the information; and the researcher has the ability to "probe" for a better answer than might be provided on a self-administered survey. In the Type 6 and 7 surveys, the trained personnel used simple, straightforward language and followed the line of discussion, including specific probes to make sure an exact location and problem description was retrieved from the respondent. Using a general script was an important part of the survey deployment. This was very true in the initial contact with a firm, in making sure that contact was made with the person who knew the most about the problems being encountered on the infrastructure.

Although the research team recognized the importance of publicizing a survey, the pilot studies were not announced via a news release prior to the surveying effort. Instead, the survey effort was endorsed with a post card signed by the Oregon Freight Advisory Committee President in Types 3 and 4. To what extent this endorsement affected the response rate is not known; these two methods yielded the lowest response of all the pilot survey types.

4.4 PILOT SURVEY CONCLUSIONS

From the findings of the pilot surveys, the research team concluded that the following elements of survey methodology were critical to the success of conducting surveys of the freight industry:

- **An up-to-date database from which to draw a sample of firms.** The first database used in sampling, which was several months old, resulted in unacceptably high rates of invalid addresses.
- **Use of a telephone survey method to achieve person-to-person contact.** A mailed questionnaire, even with repeated follow-up contacts failed to engage members of the freight industry.
- **Incorporation of multiple attempts to make contact with potential respondents.** Telephone survey professionals recommend at least five attempts to reach respondents.
- **Use of straightforward, direct questions in a short, open-ended question format to ensure that elements of the problem description, location, alternatives and impacts could be captured accurately.** Other items including time of day, time of year, firm size, truck type, and trip length could be captured using a closed-ended format for ease of coding. Review of freight survey efforts elsewhere and interviews with freight firms showed that respondents are not inclined to take much time for a survey and may resist giving information they consider sensitive.
- **Sampling of each ODOT region separately to ensure adequate representation.** Analysis of the first round pilot survey results showed that firms in rural areas may not respond as readily as those in urban areas. In addition, the types of problems likely to be mentioned can be expected to vary with the location of the firm.

- **Use of trained interviewers who know when and how to probe, to increase the value of the survey responses.** One element in the success of the telephone survey method was that researchers were able to clarify responses and probe for additional information that would not otherwise have been provided.
- **Contact with the industry and potential survey respondents to communicate the purpose and value of the survey and encourage participation.** Investigation of other relevant survey literature showed that legitimization of the survey is important for a good response rate in both the current and any future efforts.

5.0 FULL-SCALE DEPLOYMENT OF SURVEY METHOD

With the lessons learned from the pilot studies, the research team undertook a full-scale statewide survey using a telephone deployment, based on the instrument and methodology from Pilot Test 7. This approach had yielded the highest response rate from an up-to-date sampling frame.

5.1 SAMPLING PROCEDURES

The sampling frame for the survey was a list of Oregon-based firms that directly engage in freight movement as "shippers" (i.e., firms with private fleets) and for-hire "carriers," with one or more large trucks registered with the ODOT Motor Carrier Transportation Division. An Oregon-based firm was defined as one who lists an Oregon address as its principal point of contact for truck registration purposes.[1]

The sampling frame included: all active carriers; all fuel types; and firms having at least one truck weighing 26,000 lbs. or more. Excluded from the list were vehicle body types classified as passenger buses, utility or service trucks, wreckers, and trucks with fixed loads, as they were not likely to be moving freight. Also excluded were the following operation classifications: passenger for-hire carriers, trucks under 26,000 lbs., special services trucks, and carriers for whom classification was pending. The list of Oregon-based firms was comprised of 8,846 names, addresses and phone numbers in Oregon.

After examining the distribution of firm sizes in the database, the research team decided to undertake two separate surveys – 1) a random sample survey of firms having less than 200 trucks; and 2) a survey of all firms having 200 trucks or more. The total number of such firms for the latter survey was 22. The reason for conducting a separate survey of the largest firms was that the likelihood of firms this size occurring in a random sample was quite small (roughly 1 in 300), yet their exposure on the freight system was quite large, given their fleet sizes. The large firm survey group was extracted from the database first; then the random samples from each region were drawn from the list of remaining firms.

ODOT has five designated administrative regions within the state (see Figure 5.1). Since perceptions of problems with freight movement could differ from one region to another, the research team structured the sampling procedure to obtain enough responses to analyze the results by region. The number of firms in each region was estimated by overlaying zip code maps and region maps to allocate zip codes to each region, and then sorting the database by these zip code groupings.

[1] The ODOT Motor Carrier Transportation Division notes that as a general rule, if a firm has an office in the state, it will be included as an Oregon-based firm, even though it may be headquartered in another state.

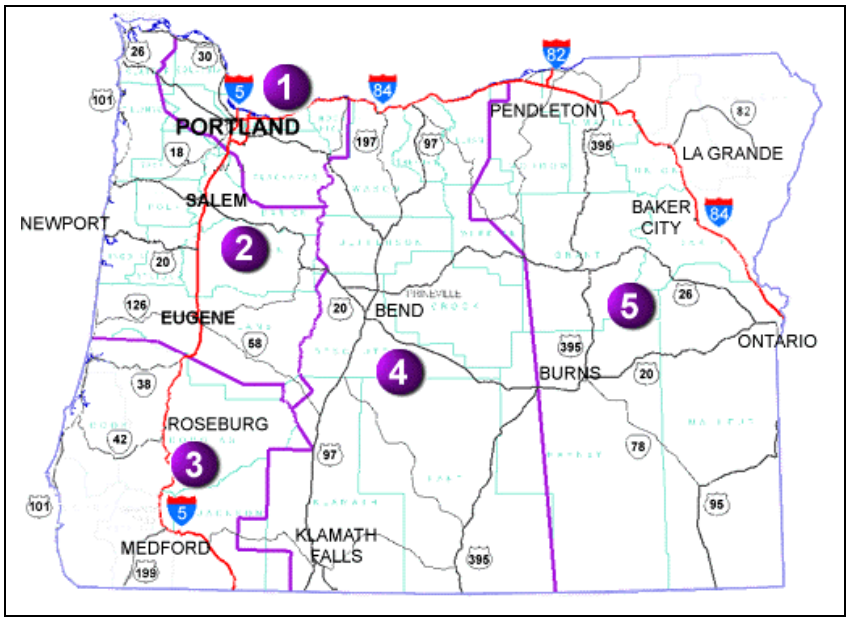

Figure 5.1: ODOT Administrative Regions

The exact sample size for each specific region was based on a formula[2] that uses the standard error of the proportion (p) based on a simple random sample of size (n). The sample size formula took into account the actual population of firms in each region and generated a figure that represented the number of responses necessary for a sampling error of ±5% and a 95% confidence level. This figure was divided by the expected response rate (60%), to obtain the required sample size. A computerized random number generator was used to select the firms in each region to participate in the survey. The sample size for each region is shown in Table 5.1.

Table 5.1: Sample sizes for each ODOT region

Region	Part of state	Truck Firm Population	Sample Size	% of Region Population
1	Portland metropolitan area	2625	791	30.1%
2	Northwest Oregon	2825	796	28.2%
3	Southwest Oregon	1525	722	47.3%
4	Central Oregon	1009	656	65.0%
5	Eastern Oregon	862	626	72.5%
Total		8846	3591	40.6%

[2]Moser, C.A. and G. Kalton. (1972). *Survey Methods in Social Investigation.* New York: Basic Books, Inc. pages 147-148.

As shown in Table 5.1, the sample sizes were not equally proportional to the population of each region. This is because the population has only a partial influence in the sample size formula. The larger determinant of sample size is the number of responses necessary to attain a given sampling error and confidence level. Once the population size exceeds about 2,500 the sample size levels off. Hence, even surveys on the national level may attain low sampling errors and high confidence levels with sample sizes that are tiny perentages of the total population.

5.2 SURVEY METHODS

To encourage participation in the full-scale survey, a letter announcing the forthcoming survey was distributed to all of the firms included in both the large firm sample and the random samples. The letter was endorsed by the trade organization members of the ODOT Motor Carrier Transportation Advisory Committee. In addition, a news release developed with ODOT staff was made available to radio stations statewide via a taped interview.

A private survey research firm conducted the random sample survey. The research team worked with the firm to refine the script for the telephone survey, which was pretested on a small sample of respondents. The telephone survey script is included as Appendix E.

The interviewers called during normal business hours during the first week of the survey. Follow-up calls were made to those not yet contacted during the weekend and evenings, as a way to reach additional potential respondents. Calls "after-hours" appeared to be effective, particularly for single-truck firms. Five callbacks were made before categorizing a firm as a non-responder.

The survey instrument was designed with open-ended questions for the problem descriptions, locations, alternatives and impacts. The remaining items were asked in a close-ended format. The questions included: a description of the problem; the location where the problem was encountered; the time of day/year when the problem was encountered; the impact of the problem on their firm; the type of truck affected; the length of the trip (from their firm) being described; whether they were an owner-operator; the size of their firm; what alternatives were used when faced with this problem; and any additional comments they might wish to share.

The same basic survey instrument was also used for the large firm survey. With the large firm survey, however, additional probing questions were included to address the particular nature of their operations (e.g., multiple sites; transportation manager perspective, etc.).

5.3 LARGE FIRM SURVEY RESPONSE

The overall response rate for the large firms was 56%, slightly less than what was achieved in the telephone deployments of the pilot surveys (Type 6 with 60% and Type 7 with 64%). Approximately 36% of the problems described were infrastructure-related, while 32% were congestion problems. Locations were reported for each problem, when applicable (e.g., for non-regulatory problems with geographic locations).

There were fewer categories reported for problems with respect to times of day and times of year than in the random survey results discussed below. Most reported problems were no worse at any particular time of day, or occurred all the time; and nearly all reported problems were no worse at any particular time of the year.

When respondents were asked if they had any alternatives to avoid or address a reported problem, for 12% of the problems reported, coping strategies were described. For 88% of the problems reported, no alternative was indicated. The large firm survey respondents reported relatively long trips, with only 20% reporting trips of 100 miles or less. (See Appendix F for details).

Since the information gathered in the large firm survey was collected in a separate effort from the random statewide survey, the large firm survey results are not combined or included in any of the percentages or analysis in the sections that follow.

5.4 RANDOM SURVEY RESPONSE

The overall response rate to the full-scale random survey was 61% (Table 5.2). This percentage was calculated by dividing the number of respondents by the qualified deployment. A total of 1,872 firms participated in the surveying effort by reporting their perceptions of problems while moving freight in Oregon, or by indicating that they currently had no problems to report.

Table 5.2: Response of full-scale deployment

A. Sample Size	3591
B. No Longer in Business/Unable to Contact	328
C. Don't Ship	199
D. Qualified Deployment (A- (B+C))	3064
E. Refused	245
F. Unsuccessful Callback/Voicemail or No Response	753
G. Unable to Respond	194
H. No Problems	617
I. Reported Problems	1255
J. Effective Response Rate ((H+I)/D)	61.1%

5.5 QUALITY OF THE DATA

As part of the objective to develop an effective survey methodology for freight firms, it was important to examine the data from the full-scale survey to better understand the value of the information that could be gathered with this methodology. The data set constructed from the responses was extensive. The survey consultant provided very detailed information on the delivery of the survey (i.e., number of call-backs, actual time spent with each firm, etc.). Each respondent who mentioned a problem was prompted for any additional details, resulting in detailed descriptions of problems and impacts.

5.5.1 Analysis of Non-Respondents

The purpose of a sample survey is to make inferences about a larger population. Random sampling ensures that those who are surveyed are representative of the population, but if responses are less than complete, the representativeness of the sample may be threatened. When non-respondents in a sample differ from respondents in terms of the substantive information sought by the survey, inferences made to the larger population will be biased.[3]

One concern for this surveying effort was whether the response rates across regions were different, reflecting a possible geographic bias in the responses that were collected. Table 5.3 shows that the percentage of responses by region was nearly identical to the regional sample size proportions. Thus no region was disproportionately represented in the survey response.

Table 5.3: Region-specific populations, sample sizes, and responses

Region	Sample Size	% of Total Sample	Responses	% of Total Responses
1	791	22.03%	411	21.96%
2	796	22.17%	420	22.44%
3	722	20.11%	384	20.51%
4	656	18.27%	335	17.90%
5	626	17.43%	322	17.20%
Total	3591	100.00%	1872	100.00%

A statistical test, the chi-square analysis, is another way to investigate response bias. Contingency tables (cross-tabulations) provide frequencies of two variables and the combinations of these two variables. The chi-square (χ^2) test evaluates the differences between the actual distribution of responses and the expected distribution if there were no interaction between the two variables. A statistically significant chi-square means that at a given level of probability the distribution in proportions for one variable are not independent of the other variable. Chi-square statistics with a significance level (p) of less than .01 will be considered statistically significant.[4]

A non-response bias analysis was performed, comparing respondents and non-respondents on the reported number of miles driven in Oregon. These figures were included in the ODOT truck registration database, from which the sample was drawn. Table 5.4 shows that there was no statistically significant difference between those firms that responded to the survey and those that did not.

[3] When a non-response bias is discovered, an adjustment process may be necessary. The procedure includes re-weighting any aggregate descriptive statistics to reflect the possibility of under-reporting/over-reporting of particular segments of the survey population. The need for the adjustment is dependent on the use of the data.

[4] Glenn E. Meyer. (1993). *SPSS: A Minimalist Approach*. Fort Worth, TX: Harcourt Brace Jovanovich College Publishers.

Table 5.4: Non-response analysis using ODOT reported miles

Responded to Survey		Miles Reported							
		Up to 5,000	5,001 - 10,000	10,001 - 50,000	50,001 - 100,000	100,001 - 500,000	500,001 - 1,000,000	Over 1,000,000	Total
Yes	Count	416	214	721	240	223	39	9	1872
	Exp. Count	435.6	219.3	727.0	227.9	214.4	37.3	10.4	1872.0
	% w/in Responded	22.2%	11.4%	38.5%	12.8%	12.4%	2.1%	0.5%	100.0%
	% w/in Miles	58.3%	59.6%	60.6%	64.3%	66.4%	63.9%	52.9%	61.1%
	Reported % of Total	13.6%	7.0%	23.5%	7.8%	7.6%	1.3%	0.3%	61.1%
No	Count	297	145	469	133	118	22	8	1192
	Exp. Count	277.4	139.7	463.0	145.1	136.6	23.7	6.6	1192.0
	% w/in Responded	24.9%	12.2%	39.3%	11.2%	9.9%	1.8%	0.7%	100.0%
	% w/in Miles	41.7%	40.4%	39.4%	35.7%	33.6%	36.1%	47.1%	38.9%
	Reported % of Total	9.7%	4.7%	15.3%	4.3%	3.9%	.7%	0.3%	38.9%
Total	Count	713	359	1190	373	351	61	17	3064
	Exp. Count	713.0	359.0	1190.0	373.0	351.0	61.0	17.0	3064.0
	% w/in Responded	23.3%	11.7%	38.8%	12.2%	11.5%	2.0%	.6%	100.0%
	% w/in Miles	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Reported % of Total	23.3%	11.7%	38.8%	12.2%	11.5%	2.0%	0.6%	100.0%
χ^2 = 9.196 with 6 df and a p value of .163									

A test for non-response bias was also conducted based on firm size. The ODOT database used for the sampling frame included the number of trucks registered by a carrier at the time the sampling frame was assembled. Although the accuracy of the data based on registration records is not known, it is still possible to use this information to test for a non-response bias, as any errors would not necessarily be correlated with whether a firm participated or not in the surveying effort. The results of this test are shown in Table 5.5.

The chi-square test indicates a statistically significant difference based on the number of trucks per firm. Firms not reporting their fleet size and those reporting one truck had a slightly lower probability of participating in the survey, while firms with two or more trucks were found to have a slightly greater likelihood of participating. Thus, if later analysis were to indicate particular differences in perceptions, which were attributable to single truck firms, it might be appropriate to make an adjustment to the findings to account for this bias.

Table 5.5: Non-response analysis using ODOT reported number of trucks

Responded to Survey		Trucks Registered						
		(no data)	One truck	2 – 5 trucks	6 –10 trucks	11- 25 trucks	26 + trucks	Total
Yes	Count	173	807	611	149	99	33	1872
	Exp. Count	185.7	849.9	584.7	132.0	88.0	31.8	1872.0
	% w/in Responded	9.2%	43.1%	32.6%	8.0%	5.3%	1.8%	100.0%
	% w/in Size	56.9%	58.0%	63.8%	69.0%	68.8%	63.5%	61.1%
	% of Total	5.6%	26.3%	19.9%	4.9%	3.2%	1.1%	61.1%
No	Count	131	584	346	67	45	19	1192
	Exp. Count	118.3	541.1	372.3	84.0	56.0	20.2	1192.0
	% w/in Responded	11.0%	49.0%	29.0%	5.6%	3.8%	1.6%	100.0%
	% w/in Size	43.1%	42.0%	36.2%	31.0%	31.3%	36.5%	38.9%
	% of Total	4.3%	19.1%	11.3%	2.2%	1.5%	.6%	38.9%
Total	Count	304	1391	957	216	144	52	3064
	Exp. Count	304.0	1391.0	957.0	216.0	144.0	52.0	3064.0
	% w/in Responded	9.9%	45.4%	31.2%	7.0%	4.7%	1.7%	100.0%
	% w/in Size	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	9.9%	45.4%	31.2%	7.0%	4.7%	1.7%	100.0%
χ^2 = 20.162 with 5 df and a p value of .001.								

5.5.2 Data Precision

When the sample size was calculated, it took into account the population of the region, a target response rate and a target level of precision, referred to as the sampling error. The objective was to have a large enough sample to give researchers a high level of confidence (95%) that if the survey were replicated, the proportion of respondents citing problems would vary by no more than ±5%.

With the survey completed, the actual sampling error could be calculated, to provide an indicator of the precision of the data collected.[5] Since the number of responses varied by region and the proportion of respondents mentioning problems also varied, the calculated sampling error differed from on region to another, as shown in Table 5.6.

Table 5.6: Region-specific sampling error

Region	1	2	3	4	5	Overall
Number of Respondents	411	420	384	335	322	1872
Percent Identifying Problems	69.6%	64.0%	59.9%	74.6%	68.3%	67.0%
Sampling error	±4.4%	±4.6%	±4.9%	±4.7%	±5.1%	±2.1%

[5] The confidence intervals were constructed using the following formula: Sampling Error $= \pm 1.96 \times \sqrt{\frac{P}{N}(1-P)}$

Thus, the research team judged that the precision of the survey data was about equal to or better than the target level in all regions and achieved an acceptable standard for a survey of this type. Note that the data aggregated to the state level attained a much better level of precision due to the large number of responses overall.

5.5.3 Problem Descriptions

The firm contracted to conduct the survey transmitted all the responses in their raw form. Coding was then performed by the research team. This was a large job, requiring each response to be categorized. The volume and diversity of the responses presented a challenge for the researchers to efficiently process the data and also preserve enough detail. The research team developed a preliminary coding strategy, assigning each response to one problem category.

A problem was classified as "Infrastructure" if the respondent described a specific type of physical feature of the highway system (e.g., pavement conditions, curves, poor bridges, etc.). If the respondent used the term "congestion" or described traffic flow problems, the problem was classified as "Congestion." If the respondent specifically mentioned a regulatory restriction (e.g., weight restrictions on bridges and/or roads or length restrictions), the problem was classified as "Restriction." If the description referred to a problem related to the behavior of other drivers, the problem was classified as "Other Drivers" (e.g., general public, tourists, farm vehicles, rude drivers, etc.). When a problem related to road construction was mentioned specifically (e.g., traffic delays due to construction and lack of warnings of construction zones), the problem was classified as "Construction." Remaining issues were classified as "Other." Examples of the problems in this category included concerns regarding speed limits; permitting; bike traffic; taxes, operations, etc.

