Survey of Highway Freight-Hauling: State Regulatory Practices, Trucker Perceptions, and Truck Traffic Volumes

Final Report 487

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16. Abstract

This study incorporates freight hauling company concerns, perceptions and truck volume analysis in an investigation of Arizona State Highway service. It also examines what policies other states have implemented in order to identify options that may mitigate trucking company concerns. This study should be viewed as a general picture of problem areas as defined by trucking companies and truck volume analysis with ideas for what other services ADOT could provide to improve service. Options for Arizona's service are generated with geographic detail of problem locations and are provided by current state agency practices as summarized in the state agency survey analysis.

Arizona's location as a border state as well as the its recent population increases resulting in a relatively new interstate system make its situation and needs unique. This study found that different state agencies have very different restrictions on trucking as well as various means of revenue collection and regulatory enforcement. Investment in overcapacitated routes may take priority, but should be accomplished in conjunction with meeting other needs such as the North-South Canamex trade route. With increased trade for Arizona, commercial traffic will increase. Magnifying the need to accomplish both priorities—traditional capacity and safety measures and efficiency measures.

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METRIC (SI*) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
in	inches	2.54	centimeters	cm
ft	feet	0.3048	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
		AREA		
in^2	square inches	6.452	centimeters squared	cm^2
ft^2	square feet	0.0929	meters squared	m^2
yd^2	square yards	0.836	meters squared	m^2
mi^2	square miles	2.59	kilometers squared	km^2
ac	acres	0.395	hectares	ha
		MASS (weight)		
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams	Mg
		VOLUME		
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft^3	cubic feet	0.0328	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.

		TEMPERATURE (exact)		
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

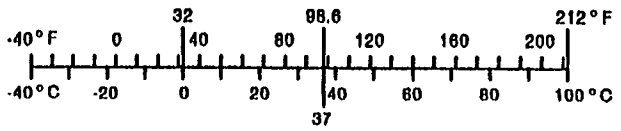
APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
		LENGTH		
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
yd	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
yd^2	kilometers squared	0.39	square miles	mi^2
ha	hectares (10,000 m^2)	2.53	acres	ac
		MASS (weight)		
g	grams	0.0353	ounces	oz
kg	kilograms	2.205	pounds	lb
Mg	megagrams (1000 kg)	1.103	short tons	T
		VOLUME		
mL	millimeters	0.034	fluid ounces	fl oz
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

		TEMPERATURE (exact)		
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

These factors conform to the requirement of FHWA Order 5190.1A

*SI is the symbol for the International System of Measurements



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EXECUTIVE SUMMARY

This study incorporates freight hauling company concerns and perceptions in an investigation of Arizona State Highway service. It also examines what policies other states have implemented in order to identify options that may mitigate trucking company concerns. These concerns and populations were left out of previous reports (Matranga & Semmens, 2000; Hernandez, 1997; ADOT, 1998; Behavior Research Center, 2000; Radwan, *et al*, 1987). This study found that different state agencies have very different restrictions on trucking as well as various means of revenue collection and regulatory enforcement. But it also found that while other states may be moving onto other concerns such as improving efficiency of highway service, Arizona may not only need to improve highway service but also expand capacity and safety. Both of which are traditional spending priorities.

This study should be viewed as a general picture of problem areas as defined by trucking companies with ideas for what other services ADOT could provide to improve service. Options for Arizona's service are generated with geographic detail of problem locations and are provided by current state agency practices as summarized in the state agency survey analysis. To this end, this study will serve as an analytical and prioritizing tool for the Arizona Department of Transportation.

It should be noted in the trucking survey, that the responses may be biased because of the respondent's position in the companies surveyed. Thirty three percent (33%) of the returned surveys were not completed. A random sample of truck drivers taken at various truck stops might shed much different results.

Key Findings

Arizona collects vehicle classification data and annual traffic volumes, utilizing the same methods most cited by other states like axle counter and weigh-in-motion technologies. However unlike other states, Arizona does not use these technologies for regulation enforcement. Very few states had plans to promote intermodal activities. Arizona has no current specific effort to promote intermodal activities.

Freight hauling restrictions can impact transit time. Such restrictions will reduce the level of service of the highway to the freight carrier. However, Arizona, unlike many other states, has very few restrictions on hauling. This may be because most of Arizona's population is in the two metropolitan areas of Phoenix and Tucson. Arizona has no lane restrictions, but does have hourly restrictions from 7-9AM and 4-6PM (commuter hours) in the urban areas of Phoenix and Tucson. Arizona also has speed restrictions for steep grades and overweight trucks on bridges, and prohibits hazardous cargo in a tunnel on I-10 in Phoenix. In the trucking survey, carriers cited few regulatory problems overall. Those mentioned, primarily were a result of construction or congestion. Therefore regulatory hauling restrictions do not appear to adversely impact level of service.

With regard to regulation enforcement and fee collection in the various states surveyed, the preferred method was mobile units. Fixed ports of entry were also widely used. With the exception of California, those states that did utilize weigh stations did not collect fees at fixed ports of entry. Only Arizona collects fees utilizing fixed ports of entry and mobile units as well as special interdepartmental task forces. Several states also utilized weigh in motion technologies to collect fees. Arizona, like other states, has weigh stations, but they also have agricultural inspection stations and border patrol inspection stations. Thus creating more opportunities for delays and congestion at various stopping points in the system.

The major ports of entry into Arizona via other U.S. states that generated complaints from trucking companies included: Ehrenberg, Yuma, Parker, and the New Mexico – Arizona port of entry. More specifically, the cited problems found with ports of entry included congestion, poor staffing, delays up to 15 minutes, and poor port design.

In Arizona, during the five years prior to NAFTA, exports to Mexico increased 153% (Ammirati, 1999). Since the inception of NAFTA, Arizona exports have increased an additional 83% (Ammirati, 1999). However, trucking survey respondents did not cite international ports of entry as problems. According to other studies, international port design and cross-border traffic are serious issues and something Arizona has not paid much attention to in the past (Dye et al, 1999; Liu and Shinbein 1999; U.S. GAO, 1997; McCray and Harrison 1999; Haines, 1997; Canamex, 1999). From this study it is unclear how many companies do perform cross-border traffic. Therefore the issue may not be a concern for this particular trucking sample.

NAFTA has great implications for freight corridors from Mexico to Canada. As previously mentioned, McCray and Harrison (1999), showed that several corridors are apparent when trade flow routes from Mexico and Canada are combined. Canamex, Arizona's North American trade route, extends from Nogales, Arizona and continues through Nevada, Utah, Idaho, and Montana. Canamex is currently involved in infrastructural improvement plans to create an I-19 and I-10 bypass, expand intermodal and warehousing facilities, increase capacity along US 93 as well as a new rail port of entry in Naco, Arizona (Canamex, 1999). Future ADOT research should focus on the needs of the commercial cross-border traffic user group.

Roadway Problems found in this study included poor pavements, congestion along specific segments particularly in urban areas, and decreased safety along specific segments due to a lack of signage, capacity, turnouts, and poorly equipped rest areas. Arizona's participation in a pavement demonstration project may in the future lead to better pavements. However, Arizona's allowance of longer combination trucks increases wear on pavements, and reduces safety (U.S. GAO, 1993). The majority of problems occurred in the highly trafficked urbanized areas of Phoenix, and the commercial routes like I-10 and US 93.

This study also found that certain non-interstate routes are important commercial traffic routes and have volume / service ratios as high as 1.19. This is in agreement with many of the complaints cited by the trucking companies that participated in the survey. These roadways include: US 93, US 60 Between Phoenix & Wickenberg, AZ, US 89 by Page, AZ, State Route 85 between I-10 and I-8. All of these routes have only two throughlanes, and yet 22 to 41% of the daily traffic volumes on these segments are commercial truck traffic. This lends credence to the argument that Arizona is primarily rural in nature, particularly in its transportation network. These routes as well as the major interstates, I-10, I-17, and I-40 are slated high priority roadways for capacity improvements. Medium priority routes include: State Route 77, State Route 66, State Route 260 by Payson, State Route 188, State Route 90, State Route 87 by Payson, State Route 89 between Sedona and Flagstaff, and US 60 east of Phoenix. The remaining low priority routes have volume/service ratios from only 0 to 0.3 and are not major commercial routes.

This research also found that state agencies' methods to expedite the collection process can be divided into three categories. The first tier states have implemented web page payment systems, accept credit cards, and use Commercial Vehicle Information Systems Networks to electronically track permits and identification with neighboring states. This second tier group utilizes such items as credit card payment, automatic vehicle identification, and prepass systems, but has not progressed to the internet. The remaining states either have plans for the aforementioned methods or simply use the court system, the state patrol, and payment with registration through the department of transportation. The third tier states are primarily states with smaller populations and so may have limited resources to implement such collection methods.

Arizona, like the second tier group, utilizes electronic issuing systems, credit card payments, and escrow accounts in expediting the permit and regulation enforcement process. However unlike other states in this group they do not use automatic vehicle identification systems or prepass systems. While ADOT has a web page, it is not at this time used to enforce regulations, obtain permits or assist in expediting the permit process in any way. Arizona obviously still has a long way to go in the electronic age. Many trucking companies have access to the internet and email as evidenced by the trucking survey. Saving companies further time and money by utilizing the web to expedite regulation processes would go a long way in serving companies' needs.

The transportation industry has changed as a result of a highly competitive global market and thus affected Arizona as well. International trade and transportation agreements have helped global commerce flourish, but today's market depends upon efficient logistics, customer service, and just-in-time inventory systems. Business wants high-quality transportation service that is speedy, flexible, competitively responsive and low cost. Optimal efficiency is the goal of the future rather than constructing new roadways (Williams and Hoel, 1998). Planning models and economic equilibrium models in future will be used to assess highway service, plan for freight efficiency, and result in reducing transport operation costs particularly those associated with congestion (Williams and Hoel, 1998). Methods such as congestion pricing, increasing road

capacity, use of electronic data interchange, automated international border clearances and improving intermodal efficiency are the latest developments of transportation service improvement (Golob and Regan, 1999). However, as shown in this research, Arizona not only needs to increase efficiency by redesigning ports of entry, reducing congestion and traffic management, but it also needs to increase capacity along particular road segments such as U.S. 93 and certain parts of I-10.

Clearly Arizona's location as a border state as well as the its recent population increases resulting in a relatively new interstate system make its situation and needs unique. Investment in overcapacitated routes may take priority, but should be accomplished in conjunction with meeting other needs such as the North-South Canamex trade route. With increased trade for Arizona, commercial traffic will increase. Magnifying the need to accomplish both priorities—traditional capacity and safety measures and efficiency measures.

INTRODUCTION

The objective of this study is to incorporate freight hauling company concerns and perceptions into an investigation of Arizona State Highway service with particular regard to freight hauling as well as examine what policies other states have implemented to identify options that may mitigate trucking company concerns. Previous studies of highway service have taken a top-down approach and focused solely on physical measures such as pavement performance, level of development of highway segments, capacity and volume, traffic counts and the percentage of commercial traffic (ADOT, 1998). The state has not performed a study in the past asking the actual users of the state highways where the system is lacking or needs improvement. This study will survey freight hauling trucking companies that utilize Arizona's state highway system to assess their perceptions and needs. Interviews of transportation experts will also be included where pertinent to the analysis.

The most recent published documents on Arizona highway service have been reports rather than analyses (ADOT, 1998). The 1998 Status & Condition Report merely presented the data from 1996 including the annual average daily traffic volume, commercial vehicles on the state highway system, bicycle suitability, functional classification, level of development, level of service, and present serviceability rating. While three of these measures are combinations of other measures, they are all physical measures. Level of service is similar to the volume-capacity ratio. This ratio represents the demand flow rate (volume) to capacity. It also utilizes certain qualitative measures describing driving conditions. Level of Development is a hierarchical ordering of road segments. Level of development takes into account the segment's functional classification, level of significance, daily traffic, and truck traffic. The present serviceabilty rating represents abnormal variations in the road surface which are collected via machine. These measurements indicate the smoothness or roughness of the pavement. While it reported all these measures there was no effort in the report to assess problem areas or areas needing improvement as a result of all the measures taken. It also did not account for user perception.

Another report conducted by ADOT, Arizona Highway User Origin and Destination Survey reported characteristics of Arizona's highway users and their most frequently utilized routes to their most frequently visited destinations (Behavior Research Center, 2000). The study's primary focus was the origins and destinations of Arizona residents. The survey sample included 3,210 Arizona residents and fourteen (14) commercial organizations (either companies such as Safeway or commercial freight carriers). However again this is just a report. The findings are merely presented and no analysis is provided regarding highway service. The most salient facts provided by this survey of highway users are that I-10 and I-40 are the most heavily traveled highways by non-Arizona residents and I-10 has the most commercial traffic (42%) followed by I-17 (13%) and US 60 (10%). This is in direct contrast to another report regarding Traffic and Expenditures on Arizona's State Highways (Matranga & Semmens, 2000). This report, based on traffic counts and vehicle classification, found that the most heavily trafficked highways were I-10 and I-40. The aforementioned study also analyzed revenue to expenditure ratios for each route segment in order to aid future infrastructure investment decision-making.

A previous study undertaken on Arizona's freight networks, included attitudinal surveys of freight carriers (Radwan, *et al*, 1987). However the primary objective of this survey was to

utilize it in a simulation of freight flows to assess the potential freight movement impacts on traffic congestion, highway safety, and pavement maintenance. While the attitudinal survey revealed that inferior pavement and delays at intermodal changes were major concerns, the study did not reveal where they were nor to what degree each were important. Rather than focus on commodity freight flows like the Radwan (1987) study, this study investigates freight carrier perceptions of the level of highway service and where it is lacking.

Lastly, a 1997 study reporting highway quality surveyed 2,000 residential users and 200 community leaders (Hernandez, 1997). This report found that 62% of residents and 53% of community leaders found major highways excellent or good, and 58% and 47% of residents and community leaders respectively rated freeways as excellent or good. This study also asked respondents generalized opinions and did not distinguish between specific routes and route segments. In addition, a vital group of users is left out of the survey, commercial freight haulers. since many residents may only travel within their immediate vicinity, it does not give an accurate picture of problems that may exist on rural highways. Commercial haulers, on the other hand, may travel over much of the state utilizing different routes depending upon their destinations. In contrast to their overall satisfaction with highways and freeways, residents also placed highway improvements—highway widening, pavement improvements, and safety features on highways, as their top three transportation spending priorities. Community leaders also placed highway concerns at the top including: widening highways, pavement improvements, building new freeways, and pavement markings on highways. However the survey report did not examine why these improvements were believed to be necessary by the satisfied survey sample.

Freight Transportation

The public sector has traditionally focused on highway system improvements that increase capacity and safety. However, the transportation industry has changed as a result of a highly competitive global market. International trade and transportation agreements have helped global commerce flourish, but today's market depends upon efficient logistics, customer service, and just-in-time inventory systems. Business wants high-quality transportation service that is speedy, flexible, competitively responsive and low cost. Murphy and Hall (1995) showed that in the 1990s, reliability, and transit time were more important than freight rates, possibility of damaged goods and customer service in selecting a motor carrier. Freight carriers and other transport providers have responded by improving their reliability and transit time. To meet customer needs, the public sector should also respond by improving their service to meet these specific market demands.

Williams and Hoel (1998) argue that planning for optimal efficiency is the goal of the future rather than constructing new roadways. They conclude that new analysis methods are needed to model multicommodity flows and integrate planning models with economic equilibrium models. These should be used to assess highway service, plan for freight efficiency, and result in reducing transport operation costs particularly those associated with congestion (Williams and Hoel, 1998). In doing so, the public sector could assist in business and transportation competitive markets.

Greater public sector involvement in improving highway service is being demanded by freight carriers. Golob and Regan (1999) surveyed trucking companies in California to find preferred policy responses to congestion. They found that the most cost feasible methods were improved traffic management, and signal coordination. However, these methods were only supported by small carriers. Support for other methods was dependent upon carrier type. Just-in-time carriers, short haulers and household goods movers supported congestion pricing. Short haul operators supported strategies to increase road capacity. Long haulers, private fleet, truckload and tank operators did not support increasing capacity. Dedicated truck facilities like a single freeway lane or surface street lane to truck traffic, and truck-only streets for access to ports, rail terminals and airports, were favored by users of intermodal rail and maritime facilities, common carriers, and operators engaged in just-in-time deliveries. Users of rail, air, and maritime intermodal facilities, and carriers engaged in long haul operations supported operational efficiency improvements such as intelligent transportation systems, advanced vehicle clearance systems at weigh stations and international border crossings, and truck-only streets for access to ports, rail terminals and airports. Household movers and common carriers favor policies which allow trucks to pre-empt traffic signals, parking bans on some streets, and truck-only lanes on surface streets.

From these examples the public sector is taking a greater role in serving freight transportation needs. Whether this is the result of having no highways to build or the response to a more competitive market is not the concern of this study. The concern of this study is to respond to freight transportation needs by first assessing what and where those needs are in order to better serve freight carriers.

Freight Hauling Restrictions

Freight hauling restrictions such as weight, vehicle size, lane restrictions, and time restrictions and commodity restrictions can impact transit time, and intermodal changes between states. Such restrictions will reduce the level of service of the highway to the freight carrier. For example, weight can impact the infrastructure creating greater stress on pavements, and greater cost to the system as Hewitt *et al* found in Montana (1999). Four scenarios with different allowable maximum gross vehicle weights of up to 128,000 lbs. were studied and analyzed with regard to system performance, safety, transportation costs and changes in the number of trips. In their investigation, they found that if these maximum weights were enforced as policy transportation costs would rise 50%, and increase far more than the infrastructure costs of maintaining the roadways at current allowable gross vehicle weights. Transportation costs were dependent upon industry and increased for heavier weight industries such as milk, cement, and fuel. Infrastructure costs also increased in all but one case. It was found that a heavier truck bearing wheat caused more damage than several trucks hauling the same cargo at the 80,000 lb. limit. In addition, regulating these restrictions, particularly weight, can create time delays of up to 20-30 minutes in a 2 hour observation period as evidenced in Illinois (Benekohal *et al*, 1999). However 30% of the trucks in the study were never inspected at the weigh station, because the weigh station in response to the queue of waiting trucks allowed 30% of the traffic to move on without inspection. This practice has serious implications and consequences such as overweight trucks, damaged pavements and infrastructure, illegal immigration and smuggling concerns.

Jessup and Casavant (1996) investigated weight violations in Washington state. Of all all the vehicles in the study 20% were overweight at three test locations. They found that 81% of violations were occurring at permanent scale houses versus 19% at portable scales at varied locations. They also found through the use of weigh-in-motion technologies that weigh station avoidance was not a significant problem. The collection of such fines was only found to be a problem with in-state carriers. Sixty-two percent of violations were paid without contest; however, these were primarily from out- of-state carriers. Curiagin (1997) also examined weigh station avoidance utilizing four different enforcement strategies: scales open with no citations, scales open with citations issued at scales, scales open with enforcement on bypass routes both issuing violations, and scales open for a short period with enforcement on bypass routes, and rest areas. He found that the most violations occurred from midnight to 6:00AM and the lowest levels from noon to 6:00PM. The study concluded that only intensive enforcement reduced violations to low levels.

Arizona, like other states, has weigh stations. Arizona also has agricultural inspection stations and border patrol inspection stations. Thus there are more opportunities for delays and congestion at various stopping points in the system.

Pavement Performance

Pavement performance can hinder or help highway service. Aging pavements can result in increased congestion, delays, reduced safety, reduced service, pollution, and even catastrophic failure resulting in collapse of the pavement (Owusu-Antwi, 1999). It is necessary to monitor roadways utilizing mechanized profilers that measure the roughness of roads and

rate it according to an international standard. With pavement condition analysis programs, states have the ability to better manage maintenance projects. Arizona's condition analysis program utilizes these roadway ratings to prioritize maintenance projects.

New technologies and design techniques are also making a difference in pavement performance, particularly in preventive maintenance. A preventive maintenance program can be more cost effective because it addresses light deterioration, retards progressive failures, and reduces the need for routine maintenance activities. It also extends the functional life of pavement by applying treatments before deterioration requires a corrective treatment. Preventive maintenance strategies for both low and high volume roads have been successful. Preventive maintenance treatments for flexible pavements include fog seal, chip seal, slurry seal, microsurfacing, crack treatment, and thin hot-mix dense, open and gap graded overlays (Zaniewski and Mamlouk, 1999).

Demonstration projects in several states have been implemented as part of a preventive maintenance study sponsored by the Federal Highway Administration. One or more projects are underway in Colorado, Utah, Michigan and Arizona. Arizona contains three project sites: State route – 260 near Show Low, U.S. – 180 near Springerville, and U.S. – 93 near Kingman (Zaniewski and Mamlouk, 1999). Each project evaluates the effectiveness of preventive maintenace treatments on pavement performance. The study showed that a specific treatment's performance is related to the condition of the pavement at the time the treatment was applied. Treatments applied to pavements in good condition have good results.

This study does not duplicate the pavement priority analysis in Arizona. However, the condition of the pavements on Arizona's roadways will be examined to the extent necessary in an overall study of freight hauling needs. Arizona, like other western states, allows longer combination trucks or LCVs of all three types including: LCV doubles, rocky mountain doubles and triples (U.S. GAO, 1993). These LCVs have been shown to increase wear on pavements, reduce safety and increase weight violation rates (U.S. GAO, 1993; Jessup & Casavant, 1996). Therefore, while pavement performance is certainly a necessary piece of Arizona's highway freight service, it will not be examined in full detail, but merely as a part of Arizona's overall service.

Intermodalism

The interchange points where freight is moved from one mode to another are the weakest links in the national transportation system (Reed, 1996). But in response to business competitiveness, intermodal freight changes are expected to grow at a rate of 13% per year (Clarke, *et al*, 1996). Impediments in efficient intermodal changes can be infrastructural such as poorly located terminals, inadequate size, capacity, layout or access, or operational impediments including a lack of technology like electronic data interchange, or preclearancing, poor coordination of modes, and inadequate operating hours. Impediments can also be regulatory, financial and institutional in nature such as long waiting periods for permits, incompatible size and weight regulations, partial funding of ISTEA for intermodal projects, and the public and private sectors' different or conflicting objectives, priorities and timing (Reed, 1996; Dept. of Transportation, 1995). Intermodal terminals may be poorly located in urban areas without

adequate capacity, pavements, or maintenance. They may also have outdated equipment for managing shipments, or lack electronic data interchange. The last three impediments mentioned have more to do with the slow process of planning than the intermodal points themselves. Many of these inadequacies such as equipment age, terminal location, and the number of vehicle miles traveled are also reflective of highway safety creating a further problem in freight service. Freight carriers' perceptions of intermodal points will be examined as part of the survey. The intent is to find out where the inferior intermodal points are and why they are inferior.

NAFTA and the Impact of the U.S. Mexico Border on Freight Hauling

Since the 1980's, cross-border freight traffic from Mexico to the United States has increased primarily because of the Border Industrialization Program. Established in 1965, this program allows foreign companies to own and operate factories in Mexico and import duty-free equipment and components, if resulting products are exported. (South, 1990). Maquiladoras, or maquilas, are manufacturing plants (primarily assembly) that operate under this agreement.

Since the North American Free Trade Agreement (NAFTA) in 1994, trade flows between the U.S. and Mexico have increased dramatically. From 1994-1996, Mexican trade with the partners of NAFTA rose 67%, while trade with other countries only rose 27% (Riner & Sweeney, 1998). This increase in trade is the result of continued and increased investment in maquiladoras. As of 1999 there were 3,051 maquiladoras employing 1.04 million workers (*The Economist Intelligence Unit*, 1999). From 1998-1999 exports from the maquiladoras increased by 26.3% while non-maquila exports increased only 3.9% (*The Economist Intelligence Unit*, 1999). In that same time period, imports to the maquiladora sector increased by 27.8% while non-maquilas increased only by 4.1%. In November 1998, 91.8% of all exports were manufactured goods. The most recent figures covering the largest period of NAFTA, 1993-1998, showed an increase in maquiladora exports of 135% (Carrera, 1998). These trade increases are still heavily reliant upon the maquila sector because NAFTA is not yet fully phased in. Two more phases in 2003 and 2008 will eliminate tariffs on non-maquila trade in such sectors as oil, steel tubes, non-automotive harnesses, electric capacitors, tiles, glassware, and agricultural products among others (Euromoney, 1995). Previous phases removed tariffs on goods such as automobiles, televisions, and computers.

In Arizona, during the five years prior to NAFTA, exports to Mexico increased 153% (Ammirati, 1999). Since the inception of NAFTA, Arizona exports have increased an additional 83% (Ammirati, 1999). All this increased trade, of course, means greater demands upon transportation systems in all the border states. Transportation is vitally important to maquiladoras, particularly those engaged in just-in-time production systems (South, 1990; Stank & Crum, 1997). Fawcett (1992), in his study of maquilas utilizing trucking, concluded that although transportation costs are higher for the maquiladora operation, companies are willing to forego this extra cost in order to take advantage of the maquiladora's benefits – namely low labor costs. Forty percent of the managers surveyed said their transportation costs were equal to or less than their U.S. facilities' transportation services. The remainder surveyed claimed the cost was only slightly higher. However in terms of information services such as transit time, equipment coordination, and documentation, performance decreased significantly.