Upon further examination of the data the research team learned that in some cases, a respondent included more than one problem description in his/her response. The problems mentioned in this type of response thus had to be disaggregated for proper coding. Further refinements in coding may be necessary in later analyses to capture the full value of the responses, especially for statements that involve multiple categories (e.g., "tourists causing traffic delays in construction zones").

The interviewers were very skilled at probing for complete information. This persistence resulted in information on exact locations and problem descriptions. In addition, the respondents provided useful descriptions of the impacts of the problems they identified. They described financial impacts, time delays, safety concerns, and experiences related to the described problem. Tables 5.7 through 5.12 provide examples of problem descriptions, locations and impacts from the survey database.

Table 5.7: Sample responses pertaining to Infrastructure-Related Problems

Problem Description	Location	Impact
Example 1		
No passing lanes; roads need work; potholes on the sides; they are coming apart.	Between Prineville, Redmond and Bend and Highway 126.	The impact is stress; everybody tries to get around me for safety reasons. People get impatient and cause me stress; also I take alternative routes, and this slows my delivery down; my business it has gotten worse in the last couple years.
Example 2		
A stretch of highway between Pendleton and Pilot Rock/Has a lot of bad potholes and causes equipment damage and driving hazards.	Highway 395 between Pendleton and Pilot Rock area, both north and south.	Causes tire wear and suspension damage/ Also safety hazard/ Slows us down, costs extra fuel and time on this stretch.
Example 3		
No turn lane into the Valley Veterinary and lots of accidents because of this problem.	Highway 30 between Rainer and Clatskanie	It slows us down due to accidents and we have to sit and wait for the accident to be cleared as there is no way around it.
Example 4		
Truck route in Lebanon. There are three 90 degree corners that are not proper.	Main and Milton, Main and Williams, Williams and Academy.	Well, you can't make the left hand turns or the right hand turns. You can't make those turns without taking up all lanes of traffic in both directions.

Table 5.8: Sample responses pertaining to Congestion

Problem Description	Location	Impact
Example 1		
The biggest thing is the heavy traffic on Highway 97.	The full length of Highway 97 is bad. So much tourist traffic.	It is more of a safety hazard than a monetary hazard. We're based in Klamath area so we use Highway 97. A lot of stress for drivers with all the vehicle varieties in summer.
Example 2		
On Highway 22 where it joins with Highway 18 when you are going from Highway 18 to Hwy 22 it's not too bad, but from Highway 22 onto Highway 18, there's too much congestion	Highway 22	When you are traveling with a full load, it's almost impossible to get across the traffic. It's three lanes then two lanes and 65 to 45 MPH and you can't cross the lanes and the drivers won't let you through. Near Fort Hill Restaurant and weigh scales the intersection to the scales, it's bad.
Example 3		
Congestion – there's definitely congestion from 7 AM to 6:30 at night.	All the way from the Airport to the Port of Portland, I-205, Sunnyside, Marine Drive, Swan Island, NW Yeon, Beaverton-Hillsdale Hwy, when you come off of I-205 to Highway 212 going towards Estacada on the Downtown sector you have carriers that have no place to park and they block up major streets.	High costs more fuel consumption takes longer to make deliveries
Example 4		
Congestion problems in the Corvallis Area.	Entering Corvallis on Highway 34 going West, the road bottlenecks down to two lanes and creates quite a traffic backup.	Think about it, I lose up to almost an extra hour during the morning hours of 7 A.M. to 9 A. M. If I am going thru that area and this is costing me money. I cannot get as many loads thru this area as I should because of this problem.

Table 5.9: Sample responses pertaining to Restrictions

Problem Description	Location	Impact
Example 1		
Height restrictions	Around Mitchell to Fossil	Restricted to 65ft length; I have long trailers. You have to go around a different way; it takes longer, cost of fuel, paying PUC, paying miles.
Example 2		
Restrictions on low bed trailers	Hwy 20 east of Sweet Home	Inconvenient, we have to take a longer route and there is more risk.
Example 3		
Northbound Hwy 47 intersection in Carlton, our standard trucks are OK through there, but with trailer are too long almost no way to get to my customers legally.	Northbound Hwy in Carlton	I would have to make two deliveries instead of one, doubles expenses. TO stay strictly legal, have to bring 53 feet of material to my location and reload instead of being able to "through route" it.
Example 4		
Weight restrictions are being lowered on certain bridges.	It's south of Eugene on I-5, I-84 and on Hwy 99W and in King City.	It lengthens the times to the jobs. It makes us use more county roads more time to the jobs.

Table 5.10: Sample responses pertaining to Other Drivers

Problem Description	Location	Impact
Example 1		
My husband hates the route over on the coast because of the tourists – they speed up and slow down and cut in front of you.	Over on the coast, in the Bandon area.	It just makes it harder to drive. It costs time. It keeps you more tense too.
Example 2		
Crazy car drivers that try to cut you off some drivers pull out in front of a truck with 50,000 lbs cannot stop that quick a lot of these people run red lights.	Diamond Lake Blvd and Stevens Intersection on Highway 138 and NE Stevens which is old 99 that goes through the middle of Roseburg.	If I ever had an accident, it would be a big impact, haven't had an accident in ten or 15 years or gotten a ticket for being overloaded.
Example 3		
Impatient drivers they take your safety space away from you.	Between Napa and Clacksanie Hwy 30	It can cost us a trip a day; $100 or $200 some days.
Example 4		
Idiot drivers.	On the west side, Beaverton, Highway 26 is about the worst.	Just wear and tear on the brakes. Stuff like that, People just aren't being cautious.

Table 5.11: Sample responses pertaining to Construction

Problem Description	Location	Impact
Example 1		
The holdup during construction on the bridge – the lack of communication by the DOT Department. I didn't get notice of the closure until the night before and when I called to ask about it, they didn't know which department was doing it. It's lack of communication amongst themselves. When I asked about a detour because of the bridge, I was told they didn't know and when I found somebody there who had any ideas, I found out it's 3 hour detour all the way up around Bend and that's ridiculous.	It was the one in Canyonville they have use no notification and no advance notice – the detour was advised 3 hours and that's almost impossible when trying to deliver milk. It's a time sensitive produce and needs to be delivered on time. I'm really complaining about no advance notice of this detour	Well, it cost us time, man hours, delays for drivers and extra hours having to work out extra pay or days off for people on salary and the customer who is waiting for the milk.
Example 2		
Construction that is congesting traffic	Exit 124 to 126 on Highway 1-5	I drive from Roseland to Sutherland 5 times a day adding an extra 30 to 46 minutes a day.
Example 3		
Construction on an overpass I-5 is underneath it that lanes under the overpass have been narrowed and I can hardly get my truck through there all my complaints have to do with construction	Where I-5 and Highway 217 cross	It probably increases having a wreck by about 2 to 3 times because the lanes are so narrow there I can barely get through there.
Example 4		
Construction	Highway 199 Grants Pass and Crescent City.	It takes him longer to load.

Table 5.12: Sample responses pertaining to Other Problems

Problem Description	Location	Impact
Example 1		
Landscaping. Can't see signals because of trees; can't see around curves.	Salem Parkway; also in Hillsboro.	Can't see signal lights.
Example 2		
Bicyclists on state and rural highway; no bike lanes. I encountered a gentleman and just about killed him. I came around a curve and there he was, they need to have bike lanes put in the highway.	South of Elsie on Hwy 34; no bike lanes, but there are bikes on the road from Philomath to Waldport.	It frightens me half to death.
Example 3		
De-icer problem they are using, whatever the new de-icer and we just bought a new truck and in a few it destroyed the fuel tank, our rims, chrome, polished stainless steel it was wiped out within two weeks, i know it helps the roads and it is a major mess on our truck that is a big problem in the winter, not with just us with a lot of truckers.	Northern part of Oregon near Portland from Portland to Seattle. I don't know if the whole state of Oregon uses de-icer.	Just our appearance of our truck it is just totally ruins the look when you pay that kind of money for a truck you want to stay nice for more than a few weeks.
Example 4		
Long waits at the Weigh Stations.	(no specific location indicated)	It slows us down. It creates a time frame problem.
Example 5		
55 mph speed limit. It is too slow on most roads in eastern Oregon. You don't get anywhere. We have 10 hrs on our log book to get where we are going and it is also dangerous, people trying to pass you all the time.	From Burns Jct. to McDermitt Nev. Oregon state line.	It slows us down and creates hazards for another thing.
Example 6		
Going through Sisters too many pedestrians	Sisters, Oregon, Highway 22	Slows everything up.
Example 7		
The car speed limit and the truck speed is different	I-5, I-84 East	Takes longer to go somewhere in Oregon

A potential concern surrounding the descriptions of the locations is the ability of ODOT staff to correctly identify the physical location of the problem, based on the respondents' remarks. This potential risk of measurement error may be greatest with respect to the location of congested areas. The perceptions of congestion can range from a large area problem to a single intersection. Further research and electronic mapping (geocoding) of the information will be needed to assess the usability of the reported locations of problems.

Due to the exploratory nature of the project, using open-ended questions was an important step, in order to characterize the range of issues of concern to respondents. Future surveys of this population could pre-code common responses in the survey instrument. Such pre-coding should be considered as a trade-off, however, as more detailed information gathered through the exact recording of the survey participants' opinions and descriptions would be lost.

5.6 DATA ANALYSIS

5.6.1 Frequencies

The initial analysis is a series of frequencies. Table 5.13 and Figure 5.2 show the frequencies of the types of problems described by the survey participants. The problem categories are: specific infrastructure problems (e.g., rough roads; ruts, etc.); congestion (both specific and general areas); restrictions (e.g., weight restrictions on bridges, etc.); other drivers; construction, and other problems (e.g., weather-related safety problems; tree limbs impacting visibility; etc.). Each description was classified into only one problem type, based on the exact words used by the respondent.

Table 5.13: Reported problem types

Problem Type	Frequency	Percent
Infrastructure	784	34.4%
Congestion	357	15.7%
Restrictions	179	7.9%
Other Drivers	110	4.8%
Construction	79	3.5%
Other Comments	768	33.7%
Total	2277*	100.0%

* Total frequency is greater than the total number of respondents, since more than one problem could be cited.

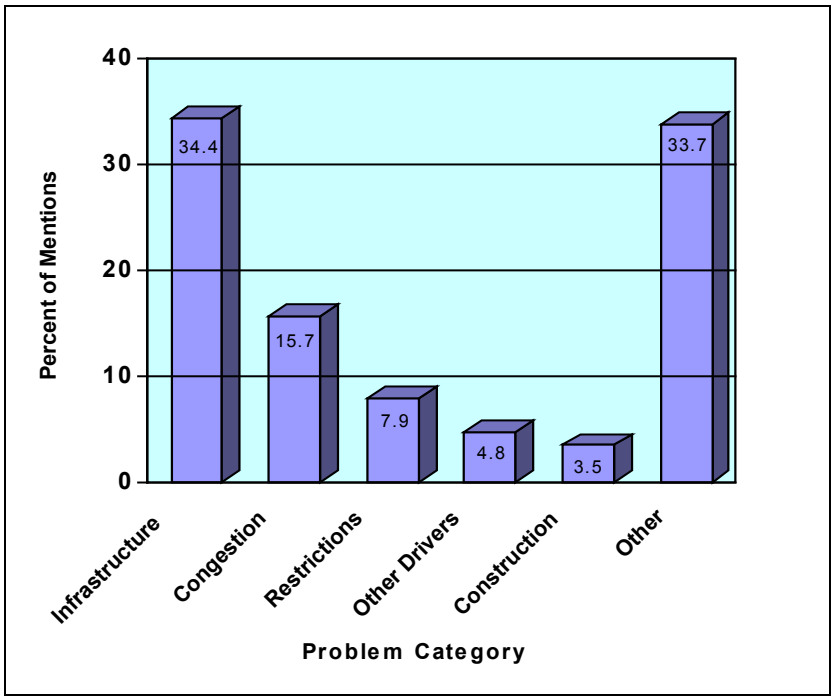

Figure 5.2: Reported Problem Types

Approximately 96% of the respondents reported a location associated with a problem they cited. The locations included a range of geographies from large areas (e.g., all the Portland Metro area) to specific intersections. Review of this data will be necessary to establish the appropriate method for geocoding the described locations. Additional analysis will be needed to ensure that all of the locational information is extracted from other fields in the database (i.e., some descriptions of problem impacts include additional information on the location).

Table 5.14 indicates that over half of the respondents reported that a particular problem was no worse at any particular time of day, or occurred all the time. The morning and evening peaks accounted for 29% of the reported time element. In some cases, more than one time dimension was indicated by the respondent.

Table 5.14: Time of day when problem occurs

Time Dimension	Frequency	Percentage
All the time/no worse at any certain time	1177	55%
Both AM & PM peak	220	10%
AM peak	155	7%
PM peak	258	12%
Other times of the day	313	16%
Total	2123*	100%

* Total frequency is greater than the total number of respondents, since more than one time of day could be cited.

Table 5.15 shows that more than half of the respondents reported that a particular problem was no worse at any particular time of the year, or occurred all the time. Summer time appears to account for about the same proportion of problems as wintertime.

Table 5.15: Time of year when problem occurs

Time Dimension	Frequency	Percentage
All the time/no worse at any certain time	1157	57%
Winter	244	12%
Summer	281	14%
Various conditions	330	17%
Total	2013*	100%

* Total frequency is greater than the total number of respondents, since more than one time of year could be cited.

When the survey participants were asked if they had any alternatives to avoid or address the reported problem, 36% reported their coping strategy, and 64% claimed they had no alternative.

Respondents were also asked what impact a reported problem had on them and their business. Table 5.16 reports the types of impacts mentioned. In many cases, several types of impacts were given for a single problem, for a total of 2,488 responses. Cost was the most frequent response (30%), followed by time issues and delays (25%). Eleven percent of the responses mentioned equipment damage. Concerns about safety accounted for 14% of the mentioned impacts, while six percent of the impacts were described as causing stress on the driver of the vehicle. Impacts included in the "Other" category include damage to customer's goods, insurance issues, and labor concerns.

Table 5.16: Impact of problem

Impact	Frequency	Percentage
Economic Factors		
Cost	739	30%
Time/Delay	624	25%
Equipment damage	282	11%
Safety Factors		
Safety	358	14%
Driver Stress	154	6%
Other Concerns	331	13%
Total	2488*	99%**

* Total frequency is greater than the total number of respondents, since more than one impact could be cited.
**Percentages do not sum to 100% due to rounding.

Table 5.17 lists the vehicle configurations reported. Almost half of the vehicles were tractors (cab-portion only) pulling one or more trailers.

Table 5.17: Vehicle configuration used when problem occurs

Configuration	Frequency	Percentage
Single unit trucks	431	27%
Truck & trailer	412	26%
Tractor with 1 trailer	577	36%
Tractor with 2 trailers	101	7%
Tractor with 3 trailers	13	1%
Other	55	4%
Total	1589	100%

Table 5.18 reports the length of trip when the described problem occurred. Almost half of the trips were under fifty miles, with 87% under 100 miles from the survey respondent's shop location.

Table 5.18: Length of trip when problem occurs

Distance from firm location	Frequency	Percentage
Under 50 miles	631	46%
50 – 100 miles	422	31%
Over 100 miles	223	16%
All locations/everywhere	86	6%
Other	15	1%
Total	1377	100%

Table 5.19 indicates that the great majority of the survey respondents (77%) were in operations with five or fewer trucks.

Table 5.19: Reported fleet size

Number of trucks in fleet	Frequency	Percentage
One truck	697	38.2%
2-5 trucks	703	38.6%
6 – 10 trucks	222	12.2%
11 - 25 trucks	136	7.5%
Greater than 25 trucks	65	3.6%
Total	1823	100.0%

Finally, as reported by the interviewers, 76% of the survey respondents were males, and 24% were females.

5.7 POTENTIAL USES FOR THE DATA

The pilot studies and the full-scale surveying effort achieved the major goals of the research project: first, to establish an effective survey methodology to gather information from the freight community; and second, demonstrating it in a full-scale survey on problems facing the freight community. The analysis of the response rates and differences across the various types of firms (i.e., size, fleet type, region) addressed these two goals. The ultimate purpose of such a survey, of course, is to provide information on the location and nature of problems perceived by various types of freight haulers. This section discusses some of the analyses of the survey data that ODOT could undertake in its further examination of the survey results and their use in future freight planning efforts.

5.7.1 Cross-tabulation Analysis

The data used in this project can be analyzed using cross-tabulations and chi-square analysis. Cross-tabulation analysis may be used to investigate differences across a number of variables, including across regions and reported firm sizes. In Table 5.20 the size of the firms responding to the survey are cross-tabulated by region. The chi-square analysis shows that there is no statistically significant difference (at the .01 significance level) across regions with respect to the

firm size of those responding to the survey. There is a slight tendency for larger firms to be represented more strongly in Region 1, which is primarily urban.

Table 5.20: Participating firm size by region

Firm Size		Region					
		1	2	3	4	5	Total
(no data)	Count	32	38	37	27	39	173
	Expected Count	38.0	38.8	35.5	31.0	29.8	173.0
	% within Size	18.5%	22.0%	21.4%	15.6%	22.5%	100.0%
	% within Region	7.8%	9.0%	9.6%	8.1%	12.1%	9.2%
	% of Total	1.7%	2.0%	2.0%	1.4%	2.1%	9.2%
One truck	Count	164	187	169	155	132	807
	Expected Count	177.2	181.1	165.5	144.4	138.8	807.0
	% within Size	20.3%	23.2%	20.9%	19.2%	16.4%	100.0%
	% within Region	39.9%	44.5%	44.0%	46.3%	41.0%	43.1%
	% of Total	8.8%	10.0%	9.0%	8.3%	7.1%	43.1%
2- 5 trucks	Count	145	129	124	110	103	611
	Expected Count	134.1	137.1	125.3	109.3	105.1	611.0
	% within Size	23.7%	21.1%	20.3%	18.0%	16.9%	100.0%
	% within Region	35.3%	30.7%	32.3%	32.8%	32.0%	32.6%
	% of Total	7.7%	6.9%	6.6%	5.9%	5.5%	32.6%
6 – 10 trucks	Count	29	33	30	29	28	149
	Expected Count	32.7	33.4	30.6	26.7	25.6	149.0
	% within Size	19.5%	22.1%	20.1%	19.5%	18.8%	100.0%
	% within Region	7.1%	7.9%	7.8%	8.7%	8.7%	8.0%
	% of Total	1.5%	1.8%	1.6%	1.5%	1.5%	8.0%
11- 25 trucks	Count	26	29	15	11	18	99
	Expected Count	21.7	22.2	20.3	17.7	17.0	99.0
	% within Size	26.3%	29.3%	15.2%	11.1%	18.2%	100.0%
	% within Region	6.3%	6.9%	3.9%	3.3%	5.6%	5.3%
	% of Total	1.4%	1.5%	.8%	.6%	1.0%	5.3%
Greater than 25 trucks	Count	15	4	9	3	2	33
	Expected Count	7.2	7.4	6.8	5.9	5.7	33.0
	% within Size	45.5%	12.1%	27.3%	9.1%	6.1%	100.0%
	% within Region	3.6%	1.0%	2.3%	.9%	.6%	1.8%
	% of Total	.8%	.2%	.5%	.2%	.1%	1.8%
Total	Count	411	420	384	335	322	1872
	Expected Count	411.0	420.0	384.0	335.0	322.0	1872.0
	% within Size	22.0%	22.4%	20.5%	17.9%	17.2%	100.0%
	% within Region	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	22.0%	22.4%	20.5%	17.9%	17.2%	100.0%
χ^2 = 30.345 with 20 df and a p value of .064.							