However, several factors can hinder the ease of transport and "increase" the friction of distance. Electronic Data Interchange is utilized by many companies as well as maquilas to track just-in-time shipments (Kuby & Reid, 1992; Horowitz, 1990). This system tracks international transactions quickly and reliably via computer and has even been found to reduce the time spent awaiting clearance from U.S. customs at the border. Ford Motor Co. uses this system for both train cargo and truck freight to expedite the clearance process (Horowitz, 1990).

Smaller companies report that trucking is more expensive than train because Mexico regulations force companies to use a national trucking company. Therefore a company would have to use their trucking in the U.S. and a Mexican trucking company in Mexico, unless they can affiliate themselves with a Mexican trucking company (Horowitz, 1990). Currently in many border city pairs, U.S. trucks heading south may cross the border and change to a Mexican carrier and Mexican trucks heading north may cross the border and change to a U.S. carrier. U.S. trucks can travel 26 miles from the border and Mexican trucks also may only pick up or deliver freight within a limited area.

Under NAFTA, the border will eventually be opened to trucking companies from both the U.S. and Mexico; any company may be used in either country (Maltz, et al., 1996; Sutter, 1996, 1997). Originally set to open in 1995, it is still delayed by lobbying from protectionist transportation organizations claiming safety concerns. U.S. and Mexican regulations regarding weight size, length and width do not correspond. There is a concern that many Mexican carriers are overweight. Regulations between the two countries differ greatly (U.S. GAO, 1996). The U.S. limits trucking hours of service to ten hours daily while Mexico has no limits. Mexico also do not require logbooks or front breaks on their carriers. Both are required in the U.S. In addition, Mexico's maximum legal weight is 97,000 pounds; 17,000 lbs. greater than U.S. regulations. Fifty percent of the trucks from Mexico at four border states did not meet U.S. regulations (U.S. GAO, 1996). It was also found that 80% of tridem axle loads and 35% of tandem axle loads from Mexico were overweight (Harrison et al, 1998). Arizona found that 63% of inspected trucks from Mexico in 1994 were put out of service while the statewide average for trucks from all origins was only 24% (U.S. GAO, 1996). Others cite immigration concerns with regard to the operator and illegal migrant transport. The Mexican government has similar safety concerns regarding vehicle length.

Several inefficiencies have been identified with border crossings regardless of the actual inspections process (Dye et al, 1999). U.S. inspection facilities were found to be the primary cause of delays in northbound traffic into the U.S., not the actual border crossing. Inspection facilities are too small to adequately inspect vehicles and too overloaded to work at capacity resulting in trucks being waived through inspections. If trucks do not get inspected, this contributes to other problems such as illegal immigration, drug smuggling, as well as cargoes containing restricted commodities and overweight vehicles. Dye, Bochner and Eckols (1999) suggest demand management practices to reduce delays. In their optimization plan, inspection facilities should be built to meet the expected demand and one large facility should be constructed rather than two smaller and costlier facilities. Liu and Shinbein (1999) take a different approach suggesting managing the traffic demand and capacity on the roadways leading up to the border crossing by diverting them to different inspection areas based on their needs. California receives 24% of the truck traffic from Mexico, and in response has opened two large

permanent inspection stations (U.S. GAO, 1997). Arizona and Texas receive more than 75% of the Mexican traffic combined and have doubled the inspection staff as a result (U.S. GAO, 1997). With 10% of the truck traffic from Mexico distributed across six ports of entry, Arizona currently has no permanent inspection facility. However the idea has been entertained at Nogales, which receives 72% of Arizona's Mexican truck traffic. However both Arizona and Texas have failed to invest in inspection facilities at border crossings citing a lack of space in urban areas. The prevailing attitude in both states is that "NAFTA is a national issue that should not be financed with state funds" (U.S. GAO, 1997).

Lastly, NAFTA also has great implications for potential freight corridors from Mexico to Canada. Having an East - West orientation in its highway transportation system, The U.S. is developing several regional transport corridors. McCray and Harrison (1999), found that several corridors clearly emerge when trade flow routes with Mexico are combined with trade flow routes with Canada. Interstate 69 is planned to extend from Laredo, Texas to Detroit, Michigan (Haines, 1997). It will pass through several economically depressed regions and impact several states' highway infrastructure. Canamex, Arizona's counterpart, extends from Nogales, Arizona and continues through Nevada, Utah, Idaho, and Montana. However not all the roadways in both corridors are interstate roadways. This necessitates expanding capacity on those non-Interstate segments. Canamex is currently involved in infrastructural improvement plans to create an I-19 and I-10 bypass, expand intermodal and warehousing facilities, as well as establishing a new rail port of entry in Naco, Arizona (Canamex, 1999). The organization spearheading the Canamex effort is presently in the planning stages of the corridor. This of course means improved service for Arizona freight. However, it would assist the planning process to determine the neediest areas and their problems, which is the intent of this study.

METHODOLOGY

The objective of this study is to incorporate freight hauling company concerns and perceptions into an investigation of Arizona State Highway service with particular regard to freight hauling as well as examine what policies other states have implemented to identify options that may mitigate trucking company concerns. This study seeks to answer questions regarding which Arizona highway segments are particular problems for trucking firms. It will also identify which problems have to do with regulations, roadways, or intermodal transfers as well as why they believe the problem exists.

State Transportation agencies will also be surveyed to identify options to assist in mitigating trucking concerns. These may be options that Arizona may not be using at this time or they may be entirely different regulatory policies.

Utilizing both surveys, options for Arizona's service will be generated with geographic detail of problem locations. To this end this study will serve as an analytical and prioritizing tool for the Arizona Department of Transportation.

Survey Instrument on State Policies

This survey was conducted by mail and had a 66% response rate (33 of 50 states responded, 4 states responded twice from different administrative units). Respondents were self-selected from all state transportation agencies. The survey asked open-ended questions dealing with three main topics: 1) Transportation Planning, 2) Truck Restrictions, and 3) Enforcement of regulations and fee collections (See Appendix A). Each section is described below.

Transportation Planning

This section included questions regarding data collection methods, types of data collected as well as data not collected that could be useful for meeting freight hauling needs. States were also asked if they take any actions to promote intermodalism and asked to describe these policies and/or projects.

Truck Restrictions

This section included a series of questions regarding state policies restricting freight haulers to particular hours of operation, designated lanes, speeds, and commodities. Respondents were asked if such restrictions existed in their state, and to describe any such restrictions.

Enforcement of Regulations

Respondents were then asked in the following section how restrictions and regulations are enforced and their methods and locations of fee collections. States were also asked whether any steps were taken to expedite regulation enforcement via technological improvements or otherwise.

Survey Instrument on Trucking Firm Perceptions

This survey was also conducted by mail to over 250 freight hauling companies and had a 12% response rate. Respondents were self-selected in this survey as well. The survey asked multiple choice and open-ended questions dealing with five main topics: 1) Carrier Background, 2) Regulatory Problems, 3) Roadway Problems, 4) Intermodalism, 5) ADOT Improvements (See Appendix B). Each section is described below.

Carrier Background

This section inquired as to the types of trucks in respondent firms' fleets including standard vans, double trailers, refrigerated units, flatbeds, cement mixers, and tanks. It also asked questions regarding length of hauls, rural vs. urban hauls, and whether their hauls are primarily within Arizona, have an origin or destination only in Arizona or just passing through Arizona. These background questions will present the carrier industry environment in Arizona as well as have implications for particular urbanized areas and pavement performance.

Regulatory Problems

Respondents were asked in this section to name the segment location along Arizona's highways that was most frequently the worst in each of the following regulatory categories: lane restrictions, hour restrictions, commodity restrictions, weight restrictions, inspection stops, and ports. Firms were also asked to describe the reason behind each problem from their perspective.

Roadway Problems

Respondents were also asked in this section to name the segment location along Arizona's highways that was most frequently the worst in each of the following roadway categories: pavement conditions, road capacity, safety, turnouts, signs, and roadside amenities. As in the previous section, firms were also asked to describe the reason behind each problem from their perspective.

Intermodalism

In this section, firms were asked questions regarding any intermodal transfers they conduct. They were also asked to state those locations that are problematic for intermodal transfers and the reason for the problem.

ADOT Improvements

Lastly freight haulers were asked what the Arizona Department of Transportation could do to improve their service in these and any other areas needing improvement.

GIS Analysis Methods

Geographic Information Systems (GIS) are utilized to map and analyze the commercial freight hauler traffic data. The data are mapped using ArcView GIS, a GIS application software from ESRI, Inc., in order to visualize where the major problem areas are in the State of Arizona. Using GIS analysis, the commercial vehicle traffic counts by highway segment from 1998 (ADOT, 2000) and roadway design data will be used to obtain an accurate picture of major problem areas.

The data analyzed in the GIS analysis is taken directly from the data collected by the Arizona Department of Transportation. These data include: the annual average daily traffic, the number of through lanes, widening feasibility, volume/service flow Ratio, the percent average daily single unit trucks, and the percent average daily combination trucks. The annual average daily commercial traffic is derived from the annual average daily traffic, the percent average daily single unit trucks, and the percent average daily combination trucks. The volume/service flow ratio is a reflection of the capacity per segment. The volume/service flow ratio is a computed value reflecting peak hour congestion for a sample section. (See Appendices E and F for definitions and procedures for data collection).

ANALYSIS AND RESULTS

This section discusses survey results, the GIS analysis and the recommendations proposed by the freight haulers and policy options garnered from the state policy survey in order to improve service to freight haulers.

State Policy Survey Results

Commonalities resulting from the survey were difficult to derive. This survey was conducted by mail and had a 66% response rate with 33 of 50 states responding (See Figure 1 for participating states). Each state has different policies regarding freight hauling service and collects different data on commercial traffic (See Appendix C for response detail). The following sections briefly discuss the range of responses as well as the most common responses on each section of the survey -- 1) Transportation Planning, 2) Truck Restrictions, and 3) Enforcement of regulations and fee collections.

Transportation Planning

The types of data collected by other states included such detailed data gathered from surveys on origin / destination flows, commodities hauled, commodity weights, truck volumes, truck classifications and vehicle miles traveled (See Table 1). These were the most common data collected. Some states also collected data on tonnage by commodity and truck type and crash data as well. Montana was the only state surveyed that collected border crossing data. In addition, Maine and Oregon were the only states to collect data on perceived problems as this study is doing. However some states such as Oklahoma, Nebraska, New Hampshire, North Carolina, Georgia and Utah, collected no data regarding freight hauling at all. Primarily the respondents utilized surveys to collect this data and some purchased data from private agencies and consultants. Many of the states are using a variety of technologies to acquire data including weigh in motion technologies, roadway monitoring data stations, and axle counters.

The majority of states needing additional data were interested in data collection that was more detailed and unique to the needs of that state (See Appendix C for response detail). Those states with common data needs wanted data that other states in the survey were already collecting such as origin / destinations, and commodities (See Table 2). However, some states would like to acquire data that none of the other states are collecting or even interested in collecting. Louisiana, for example, wants to add more geographic detail to its origin / destination data by commodity and mode. It's unclear what detail they require, whether route choice or something else. Missouri is interested in collecting data on trucking routes and freight centers as well. North Dakota currently collects agricultural flow data but wishes to add manufactures to its data set. Nevada is also interested in gathering pipeline data. Others like Wyoming, want to find out what percentage of their truck volume data are simply passing through. Data such as this would be very useful given Wyoming's location along a major trunkline in the U.S. highway system.

In contrast to the variety of data collected by other states, Arizona currently only collects vehicle classification data and annual traffic volumes. It collects this data in a variety of ways including portable electro-pneumatic equipment, handheld tallyers, continuous classifying equipment, weigh in motion devices, axle counters, and tube counts. This devices are used only for data collection however and not regulation enforcement.