Table 5.21 contains cross tabulations of those who participated in the survey by region and whether the respondent reported problems or reported "no problem." The research team noted that on the statewide level, the portion of those reporting problems and those reporting "no problem" was the same in both the full-scale survey and Type 7 pilot test, which served as the model for the full-scale effort.

The differences across regions were found to be statistically significant. A greater percentage of respondents in Region 4 reported problems (74.6% compared to the 67.0% of the total), while fewer respondents in Regions 2 and 3 reported problems.

Why these results vary by region is not clear. One possible explanation is that freight firms simply encounter fewer problems in one region than in another. It may also be that those who are reporting no problem may have been able to cope with a particular locational problem by having alternate routes or strategies to avoid the current set of problem-producing conditions on the infrastructure system. Under such an interpretation of the findings, one might speculate that those firms operating in Region 4 may have fewer choices for avoiding problems than those in Regions 2 or 3.

Table 5.21: Problem/no problem reported by region

Problem(s)/"No Problem"		Region					
		1	**2**	**3**	**4**	**5**	**Total**
Reported Problem(s)	Count	286	269	230	250	220	1255
	Expected Count	275.5	281.6	257.4	224.6	215.9	1255.0
	% within Reported	22.8%	21.4%	18.3%	19.9%	17.5%	100.0%
	% within Region	69.6%	64.0%	59.9%	74.6%	68.3%	67.0%
	% of Total	15.3%	14.4%	12.3%	13.4%	11.8%	67.0%
Reported "No Problem"	Count	125	151	154	85	102	617
	Expected Count	135.5	138.4	126.6	110.4	106.1	617
	% within Reported	20.3%	24.5%	25.0%	13.8%	16.5%	100.0%
	% within Region	30.4%	36.0%	40.1%	25.4%	31.7%	33.0%
	% of Total	6.7%	8.1%	8.2%	4.5%	5.4%	33.0%
Total	Count	411	420	384	335	322	1872
	Expected Count	411.0	420.0	384.0	335.0	322.0	1872
	% within Reported	22.0%	22.4%	20.5%	17.9%	17.2%	100.0%
	% within Region	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	22.0%	22.4%	20.5%	17.9%	17.2%	100.0%
χ^2 = 20.745 with 4 df and a p value of .000.							

Table 5.22 compares firm size by whether the survey respondent reported problems or "no problem." The chi-square is statistically significant, with single-truck firms less likely to mention problems. One possible interpretation of this finding is that single-truck firms may be able to limit their exposure to problem areas by not engaging in activities that risk their financial viability. In other words, it may be that many single-truck firms that did experience problems are no longer in business. More research would be needed to confirm or reject this notion.

Table 5.22: Firm size by reported problem/no problem

Firm Size		Problem(s)/"No Problem"		
		Problem(s) Reported	**No Problem Reported**	**Total**
(no data)	Count	106	67	173
	Expected Count	116.0	57.0	173.0
	% within Size	61.3%	38.7%	100.0%
	% within Reported	8.4%	10.9%	9.2%
	% of Total	5.7%	3.6%	9.2%
One truck	Count	505	302	807
	Expected Count	541.0	266.0	807.0
	% within Size	62.5%	37.4%	100.0%
	% within Reported	40.2%	48.9%	43.1%
	% of Total	27.0%	16.1%	43.1%
2- 5 trucks	Count	425	186	611
	Expected Count	409.6	201.4	611.0
	% within Size	69.6%	30.4%	100.0%
	% within Reported	33.9%	30.1%	32.6%
	% of Total	22.7%	9.9%	32.66%
6 – 10 trucks	Count	114	35	149
	Expected Count	99.9	49.1	149.0
	% within Size	76.5%	23.5%	100.0%
	% within Reported	9.1%	5.7%	8.0%
	% of Total	6.1%	1.9%	8.0%
11- 25 trucks	Count	78	21	99
	Expected Count	66.4	32.6	99.0
	% within Size	78.8%	21.2%	100.0%
	% within Reported	6.2%	3.4%	5.3%
	% of Total	4.2%	1.1%	5.3%
Greater than 25 trucks	Count	27	6	33
	Expected Count	22.1	10.9	33.0
	% within Size	81.8%	18.2%	100.0%
	% within Reported	2.2%	1.0%	1.8%
	% of Total	1.4%	.3%	1.8%
Total	Count	1255	617	1872
	Expected Count	1255.0	617.0	1872.0
	% within Size	67.0%	33.0%	100.0%
	% within Reported	100.0%	100.0%	100.0%
	% of Total	67.0%	33.0%	100.0%
χ^2 = 27.124 with 5df and a p value of .000.				

Table 5.23 and Figure 5.3 examine differences across the types of problems described by region. The chi-square is statistically significant. Respondents in Region 1 had the highest concerns with respect to Congestion and Construction, while respondents in Region 2 had a higher percentage of problems related to Other Drivers, followed by Construction problems. Region 3 respondents had the highest concern with respect to Restrictions. Those in Region 4 had the highest percentage of reported Infrastructure problems, while Region 5 respondents reported the highest percentage of Other concerns.

Table 5.23: Problem reported by region

Problem Description		Region					
		1	2	3	4	5	Total
Infrastructure	Count	126	180	140	188	150	784
	Expected Count	175.3	175.3	135.3	158.0	140.1	784.0
	% within Problem	13.6%	23.0%	17.9%	24.0%	19.1%	100.0%
	% within Region	24.8%	35.4%	35.6%	41.0%	36.9%	34.4%
	% of Total	5.5%	7.9%	6.1%	8.3%	6.6%	34.4%
Congestion	Count	156	87	45	53	16	357
	Expected Count	79.8	79.8	61.6	72.0	63.8	357.0
	% within Problem	43.7%	24.4%	12.6%	14.8%	4.5%	100.0%
	% within Region	30.6%	17.1%	11.5%	11.5%	3.9%	15.7%
	% of Total	6.9%	3.8%	2.0%	2.3%	.7%	15.7%
Restrictions	Count	27	41	44	25	42	179
	Expected Count	40.0	40.0	30.9	36.1	32.0	179.0
	% within Problem	15.1%	22.9%	24.6%	14.0%	23.5%	100.0%
	% within Region	5.3%	8.1%	11.2%	5.4%	10.3%	7.9%
	% of Total	1.2%	1.8%	1.9%	1.1%	1.8%	7.9%
Other Drivers	Count	25	29	16	25	15	110
	Expected Count	24.6	24.6	19.0	22.2	19.7	110.0
	% within Problem	22.7%	26.4%	14.5%	22.7%	13.6%	100.0%
	% within Region	4.9%	5.7%	4.1%	5.4%	3.7%	4.8%
	% of Total	1.1%	1.3%	.7%	1.1%	.7%	4.8%
Construction	Count	22	21	15	12	9	79
	Expected Count	17.7	17.7	13.6	15.9	14.1	79.0
	% within Problem	27.8%	26.6%	19.0%	15.2%	11.4%	100.0%
	% within Region	4.3%	4.1%	3.8%	2.6%	2.2%	3.5%
	% of Total	1.0%	.9%	.7%	.5%	.4%	3.5%
Other Concerns	Count	153	151	133	156	175	768
	Expected Count	171.7	171.7	132.6	154.8	137.3	768.0
	% within Problem	19.9%	19.7%	17.3%	20.3%	22.8%	100.0%
	% within Region	30.1%	29.7%	33.8%	34.0%	43.0%	33.7%
	% of Total	6.7%	6.6%	5.8%	6.9%	7.7%	33.7%
Total	Count	509	509	393	459	407	2277
	Expected Count	509.0	509.0	393.0	459.0	407.0	2277.0
	% within Problem	22.4%	22.4%	17.3%	20.2%	17.9%	100.0%
	% within Region	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	% of Total	22.4%	22.4%	17.3%	20.2%	17.9%	100.0%
χ^2 = 177.853 with 20 df and a p value of .000.							

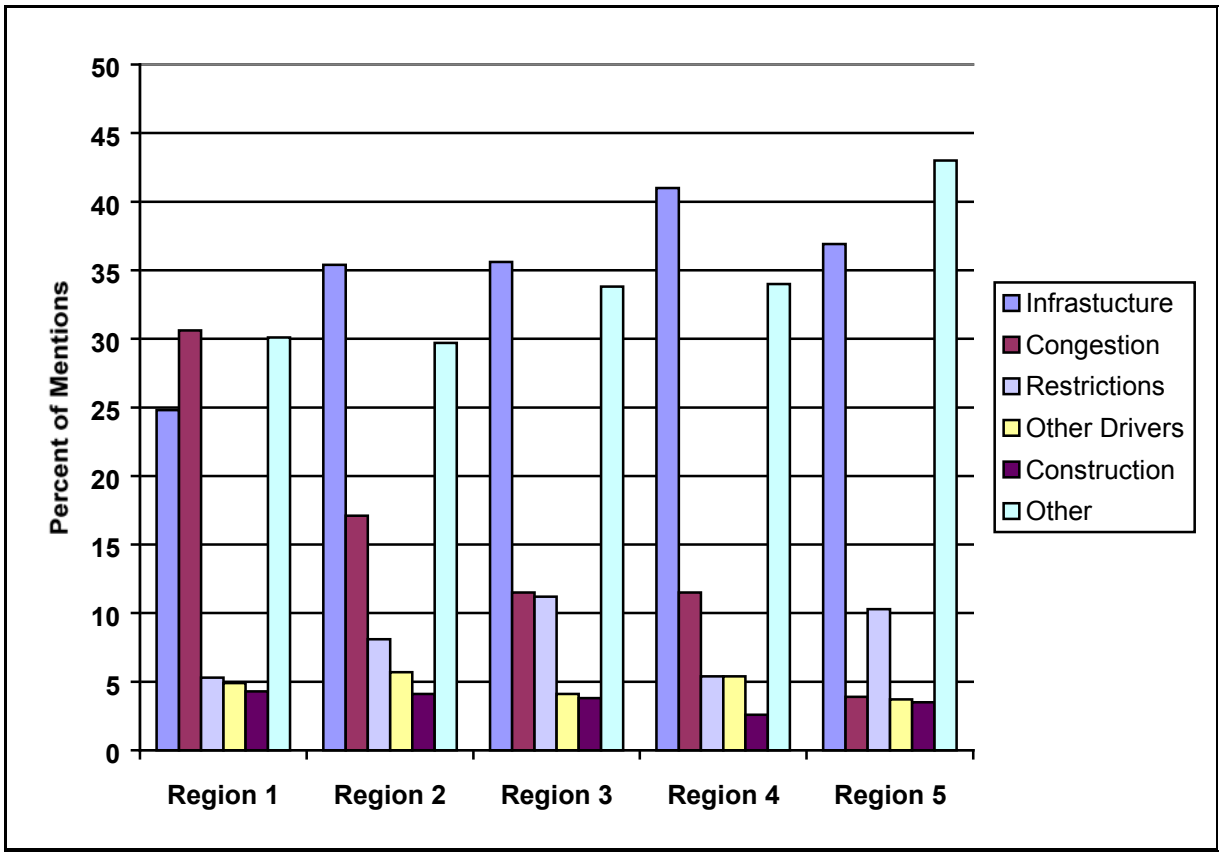

Figure 5.3: Problems reported by region

Tables 5.20 through 5.23 are only a small sample of the kinds of cross-tabulations possible to perform with this dataset. Additional research efforts may uncover new relationships by examining the data in more depth.

5.7.2 Mapping of Problems

The level of detail and specificity of the problem descriptions may make this data feasible for a geocoding process. Each problem location would require a geographically matched element. For example, intersections would be mapped as point features, while a length of highway would be mapped as a link. Where the description of the problem included an area (e.g., congestion in the Portland metro area), this would be mapped as a polygon. The development of mapped problem locations may allow additional analysis that requires combining this new data set with existing maps. For example, the data could be compared with ODOT's current inventory of roads with poor pavement or weight-restricted bridges. The maps may also be helpful in determining whether the described problems are located on state routes or local routes.

The entire set of survey responses has yet to be linked with the geocoded representations in order to facilitate additional analysis. The use of attribute tables and unique identifiers may allow

ODOT or others to enhance the survey data with information obtained by "fusing" the various types of geographic features. Maps created from these processes can highlight areas where freight community members confirmed already existing knowledge regarding the condition of the infrastructure system, as well as indicating new areas of concern. These maps/attribute tables could also function as a tool to chart future planning and programming efforts to address the described problems. Future surveys could elicit freight community responses regarding possible alternatives for addressing targeted problem areas.

5.7.2.1 Mapping for Planning Functions

A primary user of this data set, in both its current form and when it is geocoded, will be the Transportation Planning Section at ODOT. Existing data sets similar to those included in *Freight Moves the Oregon Economy* could be compared to the list of problem descriptions to confirm and enhance the inventory of infrastructure problem areas and could form the basis for discussions on priorities for future improvements. In addition, recent legislation is now requiring Oregon's Freight Advisory Committee to identify high priority freight mobility projects by region[6].

The Motor Carrier Transportation Division could potentially use the data to better understand the perceptions of the freight community on issues such as difficulties in permit processes or other administrative concerns. Thus the survey findings may help focus ODOT attention on potential opportunities for improved communication with motor carriers or better customer service.

The survey information could also be of value to maintenance crews and county transportation planners to alert them to previously unreported problems. The data may be useful to staff at various metropolitan planning organizations (MPOs) around the state to identify areas where congestion is obstructing freight movements.

5.7.2.2 Mapping for Safety Research

The data set could also provide information for transportation safety professionals. Existing data sets used by safety researchers illustrate clusters of crashes and are used to investigate safety issues and solutions. The problem descriptions available in the statewide survey include details on the experiences of the drivers and the impacts identified explicitly as safety issues. Previously geocoded data of crashes could be matched with geocoded problem location information to add clarity to what transpires at these locations.

5.7.3 Other Uses for the Survey Data

5.7.3.1 Large firm concerns compared to general survey population

Although the information gathered in the large firm survey differs in statistical rigor from the general population, it would still be useful to make comparisons of the types of

[6] See http://www.leg.state.or.us/01orlaws/0240.pdf

problems and the locations identified by both groups. This could be accomplished more readily after both data sets are geocoded.

5.7.3.2 Comparison of types of problems identified in other studies

In the review of previous surveying efforts, findings from other deployments were gathered. These findings could be compared with the Oregon findings to identify similar patterns and freight industry concerns.

5.7.3.3 In-transit Visibility

A variety of other data sources being generated for other purposes (e.g., truck counts or Port of Entry counts) could be matched and assembled into "herds" in travel models that simulate truck movements through points or areas identified by freight shippers and carriers as problems. This matching would allow for the calculation of an overall exposure level for each problem location. As problems are addressed, the travel model "herds" benefiting from these changes could be quantified. If transponder data were also available to quantify delays due to infrastructure problems, such bottlenecks could be monitored over time. Truck origin and destination data could also be mapped to the geocoded infrastructure problem data set to better understand the types of commodity movements being impacted by problems identified in this survey.

5.7.3.4 Mapping and Matching to Future Improvements/Feedback Mechanism

Wherever possible, the mapping of future improvements that were identified or described in the surveying effort should be made available to the freight community as feedback from their contribution to state and local planning efforts. Such information may be appropriate as a website link, a newsletter item, or an announcement to freight trade associations.

5.7.3.5 Exploration of Non-infrastructure Problems

Although a focus of this study was to develop a survey methodology to capture primarily infrastructure problems, a large number of other issues was captured. These additional items can be further broken down into problems related to restrictions, other drivers, construction, safety, weather, administrative issues, etc. Also reported in the "Other" category are positive comments from respondents, regarding the good work and programs they appreciate, such as the Green Light Program. Further analysis of this data could help in transportation planning efforts.

5.7.3.6 Multivariate Analysis

Another area of further research is the development of more complex econometric models for data analysis. Cross-tabulation analysis is only a first step towards better understanding of the relationship between and across the variables collected in the surveying effort. Multivariate analyses could help clarify the relative contributions of several factors to the perceptions of freight system users. One area needing more research is the responses on impacts. For example, variables such as firm type, firm size

and type of truck could be evaluated for their relative contributions to the perceived impacts of congestion problems on the freight community.

5.7.4 Summary

Although the primary purpose of this research was to establish a successful methodology for gathering information on problems experienced by the freight community, the data collected also may provide a rich source of information for future planning efforts and further research. The data may provide sufficient detail for geocoding and may also be useful to a variety of transportation-related efforts, including comparisons with previously identified problem areas, safety issues, and potential monitoring of the effect of future improvements. The outcome of the geocoding process will affect how well linkages with other data sets can be developed for further comparative research.

6.0 SUMMARY AND CONCLUSIONS

The goal of this research effort was to develop a usable survey methodology for gathering information from freight community members on their perceptions of infrastructure problems. The project used a four-pronged approach to attain this goal: 1) investigating previous freight survey efforts and survey instruments; 2) consulting with freight community members for their input on what would best serve as a survey method; 3) systematically testing a series of survey methodologies; and 4) demonstrating a promising survey instrument and deployment methodology.

Previous freight surveying efforts, although able to gather some of the desired data, have had no pattern of response rate success, based either on a particular survey instrument or methodology. The only apparent trend is the better response rate obtained from telephone surveys over written instruments. Although personal interviews conducted with purposeful samples do capture the perceptions of the selected participants, there is no way of testing for the degree of generalizability of their opinions.

With no clear evidence on how to ask the right questions of the right person in the right way, the next step was to contact freight community members to ask them directly about their preferences for being surveyed. The consultant learned that their preference was for a mailed survey questionnaire, as it was thought that a telephone survey would be too time-consuming. The series of pilot tests, however, found that a mail survey approach was not viable, as too few freight community members were willing to take the time to participate. The telephone survey methodology, when used with a short questionnaire, yielded much higher response rates. A conclusion that may be drawn from this experience is that the real concern of the freight industry is that a survey be brief and not intrude too much upon them, not that a phone contact is objectionable. The clear advantage of the telephone survey is that in most cases, once contact is made with a potential respondent, obtaining a usable response is much more likely than it is with a mail survey.

A consultant was also used to conduct a thorough review of existing survey instruments and to develop a set of critical elements to include in a questionnaire on infrastructure problems. Using this framework, the research team designed an experiment to test a quasi-open-ended survey instrument, using various mail and telephone deployment methodologies and a set of scientifically drawn samples from three different sampling frames. The first sampling frame provided industry-specific stratification, which proved to be useful but contained too many undeliverable addresses. A total of nine pilot studies were conducted and analyzed.

The pilot studies revealed that ODOT's truck registration database was the most successful sampling frame. The research team decided to conduct a separate survey of the 22 largest firms to ensure adequate representation. In addition, there was evidence from the pilot surveys of greater participation from firms located in more urban counties, compared to those in more rural counties. To address this concern the research team stratified the sample by region and drew a

large enough sample to allow regional analysis in the full-scale surveying effort.

Following some small modifications of the survey instrument, the full-scale deployment proved to be as successful as the telephone pilot survey method, with a 61% response rate. As indicated by Dillman, a dedicated effort to understand a particular survey population can provide good response rates (*Dillman 1978*). Further, a series of non-response bias tests indicated no major concerns. Single-truck firms were slightly less likely to participate, however, and this should be considered in the interpretation of subsequent analyses.

The level of detail available in the survey results appeared to be much better than in previous efforts to gather information from a large, representative sample of the freight community. Clearly, the quasi-open-ended format allowed the survey participants to describe problems and their impacts on their operation in their own words. The open-ended format also appeared to be an effective method for capturing the exact location of problems. For ease of coding, other items, such as firm characteristics, can be recorded using a closed-ended format.

To increase awareness and participation, publicity on the upcoming surveying effort prepares potential survey respondents. Such publicity includes news media releases, pre-deployment letters, and trade association newsletters and endorsements. In addition, special efforts to keep local freight groups and organizations abreast of progress towards the deployment of the survey itself may increase cooperation. Communicating an appreciation for the freight community's contributions to the surveying efforts may also increase the likelihood of future cooperation.

The full-scale survey produced a substantial set of problem descriptions that can be used by a number of users at the state and local levels. The data provides the location, nature of the problem, and impact on the reporting firm that can be geocoded for further analyses. With proper care, the geocoded data could provide information for planning functions, safety research, additional comparative research, and identification of potential improvements, either through operational, infrastructure, or policy changes. Fusing the geocoded data with other types of data may increase its value and potential for other analyses.

6.1 CONCLUSIONS

Given the performance of the telephone survey methodology developed in this study, it appears to be a viable candidate for other states or MPOs to use with their own freight communities. The success of this surveying effort also makes it a candidate for the larger national agenda of deploying a commercial-sector customer satisfaction survey.

This methodology is not without its liabilities, however. Given the volatility of the freight industry in some areas, especially among single-truck operators, it is important to have an up-to-date list of freight firms to use as a sampling frame. Otherwise the survey response may suffer.

Personnel trained in conducting survey research should be used in the survey deployment. They can incorporate the necessary orientation for interviewers to address the kind of subject matter covered in the survey. They can also provide valuable assistance in testing the instrument and refining the survey questions as needed. One lesson from this survey is that the initial training of

the interviewers should include the importance of probing on each element of the open-ended format to maximize the value of the information obtained from the surveying effort. Each problem description needs to be input separately. Review of the survey results showed that sometimes more than one problem was recorded as a single response.

The volume and diversity of problem descriptions generated from a survey with open-ended questions presents a challenge for efficient processing. Further work will be needed to develop an effective means of classifying and displaying the data gathered in Oregon. It is anticipated that much will be learned about processing open-ended responses and about the usability of the survey data.

There is a trade-off with respect to the time and resources needed to process this data and the processing ease of check box survey instruments. On the one hand, the use of open-ended questions provides an excellent method for "listening" to freight community concerns much more effectively than using check boxes. On the other hand, coding each open-ended survey response requires a number of classification steps, all of which are to some degree subjective, and which requires a significant investment of additional time to produce usable data. A pre-coded survey instrument would eliminate the need for such coding, but the responses might also lack the level of detail desired for a picture of freight industry concerns.

A recommendation to consider for future research is to use open-ended questions in a pilot survey first, in order to learn about the most common types of responses. Then the full-scale effort would use an instrument with preset response categories (based on the pilot survey results) that would allow the interviewer to immediately classify many responses. When respondents give a new type of response or when specific details about a response need to be captured, the interviewer would be able to enter the necessary text.

For most planners and other professionals in the field of freight transportation, the exciting part of this research effort is yet to come – that is, to learn in more detail what the responses of nearly 1,900 freight firms can tell us about how the transportation system in Oregon is working from their point of view. The goal is to better understand freight industry concerns as Oregon looks toward strengthening its freight transportation system in the future.

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APPENDICES

APPENDIX A: SURVEY METHODOLOGY DEVELOPMENT INTERVIEWS

REPORT
Survey Methodology Development for the Freight Shipper and Carrier Survey
Contract # 17530

Prepared by Lois Martin Bronfman
Bronfman & Associates
January 3, 2000

The objective of the Survey Methodology Development for the Freight Shipper and Carrier Survey, (Contract # 17530) was to determine what survey methods/techniques are preferred by shippers/carriers for gathering information about infrastructure problems en route in Oregon. The insights gained from the interviews conducted during this project are to contribute to the development of methodology for surveying freight shippers and carriers that is being developed by the Transportation Research Group at Portland State University under contract with ODOT (SPR 328). The following is a summary report of the results of these interviews. This information is to be integrated with the review of the literature in the development of the survey strategy as well as questions.

Methods

To select the firms to interview the consultant assumed ODOT was interested in shippers and carriers that:

- Were located or operated in different geographical regions
- Compose or service the industrial areas identified by ODOT in the 1999 Freight Moves the Oregon Economy Report: high tech, wood products, food products, fisheries, and mineral industries, or
- Represent several specialized segments; e.g., UPS and inter-modal carriers.

As an introduction to some of the issues in sample selection, the consultant began by interviewing several of the associations represented on the Motor Vehicle Advisory Committee (See list below). Each was asked to recommend some names of firms to contact. In addition, Mike Burton at the Oregon Economic and Community Development Department was contacted. He e-mailed the regional offices and asked for names of shippers in their region. The consultant received several responses with names of firms from these district offices. Using the names suggested, the consultant began the process of contacting a number of firms.

The telephone directory was used to obtain numbers for most companies although in a few cases the person making the referral provided. On average, the consultant made two calls to get to the right person. In the worst case, the consultant had to contact the national office and was referred to four different people, before finding the appropriate person to contact in Oregon. While the initial proposal indicated that three interviews

would be made with each firm, initial contacts with some firms indicated that three interviews were not necessary. After consultation with ODOT, the consultant chose to use the additional time to expand the sample in order to ensure that the important segments of the industry were contacted.

Associations contacted:

Oregon Trucking Association, John Sallak
Oregon Forest Products Transportation Association, Sarah Jespersen
Oregon Draymen and Warehousing Association, Bill Steward
Oregon Concrete Products Association, Rich Angstrom

Shippers and Carriers contacted:

Nike
Willamette Industries
Bear Creek
Oregon Steel
United Groceries
Weimer Logging
UPS
USF Reddaway Truck
Mike Conrotto Trucking
Morse Brothers
Eastern Oregon Freight
Duckwall-Pooley
Milgard
Depoe Bay Fish
Eagle Systems
Siletz Logging
Intel

(See attached table for summary of characteristics of the shippers and carriers.)

Brokers interviewed:

Independent Dispatch
HOB

Interview protocol

After an introduction in which the consultant was identified, the interviewee was told that ODOT was beginning a project to survey the freight industry, and that the purpose of the survey is to "gather information that will identify the infrastructure problems of greatest concern on the highway freight system, specifically

- locations where the problems exist,
- why these locations are problems,
- how these problems affect the business."

The consultant then informed the interviewee that her job was to gather information about how best to survey the industry about these issues. They were then asked to

- describe their firm's operations in Oregon,
- discuss the value of a survey,
- identify who should be interviewed in the industry,
- identify who in the firm would be best to respond to the survey,
- discuss how best to survey these individuals,
- identify other segments/firms in the industry that ODOT should include in the survey.

The interview strategy for the associations expanded the above interview to ask for names of firms to contact in this phase of the project and to discuss whether the association would support the survey and if it could provide the project team with membership lists.

Discussion

The sample

The sample selected for exploring methodological issues is fairly representative of firms who use the highway freight system. In this group we have firms that travel on the highway system in all parts of the state. There are big and small firms, national, regional and intrastate, and there is at least one from each segment identified by ODOT as important. In addition, we have a variety of shippers and carriers, several LTL carriers, and one inter-modal operator, plus two brokers. The consultant did not contact any railroads, ports, or warehouse facilities.

The selection of firms reflected in part the way in which the consultant perceived the problems that the survey is going to address. The consultant understands that there is some discussion within the TAC about whether to define the focus of the survey so narrowly. However, necessity required that the task be made manageable. To accomplish this, the perspective was limited to what the consultant heard was of primary importance to members of the TAC. At the same time, the consultant was committed to expanding the scope if the preliminary interviews indicated that it was necessary. As it turned out, several interviewees indicated that there are some important freight transportation issues (i.e., land use) that do not fall within the responsibility of ODOT. At the same time, they also felt the focus of the survey was appropriate. Only one respondent, a broker, pressed for inclusion of other segments of the industry (e.g., railroads).

Characteristics of the firm and relative experience or knowledge of the transportation system.

Each shipper and carrier was asked to describe how the firm is organized for transportation. The responses provide a number of useful insights that can facilitate the development of the final sample selection and survey. In this small group of firms there is a variety of organizational structures and perspectives on the highway system. Within the shipper category there are those that

- use in-house transportation services
- contract with a third party for transportation services either directly or through a broker

- or use in-house services and contract services.

Of those that contract for services, there are shippers that ***do not pay attention to the highway infrastructure (i.e., they put that responsibility off onto the contractor) and a few shippers that implement "continuous flow management" and have intimate knowledge of all impediments on the transportation system.*** In the former instance, the inattention results in minimal or no knowledge of the relationship of infrastructure issues to business decisions. For firms with this perspective the problems on the system may not be sufficiently problematic as to warrant any special attention.

Of the carriers, we find a variety in terms of size, extent of use of Oregon highways, relationships with the shippers, and cargo carried, but few clues as to whether these differences will affect their perceptions of problems with the highway system. Such ambiguity makes it difficult to structure basic questions that will allow for firms to be classified. To illustrate, one small firm works exclusively with a single shipper to carry logs. The shipper handles all dispatching and the shipper pays some drivers. While independent, the firm is for all practical purposes an in-house transportation service. Will it be important to know this? Then there are some carriers that have only containers and contract with those who have rigs, while there are others who have only rigs. Should we include and identify both groups in a sample? Then too there are firms that definitely identify themselves as inter-modal carriers, and others that do not, even though they carry product to the ports or railroads. Finally, there are those specialty carriers like UPS that experts identify as important because they move large quantities of high value freight around the state and out to the nation. Do we need to know how important they are? And finally, will these differences result in different perspectives? I'm not sure. Nothing in the interviews suggested major differences.

The factor that appears to be more important than above characteristics in terms of differentiating one perspective from another is the extent that a firm uses or does not use the state freight highway system and why. Among those interviewed, some firms operated trucks all over the Oregon highway system while others moved in a fairly local area (as little as a fifty mile radius). In addition, the proportion of time spent on the state highway network varied substantially. Logging trucks and sand and gravel trucks spend a great deal of their time driving off the freight networks as do LTL carriers. Also, interviewees noted that the extent of off-network usage would vary depending on conditions or restrictions in the use of the state highway system. These differences suggest that off road usage is more important than the distinction between LTL and full load carrier for structuring different perspectives about the freight network.

Value of the survey

The research question as stated (see above) was understood easily and seemed to focus the respondents on issues related to the highway system. All of the interviewees indicated support of the idea of ODOT seeking input from shippers and carriers. Some were positive and went so far as to suggest that ODOT would be well advised to "ride along" with drivers on occasion. They also indicated that they would support the survey effort. At the same time, they were

skeptical that anything would come of the results of the survey, and asked that if ODOT sought their participation, the agency be candid as to how the results will be used, and keep the respondents informed as to the progress of the survey.

Who should be interviewed within the firm?

The response to this question resulted into the following groups: operations people (e.g., transportation managers, supervisors, dispatchers), and drivers. Each of the groups understood that there were some issues that only the other group would have the best information. For example, all of the transportation managers/supervisors for carriers indicated that they would consult with drivers to identify specific problems on the highway network. On the other hand, the two drivers interviewed indicated that their perspective was limited as to the implication of these problems for business. As one noted: "congestion can be a positive or negative situation for me as it may mean I will get additional overtime, or it may mean that I don't get in an extra run. For me it's a question of self interest."

Discussion of how best to interview shippers and carriers.

The consensus of interviewees is that a written survey is best, and that the interview be given with sufficient time to respond. One suggested the Motor Vehicle Advisory Group could probably identify the key problems and make the appropriate choices. One other favored a telephone interview but most did not. Whatever the strategy, the basic problem that emerged for the larger companies with terminals or distribution points located throughout the state was how to obtain input from individuals at these geographically dispersed points. After two interviews, a plan emerged that was repeated or approved by most of the other interviewees. This plan involves ODOT involving the firm in the implementation of the survey.

As suggested by interviewees, ODOT contacts the firm and elicits its cooperation. In a letter ODOT discusses the purpose of the survey and the value of the survey to ODOT and to the firm. The firm is provided with copies of survey and takes responsibility for distribution within the company through inter-office mail. As suggested, the survey would be collected by the firm and returned to ODOT. This strategy leaves much to be desired in terms of implementing "a scientifically designed survey." However, given the response rates that surveys of this sort normally receive there may be value in the proposed strategy. One benefit may go to the firm itself in as much as several operations people indicated that they would like to see just what drivers are identifying as problems. Certainly, this approach requires more discussion.

To develop a survey, interviewees called for simplicity and brevity. A majority of the firms indicated that they would like to have a map to use to identify spots and routes on the system.

Which segments of the industry should be included in the survey?

The complexity of the industry appears to be as confounding for the interviewees as it is for the

project team. No clear classifications emerged from the discussions. Some carriers argued for LTL and TL, by region, private and for hire. Another indicated that LTL is not a critical breakdown. Nearly all of the carriers felt it was reasonable for ODOT to survey their part of the industry. One exception was a moving van company that was contacted that argued that ODOT does not classify it as a freight carrier (this firm was not included in the above sample). The other exception was a logging truck that traveled on only 50 miles of the highway system.

Of the shippers, those that contracted with carriers and paid little attention to infrastructure transportation issues did not think that they would contribute much to a survey. However, the one shipper that implemented "continuous flow management" felt that its information was very important. One broker argued passionately for inclusion of railroads in the survey while another broker did not believe their inclusion was critical. The general impression presented by the interviewees is that all would be pleased to know that ODOT was making an effort to survey as many different perspectives within the industry as possible.

A note on interviews with the associations

Like the firms, the associations indicated that a survey would have value and could contribute to the planning process at ODOT. Again, some of the interviews were skeptic about the results of a survey actually having an impact on ODOT decisions. When asked if the organization would support the survey, the interviewee noted that the board would have to be consulted but that they thought the response would be positive. All but one of the organizations indicated that they could make their membership lists available but it would require approval of the board after a review of the survey instrument.

Final Note on Contacting Firms

As was anticipated, the consultant had to make several calls often in order to find the right office and right person to contact. Sometimes she had to work back from the national headquarters to an Oregon office; sometimes she started with a terminal number and made contact through that office with the firm's Oregon headquarters and the appropriate transportation manager or CEO. Sometimes, other interviewees provided telephone numbers. On occasion, the consultant used ODOT's list of registered firms and found a number to call. More often the telephone directory worked best. The point of this discussion is to underscore the problem the project will have in finding the appropriate address to send a survey. It may be worth contacting the associations and having them assist in development of the appropriate addresses. One of the project advisors suggests sending an initial letter to non Oregon based firms asking them to give the address of Oregon regional office and to name the appropriate person to contact.

Summary observations for development of a survey methodology and questionnaire

The interviews conducted to explore issues of methodology suggest that

- the many firms within the freight industry believe that ODOT is taking a positive step in its effort to obtain information from firms about problems with the highway infrastructure, and that they would be willing to cooperate with ODOT in order to ensure that the survey is a success.

- ODOT must make a special effort to be open about how the survey is being implemented and how the results will be used.

- The survey should focus on obtaining information from those firms that have direct knowledge of the problems on the infrastructure system; i.e., most carriers (common and contract) and those shippers with in-house transportation services or that contract but track the flow of all shipments.

- Within the firms, the individuals who are viewed as having the relevant information for the survey are those that work most closely with the system; i.e., dispatchers and drivers.

- The design of the survey needs to address the needs of small firms with one central facility and larger firms with terminals or dispatch facilities throughout the state.

- The survey should come in the form of a written survey that can be distributed internally if necessary to different terminals or sights,

- The survey should provide a mechanism for gathering basic information on problems with the infrastructure from one group (i.e., dispatchers and drivers) while providing an opportunity for transportation managers and owner/CEO's to comment on business implications.

- The survey be written with clarity and brevity

- The sample should be selected to satisfy the requirements of representation rather than scientific analysis.

COMMENTS BY INTERVIEWEES

"Good idea to get information from a person that uses the highway in a way that they [the highways] weren't built for…that is for trucks." (LTL carrier)

"Survey is a good idea but best way to do so is to provide a good honest answer about what it is going to be used for…and what benefits the firm (or industry) will receive. Might be helpful if ODOT indicates what the problem is, what it is looking at and why ODOT is asking for input. Explain in best term as possible what results are going to do." (Oregon based sand/gravel shipper)

"I suggest that you send through my office or central office and have surveys passed on. We could get addresses for the distributions points too. Best to survey in the winter ...December through March." (Oregon based sand/gravel shipper with in house transportation services.)

"…need to access information from driver group. ___ and I are not on the road that much." (Terminal fleet manager, package delivery service)

"[Survey is] good idea. Carriers have better perspective than shippers. Shipper transportation planners shift the solving of transportation problems to carriers." (Package delivery service)

"I need to know what is going to be done with the information…surveys are nice but if there is no resulting action there is no value to the survey…. (Large LTL carrier)

I don't think it would be difficult to interview. If a survey form were put together with a brief paragraph with definitions. I find people don't like to spend time reading…I'd distribute to terminals through interoffice mail. I'd have a conference call with managers and tell them what ODOT is looking for. I'd look to managers to do the follow-up work…I wouldn't hand pick responses. I bet I can get 60-65% response rate." (Large LTL carrier)

"Go through three dispatch regions...I think that important. Contact dispatcher and have him give to drivers. (Package delivery service)

"Best way to get information? Touch base with firms to get names of persons to go through in the company. Give a mail survey, send to transportation managers and have them seek input from drivers."