Figure 1.
State Agency Survey Participation

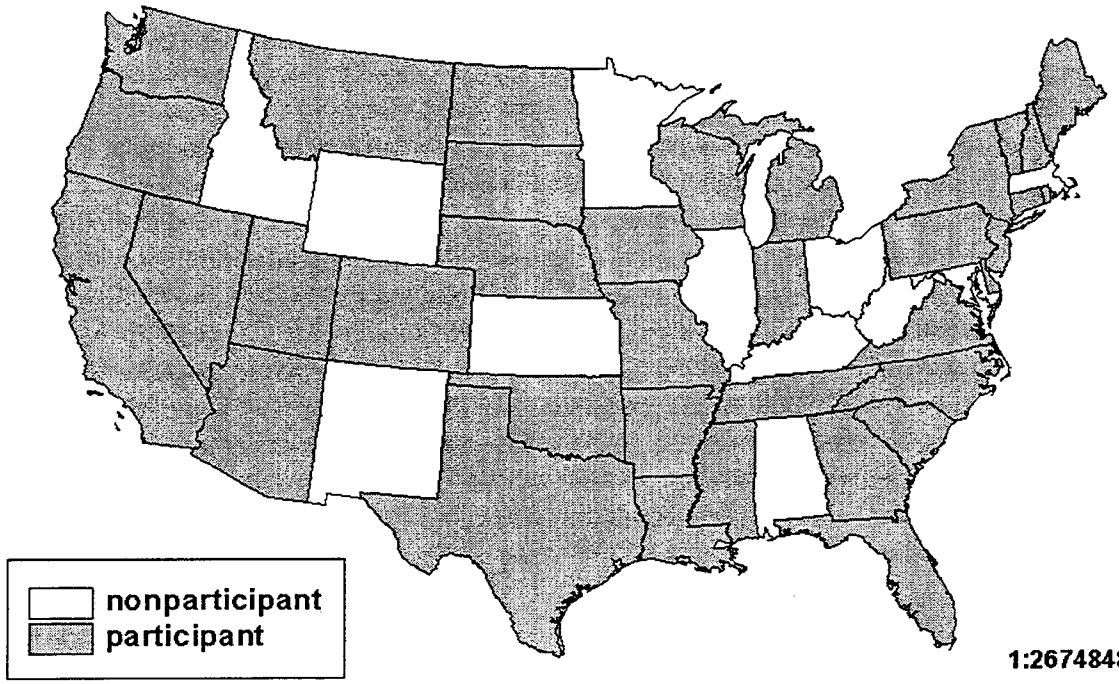


TABLE 1. Data Collected. (See Appendix C for response detail.)

STATE	Origin/ Destination	Vehicle Class	Commodity hauled	Commodity Weights	Truck Volumes	Vehicle Miles Traveled	Other
AR	*		*	*			
AZ		*			*		
CA	*	*			*		
CO		*		*	*		*
CT			*				
DE	*		*				
FL							*
GA							*
IA					*		*
IN					*		
LA	*	*					*
ME	*		*				*
MI		*					*
MO					*		
MS							
MT	*				*	*	*
NC							
ND							*
NE							
NH							
NJ	*		*				*
NV			*	*			*
NY	*		*				*
OK							
OR			*				*
PA		*		*	*		
RI							
SC		*					*
SD					*		*
TN							*
TX	*		*				
UT							
VA							*
VT	*		*	*			*
WA	*	*	*		*		*
WI		*			*		*
WY		*			*		

TABLE 2. Data Wanted but Not Yet Collected. (See Appendix C for response detail.).

STATE	Origin/ Destination	Vehicle Class	Commodity hauled	Commodity Weights	Truck Volumes	Vehicle Miles Traveled	Other
AR							*
AZ							*
CA							*
CO				*		*	
CT							
DE							
FL							*
GA							
IA	*						*
IN					*		
LA	*	*					*
ME	*						*
MI		*					*
MO					*		
MS							
MT	*		*				*
NC							*
ND							*
NE							
NH			*				*
NJ							
NV							*
NY			*	*			*
OK	*						
OR	*		*				*
PA							
RI							
SC			*				*
SD	*						
TN							*
TX							*
UT							
VA							
VT							
WA							
WI							
WY							*

There are over thirty permanent data collection sites and hundreds of temporary sites in various locations around the states. Mark Catchpole and Steve Abney of the Arizona Department of Transportation also responded that they did not know of any other data necessary to freight hauling. However, ADOT at this time has a call for proposals to investigate what types of new data it should be collecting.

States were also asked if they take any actions to promote intermodalism and to describe these policies and/or projects (See Table 3). While most states responded that policies existed or plans to implement policies existed, few states had actually implemented intermodal improvements in their state. The majority were merely "committed" to intermodalism. A few had implemented either policy or infrastructural improvements to promote intermodalism. Louisiana has completed truck / rail interchange improvements and Maine has implemented a rail access program as well as new facilities at border crossings. Iowa has started a rail loan fund program for infrastructural improvements. At a different type of interchange transfer, South Dakota has implemented a road / grain elevator interchange program, and has designated truck routes for its freight. These are concrete steps to promoting intermodal transfers in freight transportation. Other states have very generalized plans or few plans at all. Some merely state that they are committed to promoting intermodalism, while the Arizona respondents stated that they had no effort to promote intermodal activities.

Truck Restrictions

Many states place certain restrictions on trucks transporting materials in their state. These restrictions can be weight related, size related, or commodity related (See Table 4). Restrictions on transport times my also exist in certain states. Arizona, unlike many other states, has very few restrictions on hauling. Arizona has no lane restrictions, but do have hourly restrictions from 7-9AM and 4-6PM (commuter hours) in the urban areas of Phoenix and Tucson. Arizona also has speed restrictions for steep grades and overweight trucks on bridges, and prohibits hazardous cargo in a tunnel on I-10 in Phoenix.

Of the 38 survey respondents, 18 or approximately half stated that they had lane restrictions for freight haulers. Most states had lanes restricted to the two outer lanes particularly if trucks weighed more than 80,000 pounds. Montana, while not restricting trucks to designated lanes, did restrict highway usage to trucks with lower axle weights in the Spring only. However they did not specify the weight requirement. Delaware and Oklahoma also did not restrict freight haulers in general, but did restrict oversize and overweight vehicles to designated routes.

There were 19 survey respondents with hour restrictions. Most required that freight transport be performed during daylight hours particularly if oversized. Washington, Oregon, and Delaware had the added restriction of no holiday transport, and Delaware and Oregon also had no weekend transporting as did Montana and Rhode Island. Transport during peak commuter hours was restricted in Colorado, Georgia, and Oregon.

Only 12 states responded that speed restrictions existed for freight haulers. Most states either restricted haulers to a speed anywhere from 55mph to 65 mph or only restricted speeds on bridges or mountainous terrain as in Colorado. The neighboring states of California and Oregon

restricted speeds to 55 mph. Arkansas and Washington restrict speeds to 65 and 60 mph respectively. Delaware, South Dakota, and Virginia only restricted speeds on bridges or particular roadways. Montana restricts speeds based on location and time of day. It requires 65 mph limits in urban areas, 60 mph on rural highways during the day, and 55 mph on the same highways at night. Other states restricted their speeds based on weightloads. For example, Indiana restricts cargo weighing less than 26,000 pounds to 65mph, loads up to 60,000 lbs. to 60 mph, up to 80,000 lbs. or oversized loads to 45 mph, and supersized loads to 15 mph. Michigan also restricts speeds similarly from 10,000 lbs. to over 150,000 lbs. with restrictions from 55 mph to 45 mph. New Jersey on the other hand, limits speeds to 30 mph if one axle exceeds the weight limit.

All these speed restrictions are indicative of each state's location and type of industry or typical cargo within that state. Those states with speed restrictions based on weight, such as Michigan and Indiana, are areas with a lot of heavy industry and heavier cargoes. Speeds are restricted to decrease pavement damage, as well as for safety. Montana, on the other hand, is very rural and so only restricts speeds at night on rural highways.

Nineteen states surveyed stated that certain cargoes were restricted. All 19 states with cargo regulations had policies restricting the transport of hazardous materials. North Carolina and Nevada were the only states with additional restrictions regarding the transport of mobile homes or manufactured homes. North Carolina also excluded twin trailers in their state. This may also a function of each states location. Nevada has large retirement communities and is a major highway connection to Arizona, which also has large retirement communities with large markets for trailer homes. North Carolina is also on a major north-south transportation route to Florida, another large market for manufactured homes. These states have responded by restricting the flow of this particular pass through traffic.

As evidenced by the aforementioned summary of truck restrictions, Arizona has very few restrictions. This may be because most of Arizona's population is in the two metropolitan areas of Phoenix and Tucson. The remainder of Arizona is more rural. For this reason, there may be little need to restrict weights, speeds, cargoes, and hours of transport outside of its urban areas. However, Arizona also has other characteristics unique to it. Favorable weather conditions, longer distances between incorporated areas, and "a freer" regulatory philosophy in general that when compared to other states also may influence the state's lack of regulations.

TABLE 3. Intermodal Efforts.

STATE	Intermodal	Intermodal Efforts		
AR	yes	intermodal study		
AZ	no			
CA	yes	in planning - 3 documents		
CO	yes	Senate bill 37/rail	State infrastructure bank	
CT	yes	intermodal management system	port development plans	state rail plans
DE	yes	Delaware Area Regional Transit	Cape May/Lewes Ferry, cameras	Share a ride/bike to work, rail to fair
FL	yes	intermodal development program	statewide intermodal system plan	
GA				
IA	yes	eliminate access barriers	equipment, improvements	rail loan fund
IN	yes	committed		
LA	yes	intermodal priority in project selection	truck/rail efficiency improvements	
ME	yes	integrated Freight plan	new facilities, border crossings	rest areas, rail access program
MI	yes	water to truck-bulk	pipelines	Detroit Intermodal Freight Terminal
MO	yes	freight plans		
MS	yes	continuous movement permit		
MT	yes	transportation plan		
NC	no	done by NC dept. of commerce		
ND	yes	rail assistance program		
NE	no			
NH	yes	loan program for rail transfer facilities	restoring inactive rail corridors	
NJ	yes	regional planning activities	www.state.nj.us/transportation/portway support/	
NV	yes	long range transportation plan	MIS corridor studies	individual projects' process
NY	yes	Harlem River Intermodal Terminal	railroad improvements	facility & cargo access programs
OK	yes	future intermodal plan	encourage truckers to use short rails	
OR	yes	intermodal management system	"Freight moves the Oregon Economy"	2 intermodal studies
PA	yes	committed		
RI	no			
SC	yes	study on port		
SD	yes	road/grain elevator	designated truck network	
TN	no			
TX	yes	plan		
UT				
VA	no			
VT	yes	state freight study in future		
WA	yes	Eastern Washington Intermodal Study	see http://fmsib.wa.gov	
WI	yes	intermodal plan		
WY	no			

TABLE 4. Trucking Restrictions.

STATE	Lanes	Hours	Speed	Cargo
AR			rural highways -65 mph	hazardous mat. Pulaski County, & Little Rock
AZ		overweight/oversize during, commuter hours in Phoenix & Tucson	Slower speeds on steep grades; slower speed - bridges for overweight	hazardous cargo thru I10, Phoenix tunnel
CA	right hand lane	extralegal loads only	55 mph	hazardous materials
CO	left lane of I76	restricted commuter hours	mountainous terrain	hazardous material
CT	left lane prohibition	overweight/size- daylight; weekday		
DE	os/ow vehicles; toll plazas, during construction	not on weekends/holidays; daylight only	superloads on bridges	
FL	90000 lbs.- interstates intl. Cargo; 80000 lbs.- all other arterials			
GA	left lane restricted; cannot enter Atlanta without delivery	daylight; no peak commuter hours		hazardous materials
IA				
IN		overweight/oversize-830-1530	<26000lbs. - 65mph; 26000-60000 lbs. - 60mph; >80000 lbs./oversized - 45mph; supersize - 15mph	hazardous materials
LA		in metro areas only		hazardous materials/explosives
ME		daylight for overweight		
MI	right two lanes->10000 lbs.		>10000 lbs.-55 mph on freeways; <150000 lbs. -55 mph on all roads; >150000 lbs. -45 mph on all roads	explosives in Detroit; flammable liquids in Detroit
MO				
MS		daylight		
MT	in spring, lower axle weights only	oversize-no weekends	65 mph- interstate, urban areas; 60 mph day- US93 & other highways; 55 mph night- US93 & other highways	hazardous materials
NC	outer 2 lanes			limit twin trailers; limit mobile homes
ND				hazardous waste
NE	only by weight for bridges	daylight		
NH				radioactive waste
NJ	>10000 lbs. left lane restricted		1 axle exceeds limit - <=30mph	radioactive mat. route controls
NV				hazardous materials; oversize-manufactured homes
NY	third and additional lanes restricted			explosives in NYC tunnels
OK	extra heavy/wide identify routes			
OR	80000 lbs. max.; federal bridge formula	daylight, no weekends, holiday, commuter hours noninterstate	55 mph	hazardous material
PA	right lane			hazardous materials
RI	2 right hand lanes	oversize/weight -no weekend; time of day		
SC				
SD			spring- certain roadways	
TN				
TX		oversize- daylight; cylindrical bales- daylight		hazardous materials
UT	left lane->3 lanes exist & >12000 lbs.	daylight->10'w, 92'l, 14'h		hazardous materials
VA		overwidth- night moves	overweight - on bridges/culverts	
VT				
WA	left restricted-commercial trucks	holidays	60 mph	flammable materials-tunnels I90
WI		oversize		
WY	2 outside lanes only	daylight		

Enforcement of Regulations

In the final section regarding regulation enforcement and fee collection, the method cited most often in the survey was mobile units (see Table 5). Fixed ports of entry were also widely used. Surprisingly, weigh stations were not utilized in many states as fee collection sites. With the exception of California, those states that did utilize weigh stations did not collect fees at fixed ports of entry. Only Arizona collects fees utilizing fixed ports of entry and mobile units as well as special interdepartmental task forces. Three states, Nebraska, Tennessee, and Washington, distinguished between their use of portable scales and mobile units. In these states portable scales and mobile units may refer to different types of technologies even though both are mobile. The same may also be said for ports of entry and weigh stations. A weigh station does not necessarily have to be at a port of entry. In order to enforce weight restrictions, it may be more efficient to have some weigh stations dispersed throughout a state in order to enforce intrastate traffic or that traffic that transports only within that state. Several states also utilized weigh-in-motion technologies to collect fees.