"Larger firms may have them [transportation managers]…If you contact me, I'm going to survey our people. We need to talk to the people involved. Drivers and terminal people." (Oregon based LTL carrier)

"Go through an individual in each company who will spearhead the survey for you. I'd do it if I had approval of President [indicating company] will allocate time for this individual to do this. A lot depends on how fast you want the response. A good turn around time would be thirty days…If I were President, I would do it, part of our responsibility as citizens." (Oregon based LTL carrier)

"We use supply chain management…aware of problems in whole system…information is the name of the game." (Large industrial manufacturer and shipper)

"Don't pay much attention to infrastructure issues. That's the business of the carriers to pay attention to that…that's their livelihood." (Southern Oregon shipper of food products)

Summary Table of Characteristics of Firms Interviewed

Name of Firm	Classification	Transportation Services	Location	Type of Freight Generated	Persons Interviewed
Nike	Shipper (Import and export, national and international) Half shipments are inter-modal direct to customer, half sent to distribution centers	Contracts with variety of carriers; customer sometimes chooses type of carrier.	Portland metro headquarters with	Sporting goods	Director of Domestic Transportation (Interviewee did not believe it was necessary to contact the Director of International Transportation)
Willamette Industries	Shipper	Majority of shipping is contracted with small for hire carriers; also has in-house transportation capabilities(57 tractors)	Portland headquarters with locations throughout Willamette Valley	Wood products and paper	Director of Transportation
Bear Creek	Shipper	Contracts for all transportation services	Medford based	Food products	Vice President of Transportation and Logistics; and Traffic Manager for East of Rocky Mountains
Oregon Steel	Shipper	Contracts for all transportation services; implements continuous flow management	One main facility with two locations in Portland region.	Steel products	Transportation manager
United Groceries	Shipper	In house transportation services (149 drivers, most are in Portland, however few in Grants Pass and Redman.	Headquarters in Portland	Food products	Transportation Supervisor; additional contact with Transportation Manager
Weimer Logging	Moderate sized Oregon contract carrier	Exclusive contract with Willamette Industries; thirty-two log trucks.	Locations in Sweethome and Dallas	Logs	Chief Executive officer, Truck supervisor, and driver. Additional ride along.
UPS	Large national parcel service and LTL carrier	Large fleet with over 1400 motorized vehicles. Most are little trucks for local pickup and delivery. 110 are feeder trucks that service three dispatch terminals	District office in Portland. Terminals in Hermiston, Roseburg and Portland.	Large quantities of smaller packages of high and low value	District Manager; Feeder manager, Supervisor of Fleet, Secretary
USF Reddaway	National LTL common carrier	Large fleet of tractor/trailers	Western branch corporate office in Clackamas, Oregon.	Variety of goods	Vice president of operations

			Fifteen branches throughout state		
Mike Conrotto Trucking	Small regional LTL common carrier	Firm own trailers but no tractors. Contracts with own/operators for tractors.	Main office in Gilroy and Oregon office in Wilsonville.	Variety of goods	CEO and Transportation Manager
Morse Brothers	Regional based shipper tied to construction industry	In-house transportation services. Operates for hire on occasion.	Corporate office in Lebanon with 20 regional offices.	Sand, gravel, rock	Chief executive officer, dispatcher, driver/secretary
Eastern Oregon Freight	Moderate sized Oregon LTL common carrier	Fleet of tractor/trailers	Corporate office in Portland with 16 terminals throughout the state	Pick up and deliver variety of freight	Vice President
Duckwall-Pooley	Oregon based shipper (Just-in-time)	Contracts for services through broker	Corporate Office in Hood River	Fruit to brokers	Operations manager and owner
Milgard	Regional shipper (Just-in-time)	In house transportation services: three tractor, five road trailers, 28 vans	Corporate office in Tacoma; Oregon office in Wilsonville. Market is I-5 corridor, Central Oregon	Manufacture windows and sliding glass doors	Distribution Manager
Depoe Bay Fish	Small coastal based shipper	In-house transportation services	Offices in Newport. Travels to variety spots in state.	Fish	Owner/driver
Intel	Large shipper	**Return call waiting…..**			
Eagle Systems	Cartage (container) carrier, inter-modal	Supplies tractors. Picks up and delivers containers from railroad. Contracts with drivers	Headquarters and hobs are located in Portland. One office in Eugene. 70% of work is in Portland area	Anything that is shipped on railroads	Terminal Manager
Siletz Logging	Small contract carrier	Works exclusively with one firm; tractors and log rigs	Headquarters in Independence; works in 50 mile region around and on Highway 18 and 22	logs	Owner

APPENDIX B: SURVEY INSTRUMENT DEVELOPMENT

Survey Instrument Design for the Freight Shipper & Carrier Survey

Technical Memorandum

Background for Analysis of Freight Movement in Oregon

Oregon has given serious consideration to freight movement within its borders as demonstrated in a series of recent efforts. These include:

- Development of the Oregon Intermodal Management System
- Development of a Statewide Freight Forecasting Model (and data collection to support the model development)
- Establishment of the Oregon Freight Advisory Committee
- Preparation of the Research Report *Freight Moves the Oregon Economy*
- Development of a Portland Area Freight Forecasting Model (and data collection to support the model development)
- ODOT Interviews with 62 Shippers and Carriers for the I-5 Trade Corridor Study
- Port of Portland Interviews with 13 Shippers and Carriers about Freight Mobility

These efforts have made significant progress in developing an inventory of freight movement facilities and companies. They have also identified a primary trucking network and assessed the current and potential future level of service on that network. The proposed Statewide Freight Shipper and Carrier Survey will provide a valuable addition by getting first-hand information on where the state's shippers and carriers perceive the most serious impediments to freight movement to be.

Recent interviews with freight shippers, receivers and carriers in the Portland area have produced valuable information for transportation planning. These interviews have significantly increased the understanding of the region's transportation planning agencies about how freight is moved in the region. The interviews have provided valuable information about the logistical process by which goods are shipped from origin to destination, how those logistical decisions are made, how congestion affects business costs and logistical decisions and where the existing transportation system could be improved to improve freight mobility.

Lessons Learned for Previous Freight Research in Oregon

The recent interviews have also revealed much about interviewing private businesses involved in shipping, receiving and carrying goods. These lessons about surveying in the freight industry can be valuable to this current statewide effort by ODOT. The following are some of the most important lessons learned:

- **Freight movement logistics are complex.** – There are many ways in which freight can be moved from origin to destination. The shipment size may change as shipments are broken down for distribution. The timing of shipments can also be changed to fit better within an overall logistics plan for a company. As a result, a survey instrument designed for freight analysis must have some flexibility to record all the necessary information about these

complexities and be able to reflect unique practices in the freight movement logistics. There are very few "fixed" practices. It helps to have different forms for manufacturers, distributors and carriers, but companies also do not always fit exclusively into one of these categories.

- **Methods of shipping freight are changing rapidly.** – Since freight moving industries were deregulated and computerization allowed tighter inventory control, there have been dramatic changes in how freight is shipped. There is more less-than-truckload shipping and more use of parcel delivery services, there is more backhaul shipping and more inventory is maintained in trucks on the highway rather than in manufacturing plants, warehouses or stores just to name a few. If the statewide survey is to gather information about how freight is being shipped, the survey questionnaire must allow sufficient flexibility to pick up on the changes that are occurring.

- **It is not easy to get participation from private businesses.** – While most businesses in Oregon would want to provide ODOT with information that will improve freight mobility, profitable operation is almost always their top priority. As a result, it is often difficult to get adequate participation. Mail-out/mail-back surveys have notoriously low response rates but getting cooperation in an in-person interview also takes considerable work. In recent efforts, many companies had to be called back repeatedly before agreeing to participate. While this is primarily an issue of survey method rather than content, it also has implications for how a survey questionnaire is designed. The questionnaire or survey guide should request information that the person or persons being surveyed from the company can answer fairly readily. It should also be obvious from the questions asked how the survey will be useful to improving freight mobility. Many companies considered how they handle their freight movement proprietary information and only want to discuss it if it is obvious that it will help improve freight mobility for them.

- **Limit the number of issues covered in the survey**. - Because of the complexity of freight movement logistics a survey should focus on a limited number of issues so that sufficient depth of understanding on those issues can be achieved. Some of the most valuable information from the Portland-area interviews came form the individual stories told by the respondents about how they perceive and deal with transportation problems.

- **Survey the right person.** – If a survey questionnaire seeks to gain too much or to many kinds of information, it is likely that more than one person within a company will have to help in answering the questions. Such a situation may result in a logistical nightmare arranging an in-person or telephone interview or increase the chance that a mail-out/mail-back survey will not be completed and returned. A transportation manager will generally know the most about decisions about how goods are shipped and received or how a carrier will get the goods from the origin to the destination. However, the transportation manager may not know how congestion impacts company costs or profitability. Such information may have to come from someone more directly involved in the financial accounting of the firm. The transportation manager may know much about how and when and by what route shipments are made but may not be as able to describe the location and nature of congestion, weather problems or other barriers to travel as a driver. Being able to survey the right person

will depend on maintaining a fairly narrow focus in the survey.

- **Explore the reasons why transportation bottlenecks are a problem and how they affect the business.** - The Portland-area interviews found that within the metropolitan area shippers and carriers "scheduled around" many problems in the network. When congestion consistently restricted travel speeds or travel time reliability on a particular portion of roadway, shippers and carriers did all they could to avoid shipping across that segment during the times when it was congested. The recent surveys demonstrated that all roadway segments with peak-hour congestion from commuting did not necessarily cause problems for freight movement even if the routes carried a significant freight volume on a daily basis. It was only when the freight movements and congestion overlapped both spatially and temporally that a problem existed for the shippers and carriers. In the upcoming statewide survey, it will be important to ask not only about where the respondent perceives problems to exist on the highway network, but also the degree to which the company's freight shipments are affected by the problem locations. It will be important to know during what hours of the day shipments are hindered, and how that affects company's logistical decisions.

- **Nonrecurring congestion is a significant problem.** – Congestion caused by accidents, incidents or weather – was frequently mentioned as a major problem for shippers and carriers. The companies could not schedule around this unpredictable and irregular component of congestion. The statewide survey should include questions about nonrecurring congestion and explore ways of reducing its impact on freight movement.

- **Access to the major highways was as important as level of service on the major highways.** – Although level of service on the major highways in Portland was a significant concern to the companies interviewed in the Portland region, problems on the local access roads to the freeways and to the major freight terminals were also sources of significant concern. Many of the improvements that were suggested in the interviews related to signal timing, railroad grade crossings or improvements in turning radii. The statewide survey should solicit input about perceived problems on and off of the state's major highway network.

Review of Other Freight Surveys

Prior to beginning the process of drafting a questionnaire for the Oregon Statewide Freight Shipper and Carrier Survey, the research team reviewed thirty-five other freight surveys that had been implemented. A summary of the surveys is presented in Table 1. A majority of the surveys were designed to gather truck trip information that could be used to develop a freight model or be used in other ways to reflect freight movements in urban transportation planning. Seventeen of the surveys also sought the respondent's opinions on where there were problems or impediments to freight movement.

Options and Tradeoffs

The previous efforts reviewed revealed that there are a number of options for surveying firms

about freight movements on the highway system. Each option generally has advantages but there are also tradeoffs in cost, quality of response, depth of response or response rate that must be considered. An approach that achieves the highest response rate may cost more or may result in less data being collected on each firm. There may also be tradeoffs involved in who is targeted as the respondent(s) within a company.

Lois Bronfman of the research team has already conducted some exploratory interviews with freight shippers and carriers in the state to gain some insight on these issues. She found that among shippers, there were significant differences in how much the company's representative knew about transportation logistics and what problems might impede freight movement. The difference was most pronounced between companies that provided their own transportation and those that contracted for transportation services. Although those that contracted for services tended to be less knowledgeable about the logistics and impediments, some that practiced "continuous flow management" did tend to know more about the issues than those who used other management methods.

Another factor that was significantly correlated with a company being able to provide the desired information was how much the company used the state highway system. Some firms use the state system for almost all of their transportation while others provide short-haul service with much of the mileage off the state system. This made description of problems and impediments more complex.

The research interviews did indicate that different people within a company may have different views about transportation problems and impediments. Drivers may know the nature of the problems and impediments better than a transportation manager or other company representative, but may also not have the same perception of what constitutes a problem or impediment if the driver is being paid by the hour.

The research interviews also sought to determine what the respondent thought were the most significant issues from their perspective. A number of the respondents identified safety as a significant concern among freight shippers and carriers. Many of the respondents felt that ODOT should ask how safety concerns affect route choice or shipping times.

Based on the review of prior work and the exploratory research interviews of Lois Bronfman, the following list of options should be considered by the Technical Advisory Committee and resolved before a final methodology and survey content are chosen.

1. **One Company Questionnaire** versus **Separate Company Questionnaires for Shippers and Carriers** (and possibly other divisions).
2. **Survey Transportation Managers Only** versus **Survey Managers and Drivers.**
3. **Direct Driver Contact** versus **Distribution to Dirvers by Managers.**
4. Focus on **Truck Movements Only** versus focus on **All Modes of Freight** (Rail, Ship, and Air also).
5. Question about **Problems Only** versus question about **Problems, Practices, and Company Characteristics**.
6. Ask about problems on the **State and Interstate Routes Only** versus **All Routes.**

7. Explore problems through **Open-Ended Questions** versus **Structured List of Possible Problems.**
8. Ask the respondent to **Rank Problems** versus **List Problems Only**.
9. Ask about **Improvements Desired** versus ask about **Problems Only**.
10. Ask about problem and practices for **Inbound and Outbound** freight movements or **Outbound Only**.
11. Use a **Written/Self-Completing Questionnaire** versus **Interviewing** (by phone or in person).
12. Use **Cold Mailing** of written questionnaire versus **Pre-Arranged Participation.**

Some of these options can be tried and evaluated in the pre-testing phase of this project.

Suggested Content for the Oregon Statewide Freight Shipper and Carrier Survey

The stated purpose of the Statewide Freight Shipper and Carrier Survey is to "gauge customer satisfaction with Oregon's freight transportation system." The survey is to do this by collecting information on specific locations along the Oregon highway network, including intermodal facilities, where shippers and carriers perceive particular problems. Although the primary purpose of the survey is to get information on perceived problems and customer satisfaction, collecting some information about the company interviewed and the company's truck-use patterns will help to understand how serious the problems are that are identified and how they might be impacting freight movement. After briefly describing the potential areas of survey questionnaire content below, two sets of draft survey questions are provided: one designed to get the information for a company and one designed to get the information for one driver.

Introductory Material - Companies involved in freight movement are often anxious to cooperate if they feel that the information they provide will result in significant improvements.

Is the respondent adequately familiar with the company's truck operations and how they are affected? - The person completing the interview must be adequately familiar with where and when the company's freight movements are impeded by problems on the highway network. They must also be familiar with how the impediment affects the company's logistics and operating costs.

What problems does the company experience in truck shipments – what kind, where and when? - This is the core content of the survey. We might need to probe for answers in a couple of ways to bring out a comprehensive response.

What is the company able to do to compensate for the problems? - This is a follow-up question to determine how much the company can do to avoid problem areas, particularly those like traffic congestion that are limited to certain times of the day or days of the week.

How much impact does the problem create for the company? - The companies should be asked to give their own assessment of the impact of impediments on their business.

What improvement in the transportation system would the respondent like to see? - Asking for suggestions for improvements will gather potentially useful information on how ODOT can prioritize its transportation investments but will also increase the feeling by the respondent that completing the survey will benefit their company.

What kind of company is being surveyed? - It will be important to know what type company is being interviewed when the results are extrapolated to the industry as a whole. It will also be important to sample from the full range of shippers and carriers.

What is the company's level of use of trucks? - The results from a particular company should be weighted by how much trucking they do on Oregon's highways.

What are the company's truck-shipment patterns – direction, routes and time? - Prior research in the Portland area suggested that shippers and carriers often have considerable flexibility to avoid congestion problems. Understanding the freight movement needs and patterns of a company will help ODOT understand why the problem cannot be avoided.

How time-sensitive are the company's truck shipments? - Understanding the time-sensitivity of shipments by companies will also help to understand the impact of impediments on their costs.

Draft Company Survey Questionnaire Questions

A draft set of questions has been prepared for consideration by the Technical Advisory Committee. The draft content is designed to cover all of the key areas of information needs and draws on the best examples of question phrasing from other efforts. The following sections present the draft recommendations for content sorted by the content areas defined above.

Introductory Material

The Oregon Department of Transportation is conducting research that will lead to improved freight transportation in Oregon. As part of this effort we are collecting information and informed opinions from businesses that use the transportation and distribution facilities in the state. You can help us and help yourself by answering a few questions about where you think there are impediments to freight transportation on the highways of Oregon. We would also be interested in hearing what you think can be done to fix those impediments. To help us understand and interpret your response, we would also like to know a little bit about your company, your freight movement needs and your use of trucks in freight movement.

Is the respondent adequately familiar with the company's truck operations and how they are affected?

Are you the person responsible for managing or arranging truck shipments to and from your company?

- ❑ Yes
- ❑ No If no, is there another person in the company who is responsible for this function and who might be a more appropriate person to complete the questionnaire?
  - ❑ Yes
  - ❑ No

Are you familiar with the impediments to freight movements by truck that your company faces?

- ❑ Yes
- ❑ No If no, please try to try to discuss the survey with others who might be familiar with the shipping impediments.

What problems does the company experience in truck shipments – what kind, where and when?

Where are the major bottlenecks, congestion points, safety problems and other impediments on the region's transportation system that cause delay, accidents, or missed connections? Please list and identify when these problems occur - which seasons, which days of the week, which hours of the day.

_____
_____
_____
_____
_____
_____
_____

Do you have any access problems in or out of specific manufacturing plants, industrial parks or intermodal transfer yards? If yes, please describe. Please list and identify when these problems occur - which seasons, which days of the week, which hours of the day.

_____
_____
_____
_____
_____
_____
_____

Do any of the following conditions present problems for freight shipments to or from your company and/or facility?

Condition	Rate from 1 to 5 1 - not a problem 5 - very serious problem	Please describe the location and nature of the problem.
1. Highway congestion	1 2 3 4 5	
2. Merge lanes	1 2 3 4 5	
3. At-grade railroad crossings	1 2 3 4 5	
4. Highway interferences with rail lines (i.e., grade crossings)	1 2 3 4 5	
5. Turning at traffic lights	1 2 3 4 5	
6. Inadequate local streets capacity	1 2 3 4 5	
7. Roadway turning radius	1 2 3 4 5	
8. Insufficient lane width for wide loads	1 2 3 4 5	
9.Insufficient bridge/tunnel clearances (height)	1 2 3 4 5	
10.Lack access from railyards to Interstate highway system	1 2 3 4 5	
11.Lack of trailer drop-off/pickup facilities for trucks	1 2 3 4 5	
12.Curfew restrictions on movement of large and heavy	1 2 3 4 5	

trucks		
13.Delays caused by lift bridges	1 2 3 4 5	
14.Poor truck access to shipping terminals	1 2 3 4 5	
15.Poor truck access to intermodal facilities	1 2 3 4 5	
16.Poor truck access to airports for air cargo purposes	1 2 3 4 5	
17.Poor reliability due to accidents and incidents	1 2 3 4 5	
18. Unsafe roadway geometrics	1 2 3 4 5	
20. Poor reliability due to weather conditions	1 2 3 4 5	
21. Poor freeway ramp design	1 2 3 4 5	
22. Narrow roads	1 2 3 4 5	
23. Lack of roadway connectivity	1 2 3 4 5	
24. Poor Signage	1 2 3 4 5	
Other (specify)	1 2 3 4 5	

Is there anything you would like to add about problems and opportunities regarding freight movement in the region? Do you have other ideas or solutions that we should consider or investigate further?

_____
_____
_____
_____
_____
_____
_____

What is the company able to do to compensate for the problems?

What does your company do to compensate for the impediments or problems identified above?

_____
_____
_____
_____
_____
_____
_____

To what degree are you able to compensate for the problems?

_____
_____

_____
_____
_____
_____
_____

How much impact does the problem create for the company?

What effect do the transportation impediments you identified have on the the safety, profitability or logistical efficiency of your company?

_____
_____
_____
_____
_____
_____
_____

What improvement in the transportation system would the respondent like to see?

Do you think that the region needs additional or improved: (check where applicable)

1. Highway ramps? _____
2. Highway/route connectors? _____
3. Highway/route lane capacity? _____
4. Rest Areas? _____
5. Truck parking areas? _____
6. Industrial zones for facility/terminal locations? _____
7. Intermodal rail facilities? _____
8. Other infrastructure? (specify) _____
9. Information services? _____

For the types of infrastructure needs you indicated above, please list the locations(s) where you think these are needed.

Type	Location
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

What kind of firm is being surveyed?

How would you characterize your company? (Please check as many as apply.)

- ❑ **Agricultural or farming activities**
- ❑ **Forestry or lumbering activities**
- ❑ **Construction work – Buildings, homes, roads, structures, etc.**
- ❑ **Manufacturing, refining, processing activities**
- ❑ **Retail trade**
- ❑ **Wholesale trade**
- ❑ **Business and personal services**
- ❑ **Utilities – telephone, gas, electric, cable television, etc.**
- ❑ **Mining or quarry activities – Used to assist in the extraction of natural resources**
- ❑ **Transportation (Please specify type below)**

- **Common Carrier – Offer transportation service to the general public over regular and irregular routes**
- **Contract Carrier – Offer transportation service to certain shippers under specific contract**

What kinds of transportation services does your company provide? Please indicate the percentage of truckloads in each category.

- **Truckload**
- **Less-Than-Truckload**
- **Distribution and warehousing**
- **Parcel**
- **Air Freight Specialist**
- **Freight Forward**
- Drayage

What is the primary product or service provided by your company?

_____
_____
_____
_____
_____

What is the company's level of use of trucks?

Does the company operate a private fleet?

- No
- Yes

If yes, how many of each of the following do you operate?

Type	Number	Type	Number
Light Duty Truck (4 tire)		Power units	
2 axle, 6 tire Truck		Trailers	
3 axle straight truck (single unit)		Specialized (specify)	
4+ axle straight truck (single unit)		Specialized (specify)	

How many shipments arrive by truck on an average weekday? _____

What are the company's truck-shipment patterns – direction, routes and time?

What percentage of your inbound truck shipments arrive in each of these periods?

6 AM – 9 AM	%	3 PM – 6 PM	%	10 PM – 6 AM	%
9 AM – 3 PM	%	6 PM – 10 PM	%		

How many shipments leave your facilities by truck on an average weekday?

_____

What percentage of your outbound truck shipments depart in each of these periods?

6 AM – 9 AM	%	3 PM – 6 PM	%	10 PM – 6 AM	%
9 AM – 3 PM	%	6 PM – 10 PM	%		

During what month of the year is your shipping by truck greatest?

_____

What is the ratio of truck shipments during the peak month to an average month?

_____

List the routes most often used in the region for transportation of your freight. These routes can include primary roads, highways, and interstates.

_____
_____
_____
_____
_____
_____
_____

What percentage of your company's outbound truck trips are to destinations

- Less than 50 miles away _____
- 50 to 250 miles away _____
- More than 250 miles away _____

What percentage of your company's inbound truck trips are from origins

- Less than 50 miles away _____
- 50 to 250 miles away _____
- More than 250 miles away _____

Does you company ship goods by modes other than truck?

- ❑ No
- ❑ Yes If yes, what percent of your company's total shipments by weight (inbound and outbound) use the following modes:

	Percent of Shipments by Weight
❑ Rail	_____
❑ Air	_____
❑ Ship	_____
❑ Barge	_____
❑ Other (specify)	_____

How time-sensitive are the company's truck shipments?

What percent of your commodity shipments are time-sensitive – must be delivered within one-hour scheduled time?

Inbound shipments _____% Outbound shipments? _____%

Draft Driver Survey Questionnaire Questions

A draft set of questions specifically for drivers has been prepared for consideration by the Technical Advisory Committee. The draft content is designed to cover all of the key areas of information needs and draws on the best examples of question phrasing from other efforts. The following sections present the draft recommendations for content sort by the content areas defined above.

Introductory Material

The Oregon Department of Transportation is conducting research that will lead to improved freight transportation in Oregon. As part of this effort we are collecting information and informed opinions from truck drivers that use the transportation and distribution facilities in the state. You can help us, your company, your clients and yourself by answering a few questions about where you think there are impediments to freight transportation on the highways of Oregon. We would also be interested in hearing what you think can be done to fix those impediments

What problems does the driver experience in truck shipments – what kind, where and when?

Where are the major bottlenecks, congestion points, safety problems and other impediments on the region's transportation system that cause delay, accidents, or missed connections? Please list and identify when these problems occur - which seasons, which days of the week, which hours of the day.

_____
_____
_____
_____

Do you have any access problems in or out of specific manufacturing plants, industrial parks or intermodal transfer yards? If yes, please describe. Please list and identify when these problems occur - which seasons, which days of the week, which hours of the day.

_____
_____
_____
_____

Do any of the following conditions present problems for freight shipments to or from your company and/or facility?

Condition	Rate from 1 to 5 1 - not a problem 5 - very serious problem	Please describe the location and nature of the problem.
1. Highway congestion	1 2 3 4 5	
2. Merge lanes	1 2 3 4 5	
3. At-grade railroad crossings	1 2 3 4 5	
4. Highway interferences with rail lines (i.e., grade crossings)	1 2 3 4 5	
5. Turning at traffic lights	1 2 3 4 5	
6. Inadequate local streets capacity	1 2 3 4 5	
7. Roadway turning radius	1 2 3 4 5	
8. Insufficient lane width for wide loads	1 2 3 4 5	
9.Insufficient bridge/tunnel clearances (height)	1 2 3 4 5	
10.Lack access from railyards to Interstate highway system	1 2 3 4 5	
11.Lack of trailer drop-off/pickup facilities for trucks	1 2 3 4 5	
12.Curfew restrictions on movement of large and heavy trucks	1 2 3 4 5	
13.Delays caused by lift bridges	1 2 3 4 5	
14.Poor truck access to shipping terminals	1 2 3 4 5	
15.Poor truck access to intermodal facilities	1 2 3 4 5	
16.Poor truck access to airports for air cargo purposes	1 2 3 4 5	
17.Poor reliability due to accidents and incidents	1 2 3 4 5	
18. Unsafe roadway geometrics	1 2 3 4 5	
20. Poor reliability due to weather conditions	1 2 3 4 5	
21. Poor freeway ramp design	1 2 3 4 5	
22. Narrow roads	1 2 3 4 5	
23. Lack of roadway connectivity	1 2 3 4 5	
24. Poor Signage	1 2 3 4 5	
Other (specify)	1 2 3 4 5	

Is there anything you would like to add about problems and opportunities regarding freight movement in the region? Do you have other ideas or solutions that we should consider or investigate further?

What is the driver or the company able to do to compensate for the problems?

What does your company (or client) do to compensate for the impediments identified above?

_____
_____
_____
_____

What do you do as a driver to compensate for these problems?

_____
_____
_____

To what degree are you able to compensate for the problems?

_____
_____
_____

What improvement in the transportation system would the respondent like to see?

Do you think that the region needs additional or improved: (check where applicable)

1.	Highway ramps?	_____
2.	Highway/route connectors?	_____
3.	Highway/route lane capacity?	_____
4.	Rest Areas?	_____
5.	Truck parking areas?	_____
6.	Industrial zones for facility/terminal locations?	_____
7.	Intermodal rail facilities?	_____
8.	Other infrastructure? (specify)	_____
9.	Information services?	_____

For the types of infrastructure needs you indicated above, please list the locations(s) where you think these are needed.

Type	Location
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

For what kind of firm does the driver work?

How would you characterize the company for which you work? (Check as many as apply.)

- ❑ I am a self-employed driver
- ❑ Transportation (Please specify type below)
  - ❑ Common Carrier – Offer transportation service to the general public over regular and irregular routes
  - ❑ Contract Carrier – Offer transportation service to certain shippers under specific contract

  What kinds of transportation services does your company provide? Please indicate the percentage of truckloads in each category.
  - ❑ Truckload
  - ❑ Less-Than-Truckload
  - ❑ Distribution and warehousing
  - ❑ Parcel
  - ❑ Air Freight Specialist
  - ❑ Freight Forward
  - ❑ Drayage
- ❑ Agricultural or farming activities
- ❑ Forestry or lumbering activities
- ❑ Construction work – Buildings, homes, roads, structures, etc.
- ❑ Manufacturing, refining, processing activities
- ❑ Retail trade
- ❑ Wholesale trade
- ❑ Business and personal services
- ❑ Utilities – telephone, gas, electric, cable television, etc.
- ❑ Mining or quarry activities – Used to assist in the extraction of natural resources

What is the primary product or service provided by your company?

_____
_____

What are the driver's patterns – direction, routes and time?

Do you consistently drive a regular route or pattern of routes each week?

- ❑ Yes
- ❑ No

Please describe the route or routes you most frequently drive.

_____
_____
_____
_____

In driving the route(s) listed above, is your choice of roads a result of any impediments on roads that would otherwise represent a better routing?

- ❑ No
- ❑ Yes If yes, what is the location and nature of the the impediment(s)?

_____
_____
_____
_____

Table 1 - Summary of Prior Freight Survey Efforts

Survey Effort	Survey Contents	Relevance to ODOT Effort
Kentucky Transportation Cabinet Hall, Hill and Agent (TRR 1653)	Interviews conducted with 50 truck-trip generators to get **adequacy ratings** for intermodal routes.	Interviews focused on the **geometric adequacy** of roadways rather than travel patterns. No questionnaire available.
Southeast Michigan COG (1998)	Registered-commercial – vehicle-based survey of travel activity.	Long series of questions to determine number of vehicles operated by size. No relevant data collected. **Questionnaire available.**
Oregon Motor Carrier Transportation Branch (1998)	Mail-out survey to trucking companies asking how the MCTB was doing.	Response rates on a mail-out/mail-back were 18% to 44% depending on topic. No relevant data collected. No questionnaire available.
Sacramento Area Council of Governments (1996)	Mail-out/Mail-back survey of aggregate trucking activity by companies and a request for "Driver's Daily Logs".	Includes a visual depiction of truck classification. There are questions on what is being hauled, peak season, and percent of hauling in the peak season. **Questionnaire available.**
Census of Transportation – Vehicle Inventory and Use Survey (1997)	Registered-commercial-vehicle-based survey. Collected data on vehicle characteristics, maintenance and aggregate data on use.	Lists of company types and commodity types, and hazardous material types. **Questionnaire available.**
New York Metropolitan Transportation Council (1996)	Survey of truck terminals and warehouses designed to **locate highway bottlenecks**.	Mail-out/mail-back survey got 21% response rate. No questionnaire available.
Saskatchewan/North Dakota	Survey of trucks operated over the border. Requested truck type, where registered, origin and destination, route and experience at border crossing.	Visual representation of vehicle types. **One question on delays at the border** crossing and the cause. **Questionnaire available.**

Survey Effort	Survey Contents	Relevance to ODOT Effort
Washington State Department of Transportation	Intercept truck-based survey. Requested company characteristics, truck characteristics, load characteristics, origin type, destination type, and route used.	Written descriptions of truck types. **Questionnaire available.**
San Francisco-Oakland Bay Bridge and Port of San Francisco Truck Traffic Surveys	Both surveys were very brief intercept interviews designed to get origin, destination, trip frequency, truck type, route, home base and truck ownership.	Brief written truck type descriptions. **Questionnaire available.**
Caltrans – Alameda County Truck Intercept Survey and Count (1991)	Very brief survey to get origin, destination, place where garaged, type of goods carried and number of axles.	**Questionnaire available.**
NYC Economic Development Corporation Cross Harbor Freight Movement MIS Shipper Interview Guide Cambridge Systematics	Lengthy interview guide to collect information on cross harbor truck movements in New York. Collected information on the business, commodity shipment characteristics (inbound, outbound and interplant), logistical costs for the business, shipment characteristics, shipment timing, factors affecting logistical decisions, **suggestions for improvements**.	One question asking how freight movement could be improved. **Questionnaire available.**

Survey Effort	Survey Contents	Relevance to ODOT Effort
NYC Economic Development Corporation Cross Harbor Freight MIS Shipper/Distribution Center Recruiting Questionnaire	Interview is designed to determine whether the business is appropriate for the survey and whether the person contacted is appropriate to answer the questions. Other questions asked seek information about business type, commodities shipped, shipment patterns and routes, time of shipments, and time sensitivity of shipments.	Good introduction to the interview. Questions designed to determine whether the person contacted is appropriate to complete the interview. **Questionnaire available.**
Nationwide Truck Activity and Commodity Survey (1990)	A variety of questions on truck use and company type.	**Questionnaire available.**
NTTIS	Detailed questions about truck type. Also includes a one-day trip diary with questions about cargo.	**Questionnaire available.**
Chicago Area Transportation Study Commercial Vehicle Survey (1986)	Registered-commercial-vehicle-based mail-out/mail-back trip diary survey.	Four written truck-type classifications. **Questionnaire available.**
Maricopa Association of Governments (Phoenix, AZ) Urban Truck Travel Survey	Registered-commercial-vehicle-based mail-out/mail-back trip diary survey.	Example cover letter. Graphic representation of a 23-type vehicle classification system. **Questionnaire available.**
New York – New Jersey Truck Commodity Survey (1987, 1991 and 1992)	Very brief interview survey at intercept points. Questions include number of axles, type of truck, commodity, loading (full, partial or empty), origin, destination, trailer characteristics, and route.	**Questionnaire available.**
El Paso Commercial Truck Travel Survey (1994)	Registered-commercial-vehicle-based one-day trip diary.	Graphical representation of a 9 vehicle type classification scheme. **Questionnaire available.**

Survey Effort	Survey Contents	Relevance to ODOT Effort
North Carolina Triad Regional Transportation Study – Commercial Vehicle Travel Survey	Registered-commercial-vehicle-based one-day trip dairy.	Example cover letter. **Questionnaire available.**
Houston-Galveston Area Council – Commercial Passenger Carrier Survey	Registered-commercial-vehicle-based one-day trip diary.	Example cover letter. **Questionnaire available.**
Ontario (Canada) Commercial Vehicle Survey	Intercept survey collecting information on the business, the vehicle, the freight being moved, the trip, the driver's trip, and the driver's characteristics.	**Questionnaire available.**
Caltrans Rural Highway 94 Goods Movement Study Interview	Brief intercept interview includes number of occupants, vehicle type, cargo type, percent loaded, weight of load, origin, and destination.	**Questionnaire available.**
Baltimore Metropolitan Council – Motor Carrier and Freight Movement Operational Characteristics ATA Foundation (1997)	Mail-out/mail-back survey sent to 470 companies and received 62 (13.1% response rate). Survey was designed to collect information on company characteristics, major routes of travel, pickup and delivery patterns, time of day of travel, origins and destinations, intermodal activities, **impediments in freight flows**, suggestions for infrastructure improvements.	Gives examples of **problem areas** and proposals for improvements. No questionnaire available.
New South Wales, Australia Assessment of Freight-Related Industry Needs, Perceptions and Expectations	Telephone interview requests information about the company, the goods shipped and received, the shipping patterns location of company facilities and detailed information about two **problem areas**. There are also opinion questions on a long list of proposals.	Example questions on top priority **problem areas**. **Questionnaire available.**

Survey Effort	Survey Contents	Relevance to ODOT Effort
Chatham County (Savannah, Georgia) Intermodal Freight Study – Freight Movement Demand Survey	A detailed mail-out/mail-back survey of businesses designed to get information about the business, commodity flow by type (truck, rail, water and air), type of trucking services offered, flow patterns and timing, routes used in shipping, freight handling capacity, and future plans. The questionnaire also sought information about **perceived problem areas** and suggestions for solutions.	Example of a long survey that sought background information as well as opinions about **problems** and potential solutions. **Questionnaire available.**
Genesee Transportation Council – Survey of Motor Carriers in the Rochester Transportation Management Area. (1995)	This survey served as an inventory of motor carriers and a means of identifying where there are **highway problems** that affect carriers. The survey appears to be self-administering and was probably mail-out/mail-back.	There is a section for the owner or logistics manager that asks about where there are **transportation problems** then a fairly long supplemental survey that gets drivers' perceptions of problems and suggestions for improvements. Contains a listing of trucking service operations. **Questionnaire available.**
San Francisco – Oakland Bay Area Metropolitan Transportation Commission – I-880 Truck Study (1999)	One survey was targeted at public sector staff asking what they thought the most significant trucking-related issue was facing their community. There was also a trucking company survey designed to get information about the company, their trucking operations and their perceptions of how well truck traffic is served in the I-880 corridor.	The trucking company questionnaire asked about which streets the company used and whether there were **problems on the street**. It also asked specific questions about parking adequacy, designation of truck routes, full-service truck stops, and opinion about local government agencies. The questionnaire also included an open question about suggested improvements. **Questionnaire available.**

Survey Effort	Survey Contents	Relevance to ODOT Effort
California – Survey of California Commercial Vehicle Operations Golob and Regan (1998)	This telephone survey of 1200 companies in California sought attitudinal information about the relative importance of different **transportation problems**. It also sought attitudes about possible solution strategies with a particular emphasis on information systems.	The survey contains an enumeration of potential transportation problems that could be useful in structuring questions about perceived problem in the ODOT survey. **Questionnaire available.**
Central Massachusetts (Worcester) Regional Planning Commission ATA Foundation (1993)	This mail-out/mail-back survey focussed on identification of major impediments to truck traffic and possible solution strategies. The survey also sought information about the company, trucks owned or operated, frequent origins and destinations, time of truck movements, use of intermodal facilities and future needs and plans.	Sample cover letter. Sample questions on preferred truck routes, **impediments to truck flows** and possible solution strategies. **Questionnaire available.**
Southwestern Pennsylvania Regional Development Council (Pittsburgh, PA) – Questionnaire on Freight Transportation (1995)	This is a fairly short mail-out/mail-back survey designed to get information about where companies feel there are **transportation problems** that affect freight flows. The survey also sought information about the company's use of intermodal services and how that use may be changing over time. The survey asks about common freight origins and destination and about total truck traffic but nothing about the company. The survey only got a 9% response with a telephone follow up.	Sample statement of confidentiality. **Good enumeration of possible problems** with a structure for soliciting reaction from respondent. **Questionnaire available.**

Survey Effort	Survey Contents	Relevance to ODOT Effort
Portland Metro and Port of Portland – Freight Logistics Interviews Cambridge Systematics (1998)	In-person interviews lasting roughly 45 minutes with 15 companies using or providing trucking services. The survey was designed to identify logistical trends and patterns in the trucking industry and how they vary by company type or size. The survey also asked about factors that affect logistics and about specific **problem areas and solution options.**	**Questionnaire available.**
Port of Portland – Freight Movement Needs Survey	This in-person survey was designed to gather information about how freight transportation could be improved in the Portland region. The survey sought information about the business, how the business perceives freight mobility, **where there were transportation system bottlenecks**, and what transportation problems cost the business.	The results provide a useful listing of **transportation problems** in the Portland region. **Questionnaire available.**
Oregon Department of Transportation – Region 1 Freight Users/Shippers Logistics Interviews – I-5 Trade Corridor DKS Associates (1999)	This survey was a follow-on to the 1998 Metro/Port of Portland survey. It produced 61 in-depth interviews with manufacturers, distributors and carriers. The survey sought to get more information on trip rates, shipment size and type of trucking used. It also sought more information about the time sensitivity of shipments and how company costs are affected by travel time reliability.	The survey collected extensive information about **perceived problem areas** and potential solutions. **Questionnaire available.**

Survey Effort	Survey Contents	Relevance to ODOT Effort
NCHRP 2-17(4) – Measuring the Relationship Between Freight Transportation and Industry Productivity Hickling Lewis Brod	For five major industries, this set of questions was designed to determine how transportation level of service impacts business costs. The questionnaires were designed to get information about the company, their logistical patterns, current distribution system productivity and costs, and potential changes in productivity and costs from transportation improvements.	The survey provides a useful set of questions to determine the nature of the business and the types of vehicle operated. The results also provide a useful listing of transportation problems. **Questionnaire available.**
Oregon's Intermodal Management System CH2MHill et al (1997)	In-depth personal interviews with 72 companies including ship, rail and truck operators and manufacturers. The survey focussed on the key factors that affect freight mobility performance. **The survey also asked for input on significant problem areas**.	The results provide a very detailed listing of problem areas sorted by region of the state. No questionnaire available.