In order to make collections quicker or easier, respondents were asked to describe methods to expedite the collection process. The responses varied widely from the technological such as weigh-in-motion devices, prepasses, the internet, automatic vehicle identification to the not so technological like one-stop-shop centers. Many states have implemented web page payment systems, accept credit cards, and Commercial Vehicle Information systems Networks to electronically track permits and identification with neighboring states. Georgia, Iowa, Michigan, Oregon, Texas, Virginia, and Wyoming are the most technologically advanced in their regulation enforcement. However this does not appear to follow any pattern; they just are the first states to utilize the internet in their enforcement. A second tier of technologically oriented states includes California, Colorado, Indiana, Mississippi, Nevada, Utah, Vermont, Washington and Wisconsin. This second tier group utilizes such items as credit card payment, automatic vehicle identification, and prepass systems, but has not progressed to the internet. The remaining states either have plans for the aforementioned methods or simply us the court system, the state patrol, and payment with registration through the department of transportation. The states in this third category include: Arkansas, Connecticut, Delaware, Florida, Louisiana, Maine, Missouri, Montana, North Carolina, North Dakota, Nebraska, New Hampshire, New Jersey, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, and Tennessee. A few states in this third tier such as Louisiana, Maine, Delaware and Florida have implemented one stop shopping to expedite the process. These third tier states are primarily smaller states with smaller populations and so may have limited resources to implement such collection methods.

Arizona, in comparison with other states, falls in the second tier group. Arizona utilizes electronic issuing systems, credit card payments, and escrow accounts in expediting the permit and regulation enforcement process. However unlike other states in this group they do not use automatic vehicle identification systems or prepass systems. While ADOT has a web page, it is not at this time used to enforce regulations, obtain permits or assist in expediting the permit process in any way.

TABLE 5. Methods and Locations of Fee Collections and Regulatory Enforcement.

State	Mobile Units	Fixed ports of entry	Weigh Stations	Weigh in Motion	Portable Scales
AR	*	*			
AZ	*	*			
CA	*	*	*		
CO	*	*		*	
CT					
DE			*		
FL	*		*		
GA	*		*		
IA			*	*	
IN	*	*	*		
LA	*	*			
ME	*		*		
MI	*		*	*	
MO	*		*		
MS	*	*			
MT	*				
NC	*		*		
ND	*	*			
NE					*
NH	*	*			
NJ					
NV	*	*			
NY	*	*			
OK	*	*			
OR		*			
PA	*				
RI	*				
SC		*			
SD	*	*		*	
TN	*				*
TX	*	*			
UT	*	*		*	
VA	*		*		
VT	*		*		
WA	*	*		*	*
WI	*	*		*	
WY	*	*			

* Note: Only states responding to the survey are shown.

Trucking Firms' Survey Results

The mail-in survey was sent to over 250 freight hauling companies and had a 12% response rate. While a normal response rate for such a survey, within that 12%, a number of freight haulers (10 respondents) answered only questions in the background section. Of these, six freight haulers stated that they had no problems regulatory, roadway or otherwise. Only 20 of 30 respondents answered the survey's remaining sections. This is believed to be a result of the position of the respondent actually filling out the survey – either the president/owner or secretary. The president of a company may not actually be out on the roadways and therefore may not be aware of particular roadway or regulatory problems like their drivers would. A random sample of the actual truckers taken at various truck stops might shed much different results. See Appendix D for Carrier Survey detail.

The trucking companies' lack of detailed response may indicate satisfaction with Arizona State Highway service, ignorance of the existing problems, or apathy towards this investigation or improvement of the system. Therefore, the responses, relayed in the following sections, should be viewed as anecdotal and only giving one an indication of possible problem areas. These sections are -- 1) Carrier Background & Sample Characteristics, 2) Regulatory Problems, 3) Roadway Problems, 4) Intermodalism, and 5) Other Needs and ADOT Improvements.

Carrier Background & Sample Characteristics

The survey sample while representative of the larger population and diverse in the business handled, garnered a response lacking in detail with few problems mentioned. While over half of the survey respondents utilize standard vans, double trailers, refrigerated units and flatbeds are also widely used. Grain trailers, curtain vans, and transfer end dumps were also truck types cited by respondents.

Haul types also varied among respondents. Long distance hauls were cited as frequently as short distance hauls and many respondents do both. The amount of urban only haulers while small, corresponds with intrastate haulers or those haulers operating only in Arizona. The majority of respondents, 77%, stated their routes had either an origin or destination within Arizona. Only 23% of the freight haulers operated passthrough traffic. A previous ADOT sponsored origin and destination survey found that 58% of commercial drivers indicated in-state destinations and 42% indicated out-of-state destinations (Behaviour Research Center, 2000). This survey however had an extremely small commercial sample size of fourteen (14) companies. This statistic also refers to destination only whereas in this report's survey includes either an origin or a destination.

Regulatory Problems

Carriers cited few regulatory problems overall. Those mentioned, primarily were a result of construction or congestion. Several locations were cited for having lane restrictions resulting from construction. I-93 may be a continuing problem due to its already overcapacitated state. However with that exception in mind, construction and congestion along other routes may be the result of seasonal or regular roadway maintenance and not a continuing problem. Hour restrictions were also cited as bothersome as freight haulers are restricted to one lane along I-17

and I-10. But it is not known from their responses when or why these hourly restrictions occur on these routes.

Inspection stops were also considered problematic due to restricted hours of operation for portable inspection stops. However it is not clear if it is problematic because the inspection stops are portable and therefore the hauler does not know when or where it will be open. Since the nature of portable inspection stops is to enforce state regulations, it is not recommended to "fix" this problem for freight haulers.

One hauler in particular stated the need for a program similar to California's inspection program. If a truck passed inspection, they would be issued a compliance sticker so that vehicles are not stopped three times a day. This would result in less time and revenue lost.

Ports of entry were mentioned several times by respondents as problematic. Several ports of entry were entered for a variety of reasons including congestion, one booth operating at a time or no one operating any booth or checking scales for the majority (85%) of the time. One carrier stated that this results in delays up to 15 minutes. Haulers also stated that port officers did not know the regulations well, particularly exempt products. Complaints regarding inspection of domestic products at ports of entry were also issued. Haulers felt that this was repetitive and a loss of time. The design of ports of entry were also at issue with carriers. One carrier stated that it is difficult for extra long trucks to maneuver as a result of the design. Interestingly, international ports of entry were not cited as problematic.

While some of the regulatory problems cited by carriers may be difficult for ADOT to ammend due to the nature of road repair or certain types of regulation enforcement, poorly manned and designed ports of entry are issues that can be resolved with additional staff and infrastructural improvements.

Roadway Problems

Roadway problems, on the other hand, were cited more frequently. Carriers named several locations and routes with poor pavement conditions and referred to rutted lanes, rough bridges and railroad crossings. However, different routes and locations were overcapacitated according to the freight haulers. It is unclear from the survey whether the road segments with poor pavement were neglected or the result of heavy traffic.

Capacity was also mentioned as a safety concern along US 93 and I-8, but other overcapacitated routes were not serious safety hazards. The I-10 tunnel in downtown Phoenix was also perceived to be hazardous due to traffic switching lanes and inadequate lighting in the tunnel. Another issue that may be a safety concern is trucks stopping for ramp metering traffic lights before merging into traffic. This traffic management device may be hazardous for the freight hauler to come to a complete stop and move forward again to try to merge into 65 mph traffic on the freeway.

Signage issues presented by the survey were also related to safety. One carrier felt that signage is necessary on all on ramps along I-10 between 99th Ave. and I-17 reminding motorists

to merge every other vehicle. Related to the aforementioned inadequate lighting in the tunnel, another carrier suggested signage requiring motorists to use headlights while in the tunnel.

Even the problems mentioned under the turnouts and roadside amenities category could be related to safety. Carriers stated that there are not enough turnouts or other places where truckers may rest along Arizona's highways, particularly rural highways. Closed rest areas were also seen to be a hazard to truckers, as were inoperable phones at the rest areas that are open. Should a hauler have a problem at the rest area, he is unable to call from the rest area utilizing the current phone system. Carriers stated that at most rest areas telephones are inoperable.

These roadway problems are correctable problems. With better maintenance of these particular road segments, poor pavement condition can be reduced. Signage can be placed on ramps and in the I-10 tunnel to improve safety. Overcapacitated routes, given time and resources, can be expanded with additional lanes.

Intermodalism

Intermodalism, while of national concern, does not appear to be a concern of Arizona freight hauling. Only 37% of the respondents do some sort of intermodal transfers. Of those the majority make transfers to rail and secondarily make transfers to air. Two carriers in the survey makes transfers to water or shipping modes of traffic, but do so in California which is outside of Arizona.

Complaints regarding intermodal transfers were few. Respondents cited lengthiness of loading/unloading times as well as inadequate operating hours on the part of Union Pacific. It was mentioned that Union Pacific closes its operations too early and is not open for business on weekends, while trucking occurs on a daily basis. While these are valid complaints, little can be done by the Arizona Department of Transportation or the state to improve these specific problems. If more carriers that performed intermodal transfers were surveyed maybe other issues would present themselves relating to ease of intermodal transfers and infrastructure.

ADOT Improvements

In the final portion of the survey, carriers expressed other needs and suggested improvements in Arizona State highway service and regulations. Similar to previous issues presented, many carriers named increased capacity and increased number of turnouts, and a quick completion of the 101 loop. However other needs or improvements regarding Arizona regulations were also expressed. Some carriers complained that the licensing program in Arizona is not competitive with other states resulting in some companies licensing equipment in other states to avoid costs during certain periods. Another stated that out of state haulers undercut Arizona haulers rates. This carrier suggested a standardized freight rate structure be created and enforced by ADOT. Ports were also mentioned needing much improvement regarding efficiency and manpower. One carrier suggested ADOT work more closely with DPS to ensure improvements are made. More law enforcement was also presented as a need on several highways particularly on I-10 and I-8. As major freight corridors with few urbanized areas less law enforcement, it is likely that more vehicles would not abide by state regulations or even have faulty equipment. More patrols may reduce the amount of infractions over a long period of time.

While the aforementioned carriers presented new issues not previously addressed in the survey or reiterated important problems, there were three carriers that expressed the opinion that ADOT's performance is excellent overall and would not make any changes in their service at all. One in particular stated that when improvements were made, conditions worsened. This particular respondent did not give any details on the situation.

GIS Analysis

This section provides a spatial analysis of the commercial freight hauler traffic data and roadway design. The data have been mapped in order to visualize where the major problem areas are in the State of Arizona.

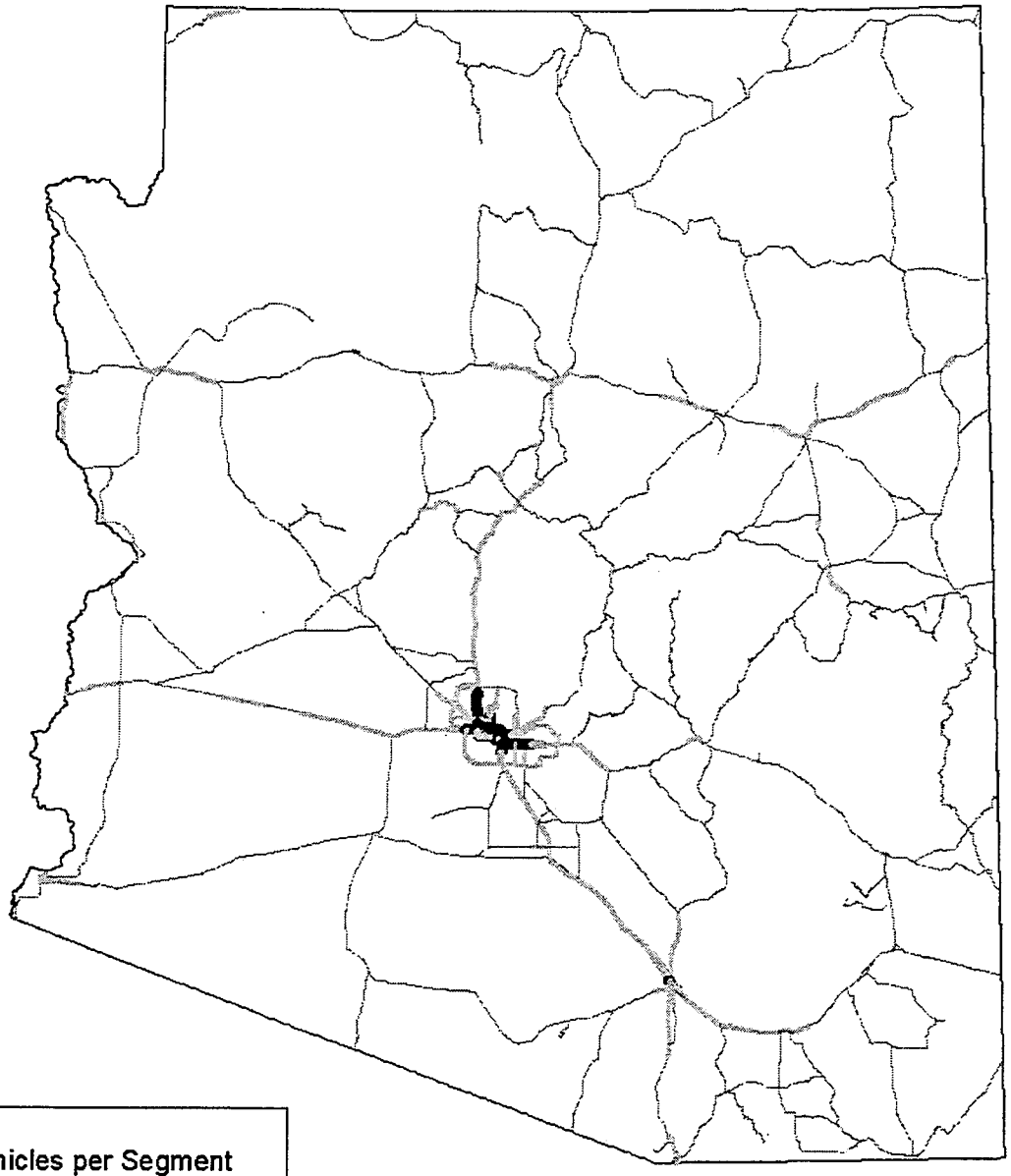
In Figure 2, average annualized daily traffic for all traffic is highest in the Phoenix urban areas. With the exception of Interstate 10 and 17, the remainder of the state has low traffic volumes overall, from 0-17,000 vehicles per day. These are U.S. highways and Arizona's state highways. These routes are mainly two-lane highways (See Figure 5). This lends credence to the argument that Arizona is primarily rural in nature, particularly in its transportation network.

Figure 3 also shows that the average daily commercial (i.e. truck) traffic is highest in Phoenix's urbanized area and interstates. While the volume of traffic is much smaller, the pattern of traffic remains the same. Arizona's state highways have a low volume of commercial traffic (0 - 4,000) in comparison to other segments like I-10 and I-17. However, from the percentage of commercial traffic by highway segment, many of these same two lane routes are major commercial routes. These major non-interstate commercial routes include: US 93, US 60 between Phoenix & Wickenberg, AZ, US 89 by Page, AZ, US 180 by Eagar, AZ, State Route 85 between I-10 and I-8, State Route 377, State Route 277, and State Route 66. All of these routes have only two throughlanes, and yet 22 to 41% of the daily traffic volumes on these segments are commercial truck traffic. Therefore these routes have the same percentage of commercial traffic as the interstate highways in Arizona.

The volume/service flow ratio is a reflection of the capacity per segment. The volume/service flow ratio is a computed value reflecting peak hour congestion for a sample section. (See Appendices E and F for definitions and procedures for data collection). Many of the aforementioned non-interstate routes have high existing volume/service flow ratios, as much as 1.19 on certain segments (See Figure 6 and Table 6). This confirms many of the complaints cited by the trucking companies that participated in the survey particularly those that complained about capacity on US 93. As seen in Figure 6, the major interstates, I-10, I-40, and I-17 have a high volume/service flow ratio particularly I-10 between Phoenix and Tucson. These non - interstate and interstate routes are high priority routes due to the volume of commercial traffic and for severely exceeding the capacity of the route.

Figure 7 shows how much each route with a volume / service ratio exceeding 0.3 can be widened. The interstates 10, 17, and 40 all have high volume / service ratios and can all be widened by up to three or more lanes. The non-interstate high priority routes vary by segment in how many additional lanes they can accommodate. See Table 6 for detail.

Figure 2.
Average Daily Volumes - All Traffic, 1998



# of Vehicles per Segment

- 0 - 17,000
- 17,000 - 60,000
- 60,000 - 126,000
- 126,000 - 240,000

1:3524150

N

Figure 3.
Average Daily Commercial Traffic Volumes, 1998

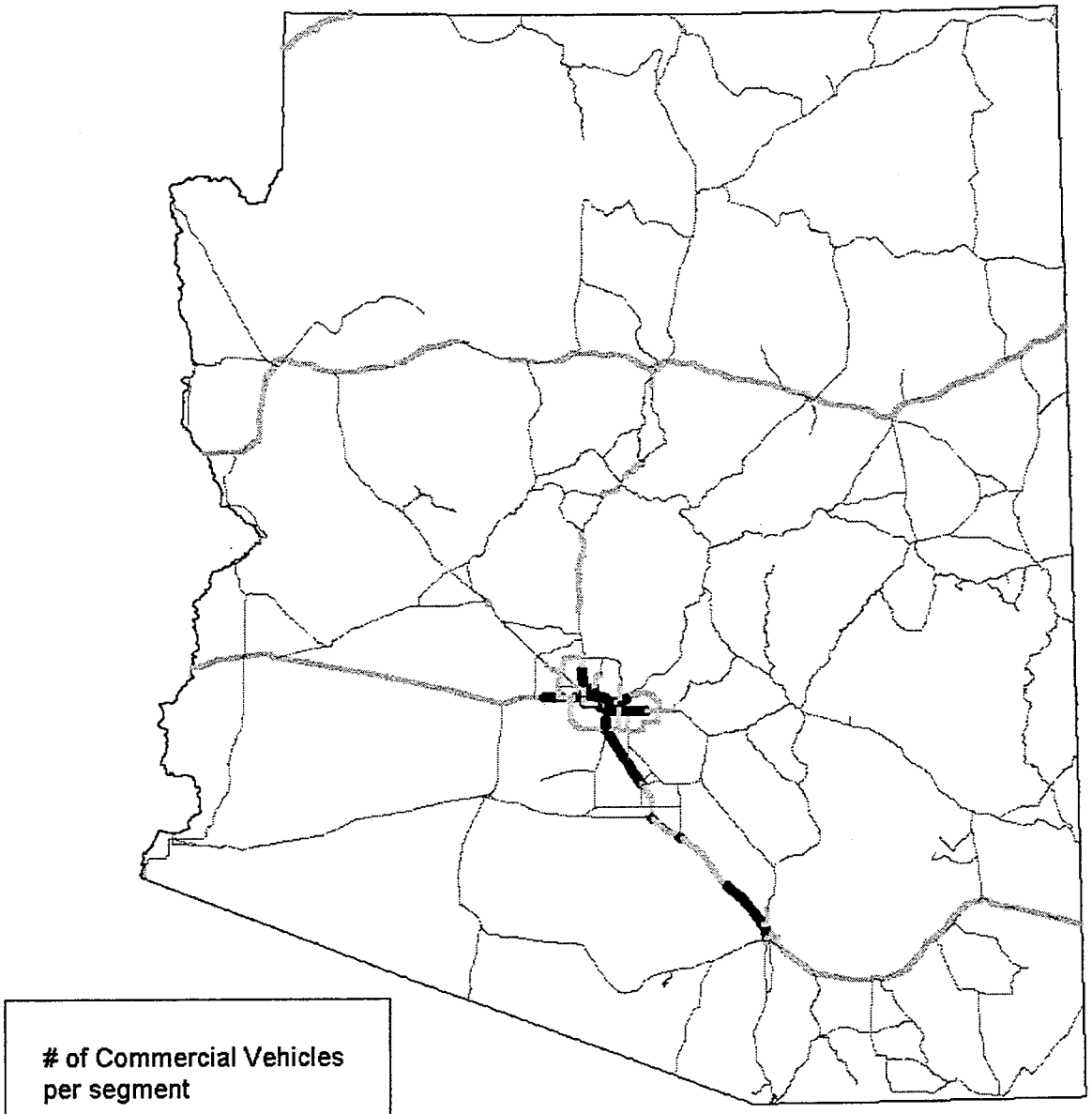
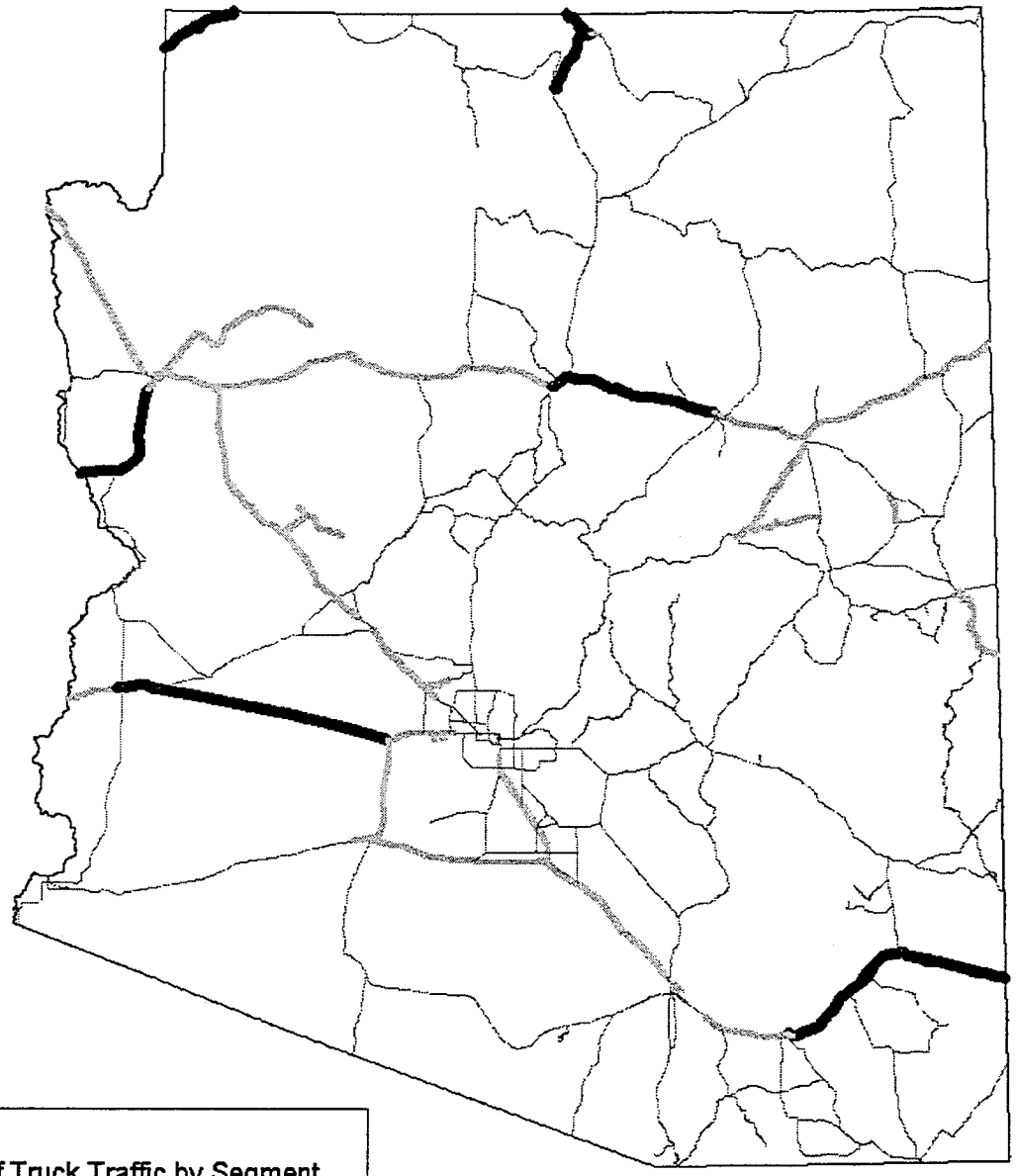