APPENDIX C: ROUND ONE PILOT SURVEY INSTRUMENT

Oregon Shipper & Motor Carrier Survey

Below are several hypothetical examples. After you have reviewed the examples, please use the attached blank form to list the freight movement problems your firm encounters at any location in Oregon.

Examples:

Description of the problem	Specific location of the problem	Time of day/year when problem occurs	Alternatives to address or avoid problem	Other comments
1. ***Really sharp curve***	***Highway 1 six miles south of Johnstown***	***All day/year***	***None***	***We can't use longer combination trucks because of length restrictions due to curve***
2. ***Congestion on Interstate 1***	***Interstate 1 between Interstate 2 and the Johnstown Interchange***	***Afternoons between 4 and 7 pm***	***Ship as much as possible outside of afternoon peak hours; travel on Beltline Parkway to avoid congestion on Interstate 1***	***If congestion gets much worse on Interstate 1, we may move all or part of our business to a location where there is less congestion***
3. ***Weight-restricted bridge***	***Cascade River bridge on Highway 1 three miles north of Johnstown***	***All day/year***	***Travel out-of-direction via Highways 14 and Johnstown Road***	***We either have to load our trucks lighter or travel 15 blocks out-of-direction***
4. ***Rail track in poor condition***	***Between Intermodal Avenue and Highway 62 in Johnstown***	***All day/year***	***Load rail cars lighter or move commodities by truck***	***If the track is not upgraded, we will move our products by truck which we estimate will mean 20 more trucks per day***

After you have completed the attached form, please mail to Catherine Lawson in the return envelope provided, or fax it to her at (503) 725-8770. ***Your participation is voluntary and greatly appreciated!***

Transportation Research Group
Portland State University
Box 751
Portland, OR 97207

Thank you! Please return your completed survey form by June 15, 2000.

Oregon Shipper & Motor Carrier Survey

Please list any freight movement problems your firm encounters in Oregon. (Please be specific. Use extra pages if necessary.)

Description of the problem	Specific location of the problem	Time of day/year when problem occurs	Alternatives to address or avoid problem	Other comments
1.				
2.				
3.				

Description of the Problem	Specific Location of the Problem	Time of day/year when problem occurs	Alternatives to address or avoid problem	Other Comments
4.				
5.				
6.				

→ NOW PLEASE GO BACK AND CIRCLE THE NUMBERS OF THE 3 WORST PROBLEMS FROM YOUR LIST ABOVE.

→ *DO YOU HAVE OTHER CONCERNS ABOUT MOVING FREIGHT IN OREGON? Please use the back of this form for your comments.*

Thank you for helping us! Please return your completed survey form in the return envelope provided by June 15, 2000. ***ID*** _____

May we contact you or another member of your firm for follow-up questions on freight movement issues? If yes, please provide information below:

Name:

Telephone Number: _____ E-mail Address: _____

APPENDIX D: ROUND TWO PILOT SURVEY INSTRUMENTS

Oregon Shipper & Motor Carrier Survey

Portland State University's Transportation Research Group is conducting this survey to help the Oregon Department of Transportation with its efforts to include freight industry views in planning for future transportation improvements. The hypothetical examples below help illustrate the type of information we are seeking. After you have reviewed the examples, please use the blank survey form on the attached sheet to list any freight movement problems you encounter at any location in Oregon, and **return to us by 12/15/2000**.

EXAMPLES:

Briefly describe the type of freight movement problem:
Really sharp curve

Describe the specific location of the problem:
Highway 1 - 6 miles south of Johnstown

Time of day or time of year it occurs:
All day/year

Truck Type(s) Affected by this Problem	**Length of Trip** (from your firm)	**What size is the firm where you are employed?**
☑ Single-Unit Truck ☐ Tractor & Trailer ☐ Truck & Trailer ☐ Tractor w/ 2 Trailers ☐ Other_____ ☐ Tractor w/ 3 Trailers	☑ Short (under 50 mi.) ☐ Medium (50-100 mi.) ☐ Long (over 100 mi.)	☐ I am self-employed ☐ Small firm size (1-5 employees) ☑ Medium firm size (6-25 employees) ☐ Large firm size (over 25 employees)

What alternatives do you use to address or avoid problem?
None

How does the problem impact you? Any other comments?
We can't use longer combination trucks because of length restrictions due to curve.

Briefly describe the type of freight movement problem:
Congestion on Interstate 1

Describe the specific location of the problem:
On I-1 between Interstate-2 & Johnstown Interchange

Time of day or time of year it occurs:
Afternoons between 4 & 5 p.m.

Truck Type(s) Affected by this Problem	**Length of Trip** (from your firm)	**What size is the firm where you are employed?**
☐ Single-Unit Truck ☐ Tractor & Trailer ☐ Truck & Trailer ☐ Tractor w/ 2 Trailers ☐ Other _____ ☑ Tractor w/ 3 Trailers	☑ Short (under 50 mi.) ☐ Medium (50-100 mi.) ☐ Long (over 100 mi.)	☑ I am self-employed ☐ Small firm size (1-5 employees) ☐ Medium firm size (6-25 employees) ☐ Large firm size (over 25 employees)

What alternatives do you use to address or avoid problem?
Ship as much as possible outside of afternoon peak hours; travel on Beltline Parkway to avoid congestion on Interstate 1.

How does the problem impact you? Any other comments?
If congestion gets much worse on Interstate 1, we may move all or part of our business to a location where there is less congestion.

ADDITIONAL EXAMPLE ON OTHER SIDE →

Briefly describe the type of freight movement problem:

Weight-restricted bridge

Describe the specific location of the problem:

Cascade River bridge, Hwy 1, 3mi. north of Johnstown

Time of day or time of year it occurs:

All day/year

Truck Type(s) Affected by this Problem	**Length of Trip** (from your firm)	**What size is the firm where you are employed?**
☐ Straight Truck ☑ Tractor & Trailer ☐ Truck & Trailer ☐ Tractor w/ 2 Trailers ☐ Tractor Only ☐ Tractor w/ 3 Trailers	☑ Short (under 50 mi.) ☐ Medium (50-100 mi.) ☐ Long (over 100 mi.)	☑ I am self-employed ☐ Small firm size (1-5 employees) ☐ Medium firm size (6-25 employees) ☐ Large firm size (over 25 employees)

What alternatives do you use to address or avoid problem?

Travel out-of-direction via Highways 14 and Johnstown Road.

How does the problem impact you? Any other comments?

I either have to load my truck lighter or travel 15 blocks out-of-direction.

Please use the blank survey form on the attached sheet to list the freight movement problems you encounter at any location in Oregon.

Your participation is greatly appreciated!

Please return your completed survey form by 12/15/2000.

Oregon Shipper & Motor Carrier Survey

Please list any freight movement problems you encounter in Oregon. (Please be as specific as you can. Use extra pages if necessary.)

After you have completed this survey form, please mail it in the return envelope provided to the Transportation Research Group – Portland State University – P.O. Box 751 – Portland, OR 97207, or fax it to (503) 725-5199. We would appreciate receiving your completed form by **November 15, 2000**. If you have any questions about the survey, please contact Jim Strathman at (503) 725-4069. Thank you for your help!

Briefly describe the type of freight movement problem:

Describe the specific location of the problem:

Time of day or time of year it occurs:

Truck Type(s) Affected by this Problem	**Length of Trip** (from your firm)	**What size is the firm where you are employed?**
☐ Single-Unit Truck ☐ Tractor & Trailer ☐ Truck & Trailer ☐ Tractor w/2 Trailers ☐ Other_____ ☐ Tractor w/3 Trailers	☐ Short (under 50 mi.) ☐ Medium (50-100 mi.) ☐ Long (over 100 mi.)	☐ I am self-employed ☐ Small firm size (1-5 employees) ☐ Medium firm size (6-25 employees) ☐ Large firm size (over 25 employees)

What alternatives do you use to address or avoid problem?

How does the problem impact you? Any other comments?

Briefly describe the type of freight movement problem:

Describe the specific location of the problem:

Time of day or time of year it occurs:

Truck Type(s) Affected by this Problem	**Length of Trip** (from your firm)	**What size is the firm where you are employed?**
☐ Single-Unit Truck ☐ Tractor & Trailer ☐ Truck & Trailer ☐ Tractor w/2 Trailers ☐ Other_____ ☐ Tractor w/3 Trailers	☐ Short (under 50 mi.) ☐ Medium (50-100 mi.) ☐ Long (over 100 mi.)	☐ I am self-employed ☐ Small firm size (1-5 employees) ☐ Medium firm size (6-25 employees) ☐ Large firm size (over 25 employees)

What alternatives do you use to address or avoid problem?

How does the problem impact you? Any other comments?

Briefly describe the type of freight movement problem:		
Describe the specific location of the problem:		
Time of day or time of year it occurs:		
Truck Type(s) Affected by this Problem	**Length of Trip** (from your firm)	**What size is the firm where you are employed?**
☐ Single-Unit Truck ☐ Tractor & Trailer ☐ Truck & Trailer ☐ Tractor w/2 Trailers ☐ Other_____ ☐ Tractor w/3 Trailers	☐ Short (under 50 mi.) ☐ Medium (50-100 mi.) ☐ Long (over 100 mi.)	☐ I am self-employed ☐ Small firm size (1-5 employees) ☐ Medium firm size (6-25 employees) ☐ Large firm size (over 25 employees)
What alternatives do you use to address or avoid problem?		
How does the problem impact you? Any other comments?		

→ ***DO YOU HAVE OTHER CONCERNS ABOUT MOVING FREIGHT IN OREGON?*** ←

Please use this space for your comments.

May we contact you or another member of your firm for follow-up questions on freight movement issues? If yes, please provide information below:

Name of contact person: _____

Telephone Number: _____ E-mail Address:_____

Thank you for helping us! Please return your completed survey form by November 15, 2000 in the return envelope provided, or fax it to (503) 725-5199.

Phone Script for Survey of Motor Carriers

Hi. I'm calling for the Transportation Research Group at Portland State University, collecting information related to transportation problems on Oregon's roadways. Is there someone there I could speak to who is aware of the transportation problems your company faces?

When possible to continue with the same person who answered the phone:

The Oregon Freight Advisory Committee is teaming up with the Oregon Department of Transportation to identify freight movement problems in the state, by surveying Oregon's shippers and motor carriers. The purpose of this information is to help ODOT better understand concerns of the freight industry and more effectively plan to meet future needs. So what we're asking for is information about infrastructure- and operational-related problems on the roads: will you describe the problems you're aware of? Your comments will be kept confidential, by the way. (Examples of problems were given if requested; e.g., narrow bridges, sharp curves, congestion, etc.)

When transferred to another employee:

Hi. I'm calling for the Transportation Research Group at Portland State University, collecting information related to transportation problems on Oregon's roadways. I was told you'd be the best person to talk to about this. The Oregon Freight Advisory Committee is teaming up with the Oregon Department of Transportation to identify freight movement problems in the state, by surveying Oregon's shippers and motor carriers. The purpose of this information is to help ODOT better understand concerns of the freight industry and more effectively plan to meet future needs. So what we're asking for is information about infrastructure- and operational-related problems on the roads: will you describe the problems you're aware of? Your comments will be kept confidential, by the way. (Examples of problems were given if requested; e.g., narrow bridges, sharp curves, congestion, etc.)

Typically while describing problems, respondents supplied location, time, and impacts without being prompted. Any missing information was requested; for example:

- ***Where specifically do you encounter this problem?***
- ***Is there a particular time of day/year this problem is more likely to occur?***
- ***Are there alternatives you can use to avoid this problem?***
- ***How does this problem impact your company?***

Respondents were asked to elaborate upon and clarify their answers, as necessary.

After describing the first problem, respondents were asked to provide truck type, trip length and firm size information. They were then asked if there were any other transportation problems they could think of that impacted their company. The truck type/trip length question was repeated for each problem, unless it was made clear that the answers would not differ from one problem description to the next; e.g., for companies with only one truck type and one set trip length.

Responses, with the corresponding ID number, were recorded on blank survey forms to ensure that all the survey questions were captured in the phone conversation. For consistency, the same form used for the mail survey was used for the phone survey (see below). Multiple forms were used when respondents had multiple problems to report. Before hanging up, the comments were read back to the respondents, who were asked again if they had anything else to add, and then thanked for participating.

Being connected to the person who could answer the survey questions was challenging; it typically involved at least one transfer and often a callback. Introductory information with details about the survey effort, was minimized whenever possible since it was likely that the first few people answering were not the appropriate survey respondents. Only two of the respondents were interested to hear more about the survey purpose; none asked about confidentiality.

Sample Blank Survey Form for Recording Phone Responses

Briefly describe the type of freight movement problem:	
Describe the specific location of the problem:	
Time of day or time of year it occurs:	
Truck Type(s) Affected by this Problem	**Length of Trip** (from your firm)
☐ Single-Unit Truck ☐ Tractor & Trailer ☐ Truck & Trailer ☐ Tractor w/2 Trailers ☐ Other_____ ☐ Tractor w/3 Trailers	☐ Short (under 50 mi.) ☐ Medium (50-100 mi.) ☐ Long (over 100 mi.)
What alternatives do you use to address or avoid problem?	
How does the problem impact you? Any other comments?	

What size is the firm where you are employed?	☐ I am self-employed ☐ Medium firm size (6-25 employees) ☐ Small firm size (1-5 employees) ☐ Large firm size (over 25 employees)

Do you operate truck(s) for-hire or for a shipper with a private fleet*?*

For Hire	☐ Yes	☐ No	
Private Fleet	☐ Yes	☐ No	
Other	☐ Yes	☐ No	Please explain:

ID Number _____

APPENDIX E: FULL-SCALE STATEWIDE SURVEY INSTRUMENT

INTRO:

IF NOT AVAILABLE, ARRANGE CALL-BACK

<LOCAL CALL / LONG DISTANCE CALL>

Company name: <comp>

IF DIFFERENT THAN LISTED ABOVE: Is your company affiliated with <comp>.

IF NO, VERIFY NUMBER DIALED.

INTRO...

A) Hi, I'm ____, calling on behalf of the Transportation Research Group at Portland State University, collecting information for the Oregon Department of Transportation, about problems motor carriers encounter on Oregon's roadways. You may have received a letter recently saying that we would be calling.

B) Are you the best person to talk to about this, or would someone else be more familiar with the transportation problems your company faces?

IF NO, ASK TO SPEAK TO THAT PERSON. ONCE ON LINE REREAD INTRO (IF SPEAKING TO A REFERRAL, STOP AT B

IF DON'T USE ROADS, PROBE: Does your company operate any trucks?

IF YES, CONTINUE / IF NO, NQ 61

PROBE: Problems could include things like poor quality or rough roads, narrow or low bridges and overpasses, congestion and traffic delays, sharp curves or steep grades, or weight restrictions.

IF NEEDED: * This study is being sponsored by the Oregon Department of Transportation to identify infrastructure problems in the state. We are talking with shippers and motor carriers.

*This information will help ODOT better understand concerns of motor carriers and more effectively plan to meet future needs.

*Your comments will be kept confidential and only released when grouped with other responses.

*It will just take a couple of minutes, depending on your answers.

*There is really only one main question, which is about what problems you experience.

Continue, No name given.....91

Continue, RECORD NAME IF MENTIONED.....92

Q1:

CLARIFY. PRESS ENTER TO CONTINUE

Can you think of any transportation problems your company experiences on the roads?

*IF NONE/DON'T KNOW, PROBE: Problems could include things like poor quality or rough roads, narrow or low bridges and overpasses, congestion and traffic delays, sharp curves or steep grades, or weight restrictions.

*IF NEEDED: Anything that you encounter on Oregon roads that impacts your ability to move your load. *IF MORE THAN ONE, SAY: Let me ask you more about one of them before we go on to the next.

*IF DON'T USE ROADS MUCH, PROBE: But when you do use the roads, do you have any problems?

None/Nothing - Probed.....00 skip to Q10

RECORD COMMENTS.....01

Don't know/Uncertain - Probed.....98 skip to Q10

Refused.....99 skip to Q10

Q2:

PROBE FOR SPECIFICS

Can you give me a specific location where this occurs?
IF ALL, OR EVERYWHERE, CLARIFY: Can you tell me which cities or highways?
RECORD COMMENTS.....01
Don't know/Uncertain.....98
Refused.....99

Q3:

PROBE TO FIT

Is it worse at certain times of day? IF YES, ASK: When is that?
No - not worse at certain times of day.....01
All times.....02
Early morning.....03
Late evenings.....04
Dark times/night-times.....05
Both Morning and afternoon rush hours.....06
Morning rush hour (6 AM to 9 AM).....07
Afternoon rush hour (3 PM - 7 PM).....08
Mid-day.....09
Other (SPECIFY:).....10
Don't know/Uncertain.....98
Refused.....99

Q4:

PROBE TO FIT

Is it worse at certain times of year? IF YES, ASK: When is that?
No - not worse at certain times of year.....01
All times.....02
Winter.....03
Spring.....04
Summer.....05
Fall.....06
Snow/Icy times.....07
Rainy times.....08
Other (SPECIFY:).....09
Don't know/Uncertain.....98
Refused.....99

Q5:

What impact does this problem have on your business? PROBE: What makes it a problem for you?
RECORD COMMENTS.....01
Don't know/Uncertain.....98
Refused.....99

Q6:

CLARIFY. PRESS ENTER TO CONTINUE

Do you have any alternatives to avoid this problem?
IF NEEDED: Is there anything you can do to avoid it?
IF YES, ASK: What can you do?
IF USE ALTERNATIVE, PROBE ONCE FOR SPECIFICS.
IF RESPONDENT REFUSES TO SAY, JUST RECORD COMMENTS.

No alternatives 00
RECORD COMMENTS 01
Don't know/Uncertain 98
Refused 99

Q7A1:

Are there other transportation problems your company experiences on the roads? IF MORE THAN ONE, SAY: Let me ask you more about one of them before we go on to the next.
IF NEEDED: Anything that you encounter on Oregon roads that impacts your ability to move your load. IF NONE/DON'T KNOW, PROBE: Problems could include things like poor quality or rough roads, narrow or low bridges and overpasses, congestion and traffic delays, sharp curves or steep grades, or weight restrictions.

No other - Probed ..... 00 skip to Q8
RECORD COMMENTS 01
Don't know/Uncertain - Probed ..... 98 skip to Q8
Refused ..... 99 skip to Q8

Q7A2:

PROBE FOR SPECIFICS

Can you give me a specific location where this occurs?
IF ALL, OR EVERYWHERE, CLARIFY: Can you tell me which cities or highways?

Don't know/Uncertain 98
Refused 99

Q7A3:

CLARIFY, PROBE TO FIT

Is it worse at certain times of day? IF YES, ASK: When is that?