Figure 4.
Percent of Commercial Traffic, 1998



% of Truck Traffic by Segment

2 - 21
22 - 41
42 - 61

1:3524150

N

Figure 5.
Number of Thrulanes

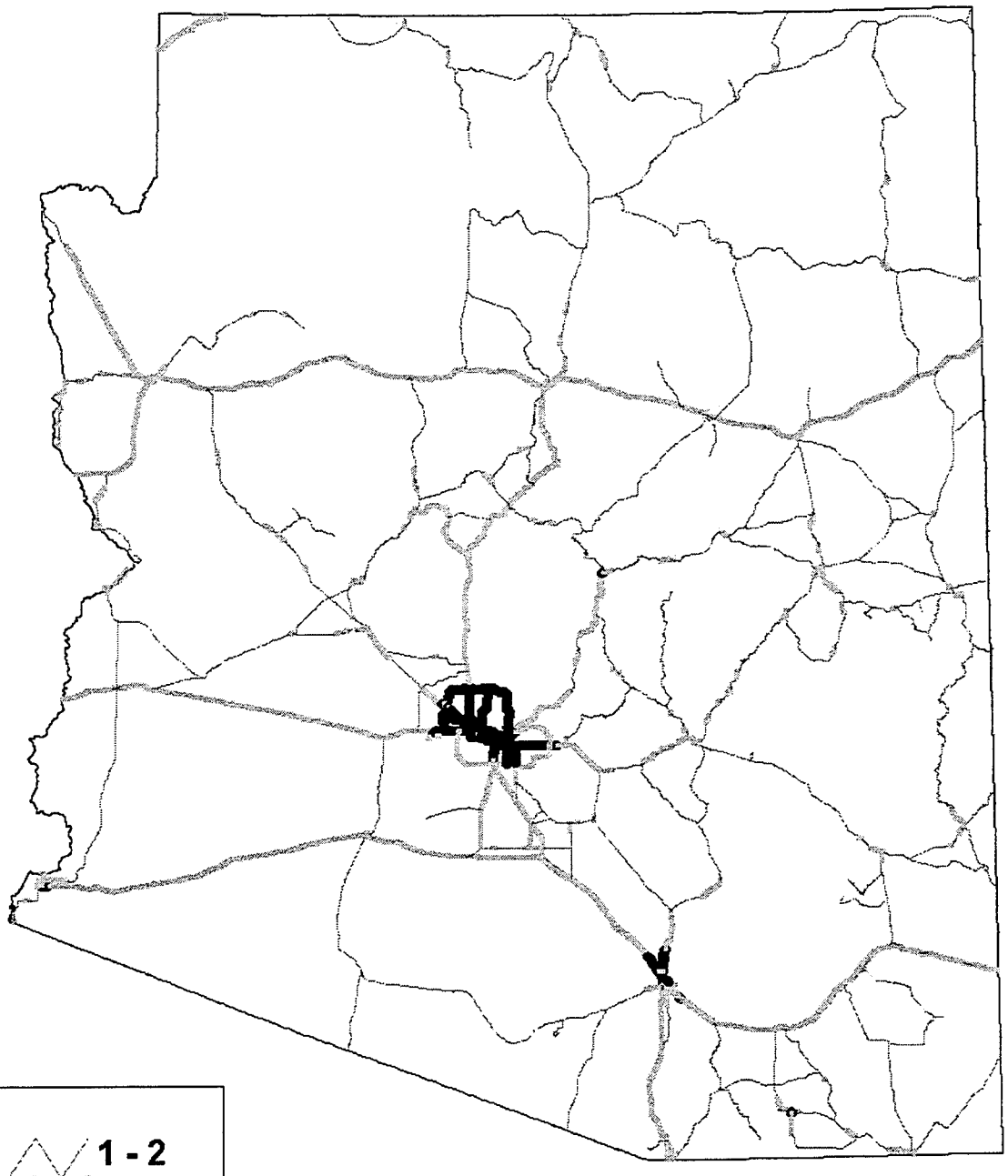


Figure 6.
Volume/Service Flow Ratio, 1998

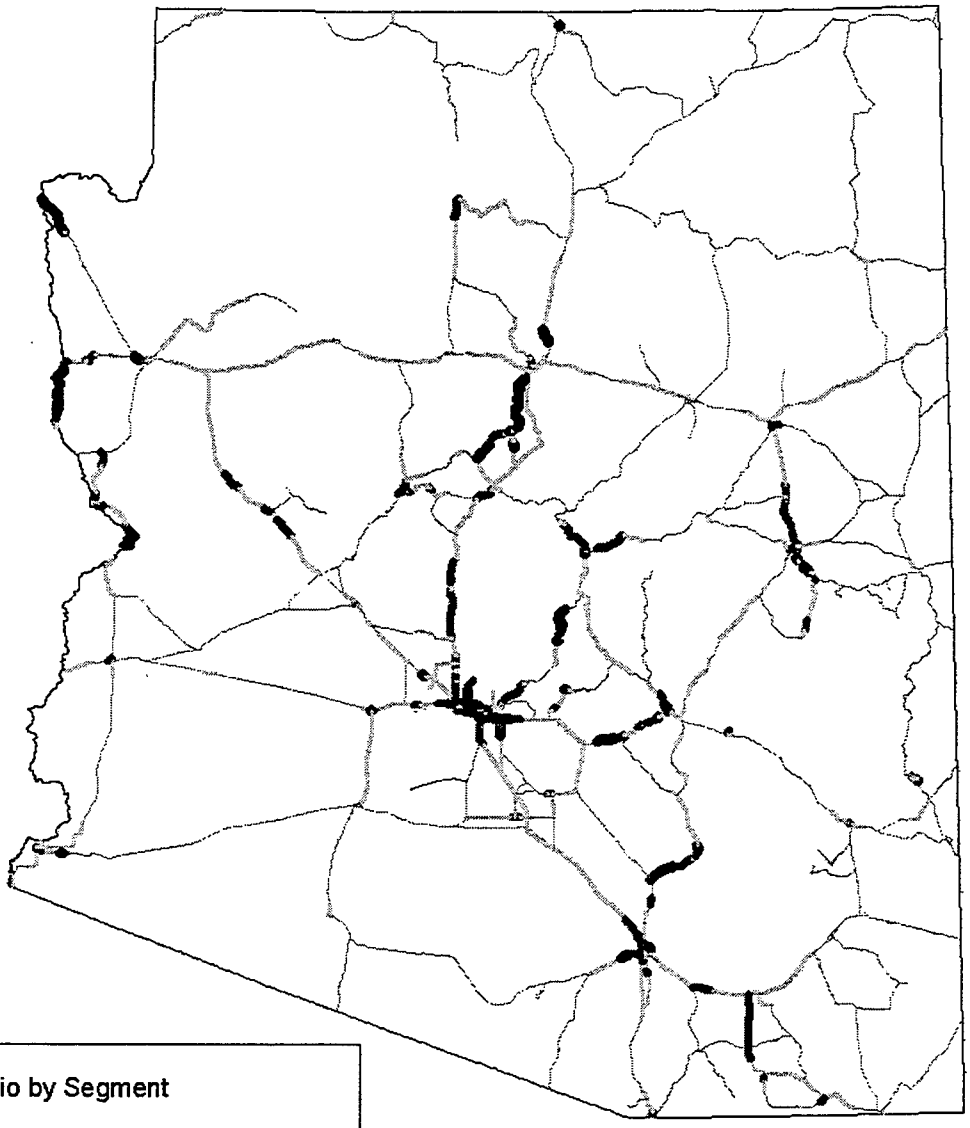
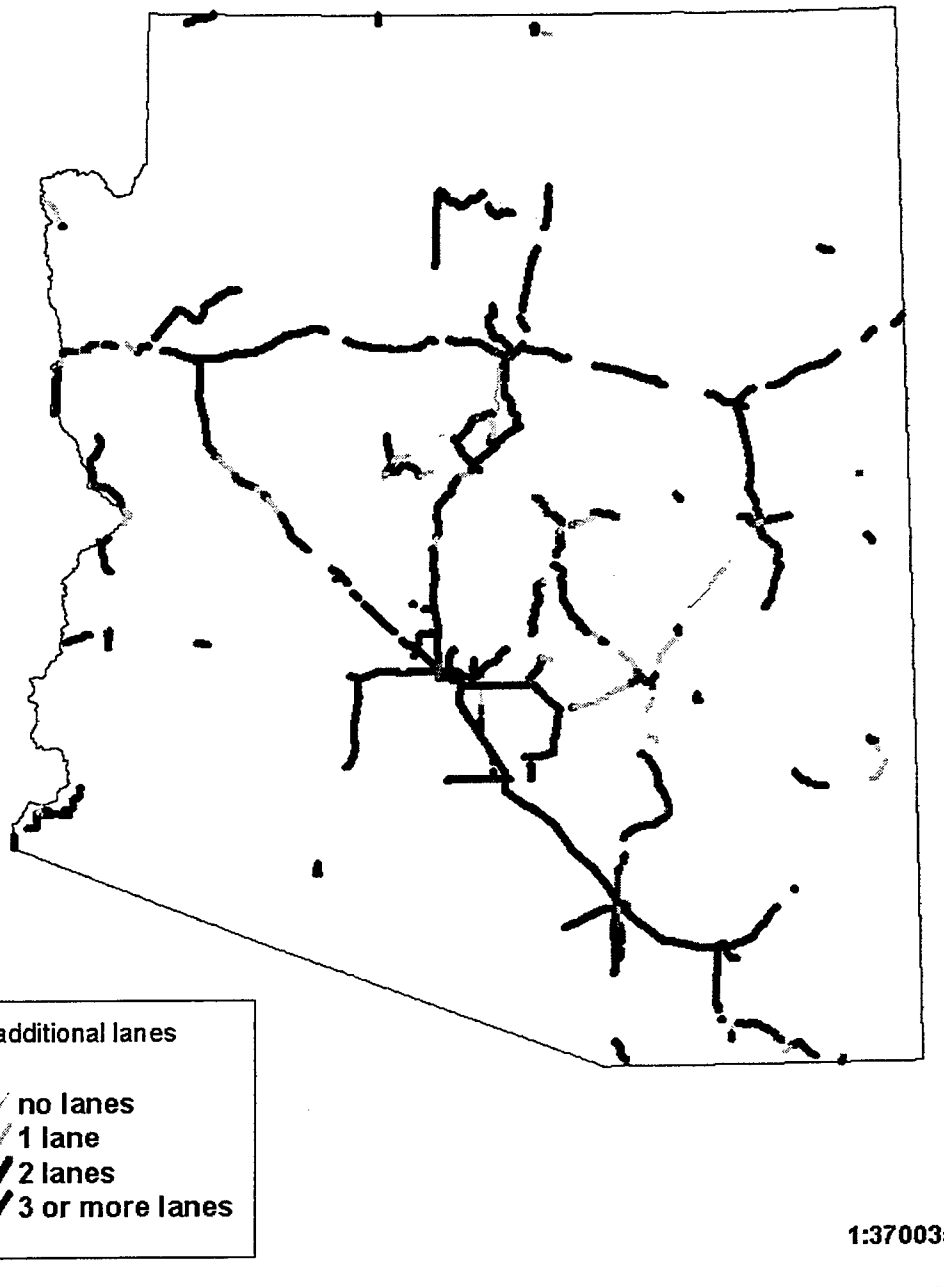


Figure 7.
Segments with high Volume/Service ratios that can be Widened



These routes while major commercial routes in Arizona, are not the only non-interstate routes in need of attention. Other non-interstate routes have extremely high volume / service ratios. Figure 6 shows that the following non-interstate routes in addition to those previously mentioned are severely over capacity. These routes include: State Route 77, State Route 66, State Route 260 by Payson, State Route 188, State Route 90, State Route 87 by Payson, State Route 89 between Sedona and Flagstaff, and US 60 east of Phoenix. These routes are medium priority routes.

The remaining routes in the state do not have high volume/service ratios and are not major commercial routes. Commercial traffic is only 2-21% of all traffic on these routes. These are low priority routes.