No - not worse at certain times of day 01
All times 02
Early morning 03
Late evenings 04
Dark times/night-times 05
Both Morning and Afternoon Rush hours 06
Morning rush hour (6 AM to 9 AM) 07
Afternoon rush hour (3 PM - 7 PM) 08
Mid-day 09
Other (SPECIFY:) 10
Don't know/Uncertain 98
Refused 99

Q7A4:

CLARIFY, PROBE TO FIT

Is it worse at certain times of year? IF YES, ASK: When is that?
No - not worse at certain times of year 01
All times 02
Winter 03
Spring 04
Summer 05
Fall 06
Snow/Icy times 07
Rainy times 08
Other (SPECIFY:) 09
Don't know/Uncertain 98
Refused 99

Q7A5:

CLARIFY. PRESS ENTER TO CONTINUE

What impact does this problem have on your business?
PROBE: What makes it a problem for you?
RECORD COMMENTS 01
Don't know/Uncertain 98
Refused 99

Q7A6:

CLARIFY. PRESS ENTER TO CONTINUE

Do you have any alternatives to avoid this problem?
IF NEEDED: Is there anything you can do to avoid it?
IF YES, ASK: What can you do? IF USE ALTERNATIVE, PROBE ONCE FOR SPECIFICS. IF RESPONDENT REFUSES TO SAY, JUST RECORD COMMENTS.
No alternatives 00
RECORD COMMENTS 01
Don't know/Uncertain 98
Refused 99

Q7B1:

Are there other transportation problems your company experiences on the roads? IF MORE THAN ONE, SAY: Let me ask you more about one of them before we go on to the next.
IF NEEDED: Anything that you encounter on Oregon roads that impacts your ability to move your load. IF NONE/DON'T KNOW, PROBE: Problems could include things like poor quality or rough roads, narrow or low bridges and overpasses, congestion and traffic delays, sharp curves or steep grades, or weight restrictions.
No other - Probed ..... 00 skip to Q8
RECORD COMMENTS 01
Don't know/Uncertain - Probed ..... 98 skip to Q8
Refused ..... 99 skip to Q8

Q7B2:

PROBE FOR SPECIFICS

Can you give me a specific location where this occurs?
IF ALL, OR EVERYWHERE, CLARIFY: Can you tell me which cities or highways?
RECORD COMMENTS.....01
Don't know/Uncertain.....98
Refused.....99

Q7B3:

CLARIFY, PROBE TO FIT

Is it worse at certain times of day? IF YES, ASK: When is that?
No - not worse at certain times of day.....01
All times.....02
Early morning.....03
Late evenings.....04
Dark times/night-times.....05
Both Morning and Afternoon Rush hours.....06
Morning rush hour (6 AM to 9 AM).....07
Afternoon rush hour (3 PM - 7 PM).....08
Mid-day.....09
Other (SPECIFY:).....10
Don't know/Uncertain.....98
Refused.....99

Q7B4:

CLARIFY, PROBE TO FIT

Is it worse at certain times of year? IF YES, ASK: When is that?
No - not worse at certain times of year.....01
All times.....02
Winter.....03
Spring.....04
Summer.....05
Fall.....06
Snow/Icy times.....07
Rainy times.....08
Other (SPECIFY:).....09
Don't know/Uncertain.....98
Refused.....99

Q7B5:

What impact does this problem have on your business? PROBE: What makes it a problem for you?
RECORD COMMENTS.....01
Don't know/Uncertain.....98
Refused.....99

Q7B6:

CLARIFY. PRESS ENTER TO CONTINUE

Do you have any alternatives to avoid this problem?
IF NEEDED: Is there anything you can do to avoid it? IF YES, ASK: What can you do?
IF USE ALTERNATIVE, PROBE ONCE FOR SPECIFICS.
IF RESPONDENT REFUSES TO SAY, JUST RECORD COMMENTS.

No alternatives 00
RECORD COMMENTS 01
Don't know/Uncertain 98
Refused 99

Q7C1:

CLARIFY. PRESS ENTER TO CONTINUE

Are there other transportation problems your company experiences on the roads?
IF MORE THAN ONE, SAY: Let me ask you more about one of them before we go on to the next.
IF NEEDED: Anything that you encounter on Oregon roads that impacts your ability to move your load. IF NONE/DON'T KNOW, PROBE: Problems could include things like poor quality or rough roads, narrow or low bridges and overpasses, congestion and traffic delays, sharp curves or steep grades, or weight restrictions.

No other - Probed ..... 00 skip to Q8
RECORD COMMENTS 01
Don't know/Uncertain - Probed ..... 98 skip to Q8
Refused ..... 99 skip to Q8

Q7C2:

PROBE FOR SPECIFICS

Can you give me a specific location where this occurs?
IF ALL, OR EVERYWHERE, CLARIFY: Can you tell me which cities or highways?

RECORD COMMENTS 01
Don't know/Uncertain 98
Refused 99

Q7C3:

Is it worse at certain times of day?
IF YES, ASK: When is that?

No - not worse at certain times of day 01
All times 02
Early morning 03
Late evenings 04
Dark times/night-times 05
Both Morning and Afternoon Rush hours 06
Morning rush hour (6 AM to 9 AM) 07
Afternoon rush hour (3 PM - 7 PM) 08
Mid-day 09
Other (SPECIFY:) 10
Don't know/Uncertain 98
Refused 99

Q7C4:

Is it worse at certain times of year?
IF YES, ASK: When is that?
No - not worse at certain times of year 01
All times.....02
Winter 03
Spring.....04
Summer.....05
Fall 06
Snow/Icy times.....07
Rainy times 08
Other (SPECIFY:).....09
Don't know/Uncertain 98
Refused 99

Q7C5:

What impact does this problem have on you and your business? PROBE: What makes it a problem for you?
RECORD COMMENTS.....01
Don't know/Uncertain 98
Refused 99

Q7C6:

CLARIFY. PRESS ENTER TO CONTINUE
Do you have any alternatives to avoid this problem?
IF NEEDED: Is there anything you can do to avoid it? IF YES, ASK: What can you do?
IF USE ALTERNATIVE, PROBE ONCE FOR SPECIFICS.
IF RESPONDENT REFUSES TO SAY, JUST RECORD COMMENTS.
No alternatives 00
RECORD COMMENTS.....01
Don't know/Uncertain 98
Refused 99

Q8:

When you encounter problems, are you in a single unit truck or a truck with a tractor or trailer? IF TRACTOR/TRAILERS, ASK: Would that be a tractor with 1, 2, or 3 trailers?
Single unit trucks 1
Truck and trailer.....2
Tractor with 1 trailer 3
Tractor with 2 trailers.....4
Tractor with 3 trailers.....5
Other (SPECIFY:).....6
Don't know/Uncertain 7
Refused 8

Q9:

Do problems typically occur on trips that are within 50 miles of your shop, between 50 and 100, or over 100 miles from your shop?

Under 50 miles 1
50 - 100 miles 2
Over 100 miles 3
All locations/Everywhere 4
Other (SPECIFY:) 9
Not applicable 5
Don't know/Uncertain 6
Refused 7

Q10:

Can you tell me about how many trucks your shop operates?

Don't know/Uncertain 9998
Refused 9999

Q10A:

READ 1-4

Is that. . .

SKIP IF NOT Q10=9998 9999

One 1
2-5 2
6-25 3
Over 25 4
Don't know/Uncertain - DO NOT READ 5
Refused - DO NOT READ 6

Q11A:

Are you an owner-operator? IF NO, BUT MENTIONS TITLE, PLEASE RECORD

SKIP IF NOT Q10C=1 2 5 6

Yes 01
No, title not offered 02
No (VOLUNTEERED JOB TITLE - RECORD) 03
Don't know/Uncertain 98
Refused 99

Q11B:

Are you yourself a driver or a dispatcher?

SKIP IF Q11A=01 OR (Q11A=01-03 AND Q10C=1-2)

Driver 01
Dispatcher 02
Neither, no information 03
Neither (VOLUNTEERED JOB TITLE - RECORD) 04
Both Driver and Dispatcher
Don't know/Uncertain 98
Refused 99

Q12:

CLARIFY.

Is there anything else you'd like to add?
No/No comments ..... 00 skip to Q13
RECORD COMMENTS 01
Don't know/Uncertain ..... 98 skip to Q13
Refused ..... 99 skip to Q13

Q12AA:

WAS ANOTHER TRANSPORTATION PROBLEM MENTIONED?
Yes 1
No ..... 2 skip to Q13

Q12A2:

PROBE FOR SPECIFICS

Can you give me a specific location where this occurs?
IF ALL, OR EVERYWHERE, CLARIFY: Can you tell me which cities or highways?
RECORD COMMENTS 01
Don't know/Uncertain 98
Refused 99

Q12A3:

Is it worse at certain times of day? IF YES, ASK: When is that?
No - not worse at certain times of day 01
All times 02
Early morning 03
Late evenings 04
Dark times/night-times 05
Both Morning and afternoon rush hours 06
Morning rush hour (6 AM to 9 AM) 07
Afternoon rush hour (3 PM - 7 PM) 08
Mid-day 09
Other (SPECIFY:) 10
Don't know/Uncertain 98
Refused 99

Q12A4:

Is it worse at certain times of year? IF YES, ASK: When is that?
No - not worse at certain times of year 01
All times.....02
Winter 03
Spring.....04
Summer 05
Fall 06
Snow/Icy times.....07
Rainy times 08
Other (SPECIFY:).....09
Don't know/Uncertain 98
Refused 99

Q12A5:

What impact does this problem have on you and your business? PROBE: What makes it a problem for you?
RECORD COMMENTS.....01
Don't know/Uncertain 98
Refused 99

Q12A6:

CLARIFY. PRESS ENTER TO CONTINUE

Do you have any alternatives to avoid this problem? IF YES, ASK: What can you do?
IF USE ALTERNATIVE, PROBE ONCE FOR SPECIFICS.
IF RESPONDENT REFUSES TO SAY, JUST RECORD COMMENTS.
No alternatives 00
RECORD COMMENTS.....01
Don't know/Uncertain 98
Refused 99

Q13:

In case my supervisor needs to check my work, may I please have you first name?

SKIP IF INTRO=92

Yes (RECORD NAME).....1
No.....2
Refused 3

PHONE:

And may I verify that I have reached you at <tel02>
Yes .....1 skip to GENDR
No.....2
Refused .....3 skip to GENDR

TEL03:

RECORD CORRECT PHONE NUMBER.
RECORD AREA CODE AND PHONE NUMBER ONLY EXAMPLE: 5032364551

GENDR:

DO NOT ASK!
RECORD GENDER
Male 1
Female.....2

INT01:

That concludes my questions. Thank you very much for your time and cooperation.

F7:

* We are not selling anything. This is strictly a survey for research purposes.
* I work for Gilmore Research Group, an independent survey research firm located in Portland and we are calling for Portland State and the Oregon Department of Transportation.
* If you would like to verify this call and get more information, you may call my supervisor at 800-218-6148 in Portland.
* If you would like to contact our client to verify this survey you may call Jim Strathman at 503-725-4069.
* ODOT has a recorded radio interview that describes the project. You may call 1-800-452-6368, and select the story, "Survey Will Chart Highway Freight Problems".
RETURN TO SURVEY 1

APPENDIX F: LARGE FIRM SURVEY RESPONSE

Freight Shipper and Motor Carrier Survey - July 2001: ***Responses from Large Firms (with 200 trucks or more) Based in Oregon***

ID	Problem Description	Location (s)	Time	Alternatives	Impacts	Other Comments	Position	Truck Type	Number of Trucks	Trip Length
1						He had already been contacted a few weeks ago – received letter and call. Responded to questions. Represents a number of trucking firms.				
2	Congestion.	Clackamas terminal – Hwy 224 onto I-205, and the intersection at 82nd. They probably go in and out on Hwy 224 a thousand times a day.	A, but worse at rush hours.	N. Other routes don't really save time.	Financial – delays drivers who are paid hourly. Freight in and out gets delayed.	No other problems statewide that are out of the ordinary – just typical congestion, construction and occasional bridge closures.	Director of Safety	TT, T2, T3	300 in Clackamas but many more in Boise, Salt Lake, S. OR	A
3	Construction delays.	All along I-5.	Summer	N	D	Quick and painless weigh stations.	Dispatcher	TT	680	L
4	1. Bridge closures for repairs.	1. I-84 in Douglas County S of Roseburg.	1. A	1. N	1. Trucks over 64,000 lbs. Have to take detours. Company does a lot of hauling with loads of 80,000 lbs and more. Financial impact because have to take a longer route and pay more for drivers, fuel, maintenance, etc.	Realizes that a lot of these problems take money to address. Thinks the scales are okay; bypass system and green light programs are good. Says ODOT is doing a good job of coordination – MCTAC and OTA – trying to communicate better about closures.	President	TT	350	L
	2. Not enough parking at rest areas; they're full at night.	2. Along I-5.	2. A	2. N	2. Drivers wind up parking unsafely on on-ramps. Required to stop but there's no safe place.					
	3. Restricted road – doesn't allow trucks over 65 ft. long.	3. Southern OR - Hwy 140 going E out of Klamath Falls.	3. A	3. N	3. Have to go out of route, through Bend or California, when trying to go east.					
	4. Not enough lanes to accommodate trucks.	4. I-5 mountain roads in southern OR.	4. A	4. N	4. Trucks have to go slower because of the hills, so wind up having to drive on the shoulder or else block the road. Need 3 lanes on uphill grades.					

KEY
Truck Type: SU = Single Unit TT = Truck/Trailer T1 = Tractor/1 Trailer T2 = Tractor/2 Trailers T3 = Tractor/3 Trailers
Trip Length: S = Short (under 50 mi.) M = Medium (50–100 mi.) L= Long (over 100 mi.)
General: D = Delays A = all times N = North. S = South. E = East. W = West.

ID	Problem Description	Location (s)	Time	Alternatives	Impacts	Other Comments	Position	Truck Type	Number of Trucks	Trip Length
	5. Congestion; bottlenecks.	5. Portland: I-205, and I-5 bridge going in to Vancouver. Also in Medford, Bend, Eugene, Salem.	5. Most of the time, but worse at rush hours.	5. N	5. Safety issues, pollution, delays.					
5						Referred to HR. Voicemail – 5 tries.				
6						Busiest time of year – no one's available to answer questions and there's no good time to call. Receptionist may be aware of some of the problems but she has ten incoming calls so no time to talk.				
7						They do road taxes and licensing – guide trucking companies through the process. Don't have any trucks themselves. Thinks Port of Entries should be kept open all night because people have to wait until they're open to get a permit. Drivers get hung up over night when they're going from Olympia to California.				
8						Phone was disconnected.				
9	Congestion.	I-5 and I-205.	PM rush hour	N. Have to use the highways to get through PDX.	D		Dispatcher	TT	>100	L – 850 miles ave.

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10	General congestion and as related to construction.	PDX metro area, and Bend, Albany, Eugene – all the places company is based. Throughout OR – I-5 and all major freeways.	Busy all day, with peaks at rush hours.	Use a radio system to try to route drivers around accidents/ congestion. E.g., divert them to I-5 rather than I-205.	D. Financial impact – time is money. Increased fuel and labor costs because of stop and go situation.		Operations Supervisor	T2	200, company-wide; 100 in OR	M/L – half and half.
11	Congestion.	Marine Dr., westbound going over I-5 (I-5 overpass, on ramp from Marine Dr. westbound); MLK northbound; I-5 N cloverleaf in all directions.	PM, from 3:30 – 6:00	N	Safety problems for people going W on Marine or S on I-5 – they get caught in backup. 1 lane ramp turns into 2 lanes and causes a bottleneck merging. Ugly merge situation. Poor design – doesn't function well and dangerous. Can't see well as you're going downhill into curve – can't tell when you're merging into, especially in a truck.		Safety Director	TT		M/L – half and half.
12						Same company as above (listed under 2 names, but same phone number – same problems).				
13						Customer service number – couldn't get direct line to dispatch department. Was told to leave a message and they'd have someone in the field call back. (Left 3 messages).				

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14	1. Congestion – roads are undersized because of bike paths. Bikes don't obey the rules of the road and cause congestion. The world's closing in on truckers.	1. Portland area – Ross Island and Morrison bridges where they're doing overlays; all major highways. Downtown – a lot of construction. Pearl district is especially congested because the roads there are narrow to begin with.	1. A	1. N	1. Delays and associated financial impact. They have a perishable product (concrete). Can't exceed an hour and a half of delivery time – if you do, they won't accept the load. Then you have to pay to dispose of the load (another company has to come in and break it apart and then drive it away), and replace it. Each load is $500 – $600. Also there are costs associated with the drivers' travel time, and the hourly construction crew waiting for the concrete.		Fuel Superintendent	SU	175	S
	2. Huge dip in road.	2. W of the St. Johns bridge, on Lombard, near Terminal 4 -– overpass over RR tracks.	2. A	2. N	2. Damage to trucks and driver injuries – they've hurt their necks and heads.					
15						Referred to another employee. Voicemail and pager – 5 tries.				
16	1. Unsafe corners - need to lower speed. Should either straighten or widen.	1. Carver Curves. MP 11, Hwy 224.	1. A	1. N	1. Equipment damage – rolled a truck.	Faxed a list of problems after talking to drivers; was subsequently contacted to get some clarification on responses and impacts/alternatives.	Safety Manager	TT, T2, T3	165	L – between 100 and 500 miles.
	2. Tight corner – should widen.	2. Verborth Rd in Forest Grove	2. A	2. Alternate route.	2. Tip-overs, crossing centerline to turn.					
	3. Narrow bridge – should widen.	3. Hwy 213 at Arrowhead Golf Course in Molalla.	3. A	3. N	3. Slow-downs. Dangerous – have to drive too close to centerline.					

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	4. Unsafe intersection because of traffic increases over the years – need to install a signal.	4. Marine Dr. and 122nd; and Marine Dr. and Sundial Rd.	4. A	4. N	4. Dangerous					
	5. Congestion – need three lanes.	5. I-5 N and S, at Interstate bridge.	5. A	5. N	5. Time/money from delays.					
	6. Congestion and cars racing around trucks – need additional lanes.	6. Cornelius Pass Rd, Hwy 26 to Hwy 8.	6. A	6. N	6. Time/money, and dangerous.					
	7. Impaired vision – tree obstructs view. Should remove/reduce trees.	7. 219 and Wynaski Rd. in Newberg.	7. A	7. N	7. Dangerous. Trucks have to nose out to see traffic.					
17	1. City streets are too narrow for trucks.	1. Portland metro area, Tigard, Clackamas.	1. A	1. N	1. Difficult to get around; slow.		Operations Manager	TT		A - local, between states, and coast to coast.
	2. Construction.	2. I-5, between Roseberg and Salem.	2. Past 5 years.	2. N	2. D.	Glad that improvements have been made – added lanes in Salem and bridges are being widened and strengthened.				
18						Voicemail – 5 tries.				
19	1. Lack of respect from drivers. Cars cut them off – dive in front of trucks and then put on their brakes. Cars don't merge properly or allow trucks into traffic. This is the company's biggest problem.	1. A	1. A	1. N	1. Safety issues. Truck drivers get frustrated and then do things they shouldn't.					

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	2. Low bridge and road in disrepair – there's a warning sign, but it's not enough. Overpass/train trussle – has been hit by 255 trucks over the years.	2. 185th, between Marine Dr. and Sandy –	2. A	2. Take another route when possible, except when need to get to businesses on that road.	2. Damage to trucks.		Vice President of Operations	TT, T2, T3	164	L primarily, but also local
20						Referred to another employee. Voicemail - 5 tries.				
21						Licensing agent. Does licensing and taxes for trucking company. Doesn't have any trucks.				
22						Said congestion in general was a problem, but didn't have any specifics and said he wasn't qualified to answer questions because he hasn't been a full time driver for over 5 years (he's a dispatcher now). Drivers would be the only ones with information and they wouldn't be available for contact because they're always out in the field.				
23						Phone number didn't work - repeated busy signal.				

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