In Table 6 the aforementioned high and medium priority non-interstate routes are identified with their current amount of throughlanes, volume/service flow ratio and the number of additional lanes that could be built on each route. Many of the high priority, non-interstate route segments can be widened by more than 3 lanes, as can the medium priority route segments. US 93 varies in how many additional lanes can be added. In the area immediately surrounding Wickenberg, Arizona, the number of additional lanes is zero. While it may be possible to physically widen US 93 around these communities, again it may not be financially feasible. State Route 89 between Sedona and Flagstaff, and US 60 east of Phoenix have very high volume/service flow ratios. However, SR 89A cannot be widened at all and US 60 can only be widened by 1 lane. State Route 89A is impossible to widen due to the terrain, and US 60 east of the Phoenix metro area, it may be financially and environmentally infeasible as well. Therefore, for these two routes, other means of service improvement will have to be investigated.

Table 6. Major Non – Interstate Commercial Routes

Major Route	# of lanes	Volume/Service Flow Ratio	# of additional lanes
HIGH PRIORITY			
US 93	2	0.3-0.89, varies	1 to 3, varies
US 60 Between Phoenix & Wickenberg	2	0.3-0.89, varies	3 or more
US 89 by Page	2	0.6-0.89 in Page, AZ	1 to 3, varies
State Route 85 between I-10 & I-8	2	0.3-0.6	3 or more
MEDIUM PRIORITY			
State Route 77	2	0.3-1.19, varies	3 or more
State Route 66	2	0.3-0.6	3 or more
State Route 260, by Payson	2	0.3-0.89	1 to 2
State Route 87, by Payson	3 to 5	0.6-0.89	2 to 3, varies
State Route 188	2	0.3-0.6	3 or more
State Route 90	2	0.3-0.89	3 or more
State Route 89 between Sedona & Flagstaff	2	0.89-1.19	0
US 60 East of Phoenix	2 to 5	0.3-1.19, varies	0 to 1

CONCLUSIONS

This study incorporates freight hauling company concerns and perceptions in an investigation of Arizona State Highway service as well as examine what policies other states have implemented to identify options that may mitigate trucking company concerns. These concerns and populations were left out of previous reports (Matranga & Semmens, 2000; Hernandez, 1997; ADOT, 1998; Behavior Research Center, 2000; Radwan, *et al*, 1987). This study found that different state agencies have very different restrictions on trucking as well as various means of collection and reinforcement. But it also found that while other states may be moving onto other concerns such as improving efficiency of highway service, Arizona may not only need to improve highway service but also expand capacity and safety. Both of which are traditional spending priorities.

Arizona collects vehicle classification data and annual traffic volumes, utilizing the same methods most cited by other states like axle counter and weigh-in-motion technologies. However unlike other states, Arizona does not use these technologies for regulation enforcement. Very few states had plans to promote intermodal activities. Arizona has no current specific effort to promote intermodal activities.

Freight hauling restrictions can impact transit time. Such restrictions will reduce the level of service of the highway to the freight carrier. However, Arizona, unlike many other states, has very few restrictions on hauling. This may be because most of Arizona's population is in the two metropolitan areas of Phoenix and Tucson. Arizona has no lane restrictions, but do have hourly restrictions from 7-9AM and 4-6PM (commuter hours) in the urban areas of Phoenix and Tucson. Arizona also has speed restrictions for steep grades and overweight trucks on bridges, and prohibits hazardous cargo in a tunnel on I-10 in Phoenix. In the trucking survey, carriers cited few regulatory problems overall. Those mentioned, primarily were a result of construction or congestion. Therefore regulatory hauling restrictions do not appear to adversely impact level of service. Arizona's rural nature was also found to be influential on the lack of regulatory measures. Favorable weather conditions, longer distances between incorporated areas, and "a freer" regulatory philosophy in general also may influence the state's lack of regulations.

With regard to regulation enforcement, the preferred method of fee collection was mobile units. Fixed ports of entry were also widely used. With the exception of California, those states that did utilize weigh stations did not collect fees at fixed ports of entry. Only Arizona collects fees utilizing fixed ports of entry and mobile units as well as special interdepartmental task forces. Several states also utilized weigh in motion technologies to collect fees. Arizona, like other states, has weigh stations, but they also have agricultural inspection stations and border patrol inspection stations. Thus creating more opportunities for delays and congestion at various stopping points in the system.

The major ports of entry into Arizona via other U.S. states were found to be problematic—in particular, Ehrenberg, Yuma, Parker, and the New Mexico – Arizona port of entry. Problems found with ports of entry included congestion, poor staffing, delays up to 15 minutes, and poor port design.

In Arizona, during the five years prior to NAFTA, exports to Mexico increased 153% (Ammirati, 1999). Since the inception of NAFTA, Arizona exports have increased an additional 83% (Ammirati, 1999). However, trucking survey respondents did not cite international ports of entry as problematic. According to other studies, international port design and cross-border traffic are serious issues and something Arizona has not paid much attention to in the past (Dye et al, 1999; Liu and Shinbein 1999; U.S. GAO, 1997; McCray and Harrison 1999; Haines, 1997; Canamex, 1999). From this study it is unclear how many companies do perform cross-border traffic. Therefore the issue may not be a concern for this particular trucking sample.

NAFTA has great implications for freight corridors from Mexico to Canada. As previously mentioned, McCray and Harrison (1999), showed that several corridors are apparent when trade flow routes from Mexico and Canada are combined. Canamex, Arizona's North American trade route, extends from Nogales, Arizona and continues through Nevada, Utah, Idaho, and Montana. Canamex is currently involved in infrastructural improvement plans to create an I-19 and I-10 bypass, expand intermodal and warehousing facilities, increase capacity along US 93 as well as a new rail port of entry in Naco, Arizona (Canamex, 1999). Future ADOT research should focus on the needs of the commercial cross-border traffic user group.

Roadway Problems found in this study included poor pavements, routes with high/volume service ratios, congestion along specific segments particularly in urban areas, and decreased safety along specific segments due to a lack of signage, capacity, turnouts, and poorly equipped rest areas. Arizona's participation in a pavement demonstration project may in future lead to better pavements. However, Arizona's allowance of longer combination trucks increases wear on pavements, and reduces safety (U.S. GAO, 1993). The majority of problems occurred in the highly trafficked urbanized areas of Phoenix, and the commercial routes like I-10 and US 93.

This study also found that certain non-interstate routes are important commercial traffic routes and have volume / service ratios as high as 1.19. This is in agreement with many of the complaints cited by the trucking companies that participated in the survey. These roadways include: US 93, US 60 Between Phoenix & Wickenberg, AZ, US 89 by Page, AZ, State Route 85 between I-10 and I-8. All of these routes have only two throughlanes, and yet 22 to 41% of the daily traffic volumes on these segments are commercial truck traffic. This lends credence to the argument that Arizona is primarily rural in nature, particularly in its transportation network. These routes as well as the major interstates, I-10, I-17, and I-40 are slated high priority roadways for capacity improvements. Medium priority routes include: State Route 77, State Route 66, State Route 260 by Payson, State Route 188, State Route 90, State Route 87 by Payson, State Route 89 between Sedona and Flagstaff, and US 60 east of Phoenix. The remaining low priority routes have volume/service ratios from only 0 to 0.3 and are not major commercial routes.

This research also found that state agencies' methods to expedite the collection process can be divided into three categories. The first tier states have implemented web page payment systems, accept credit cards, and use Commercial Vehicle Information Systems Networks to electronically track permits and identification with neighboring states. This second tier group

utilizes such items as credit card payment, automatic vehicle identification, and prepass systems, but has not progressed to the internet. The remaining states either have plans for the aforementioned methods or simply use the court system, the state patrol, and payment with registration through the department of transportation. The third tier states are primarily states with smaller populations and so may have limited resources to implement such collection methods.

Arizona, like the second tier group, utilizes electronic issuing systems, credit card payments, and escrow accounts in expediting the permit and regulation enforcement process. However unlike other states in this group they do not use automatic vehicle identification systems or prepass systems. While ADOT has a web page, it is not at this time used to enforce regulations, obtain permits or assist in expediting the permit process in any way. Arizona obviously still has a long way to go in the electronic age. Many trucking companies have access to the internet and email as evidenced by the trucking survey. To save the companies further time and money by further utilizing the web to expedite regulation processes would go along way in serving companies needs.

The transportation industry has changed as a result of a highly competitive global market and thus affected Arizona as well. International trade and transportation agreements have helped global commerce flourish, but today's market depends upon efficient logistics, customer service, and just-in-time inventory systems. Business wants high-quality transportation service that is speedy, flexible, competitively responsive and low cost. Optimal efficiency is the goal of the future rather than constructing new roadways (Williams and Hoel, 1998). Planning models and economic equilibrium models in future will be used to assess highway service, plan for freight efficiency, and result in reducing transport operation costs particularly those associated with congestion (Williams and Hoel, 1998). Methods such as congestion pricing, increasing road capacity, use of electronic data interchange, automated international border clearances and improving intermodal efficiency are the latest developments of transportation service improvement (Golob and Regan, 1999). However, from this research and the relative newness of Arizona's highway system, Arizona not only needs to increase efficiency by redesigning ports of entry, reducing congestion and traffic management, but it also needs to increase capacity along particular road segments such as U.S. 93 and certain parts of I-10.

Clearly Arizona's location as a border state as well as its recent population increases resulting in a relatively new interstate system make its situation and needs unique. Investment in overcapacitated routes may take priority, but should be accomplished in conjunction with meeting other needs such as the North-South Canamex trade route. With increased trade for Arizona, commercial traffic will increase, magnifying the need to accomplish both priorities—traditional capacity and safety measures and efficiency measures.

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APPENDIX A

Survey on Highway Freight Hauling: State Agencies

Name of respondent: _____

Organization/title: _____

State: _____

Phone: _____

e-mail: _____

REGARDING PLANNING TO MEET HIGHWAY FREIGHT HAULING NEEDS

1. What kind of data do you gather to help you assess highway freight hauling needs?

2. How do you gather this data?

3. Is there data that you lack that would be helpful in meeting highway freight hauling needs? If so, what is this data and how would it be used?

4. Does your state take any specific actions designed to promote intermodalism? If so, could you list them or attach a document describing them?

REGARDING TRUCK RESTRICTIONS

5. Some states restrict heavy vehicles to certain designated lanes on multi-laned roadways. Does your state do this? If yes, could you either describe the restriction or attach a document that describes the restriction?

6. Some states restrict heavy vehicles to certain hours of operation. Does your state do this? If yes, could you either describe the restriction or attach a document that describes the restriction?

7. Some states restrict heavy vehicles to lower speed limits. Does your state do this? If yes, could you either describe the restriction or attach a document that describes the restriction?

8. Does your state have any commodity restrictions for particular highway segments? If so, could you describe the commodity restrictions or attach a document describing the restriction?

9. How does your state enforce regulations and collect fees from truckers?
    a. Fixed ports-of-entry
    b. Mobile enforcement units
    c. Other (please specify)

10. What steps does your state take to make the enforcement of regulations and collection of truck fees quick and convenient?

THANK YOU FOR YOUR ASSISTANCE

FOR QUESTIONS CONTACT John Semmens (602-712-3137) OR
jsemmens@dot.state.az.us

If you would like a copy of the final report on this project, please give us your mailing address:

APPENDIX B

Survey on Highway Freight Hauling: Trucking Company Perceptions

Purpose: to gather freight hauling company perceptions of Arizona State highways' level of service. Data gathered from this survey will be utilized in an ADOT sponsored study assessing state highway service of freight needs.

Name of respondent: _____

Organization/title: _____

Address: _____

Phone: _____

e-mail: _____

Carrier Background

1) Do you utilize any of the following in your company?
   (circle each applicable type)
   a) Standard vans
   b) Double trailers
   c) Refrigerated units
   d) Flatbeds
   e) Cement mixers
   f) Tanks
   g) other _____

2) Do you primarily do?
   a) long distance hauls
   b) short distance hauls

3) Does your fleet transport primarily to
   a) rural areas
   b) urban areas
   c) both

4) Does your company primarily haul
   a) intrastate (within Arizona only)
   b) interstate (with an origin or destination within Arizona)
   c) interstate (only passing through Arizona)

Regulatory Problems

5) For each regulatory problem, please list the location in Arizona that is frequently the worst problem for you.

Describe in a few words the reason for this problem. (i.e. I-10 segment between place 1 and place 2, inefficient government employees, poorly designed process, etc.)

Problem	Location	Reason
Lane restrictions		
Hour restrictions		
Commodity restrictions		
Weight restrictions		
Inspection stops		
Ports		
Other		

Roadway Problems

6) For each roadway problem listed, please list the segment of highway in Arizona that is most frequently a problem for you.

Describe in a few words the reason for this problem. (i.e. I-10 segment between place 1 and place 2, cracked pavement, traffic congestion, etc.)

Problem	Segment/location	Reason
Pavement condition		
Road Capacity		
Safety		
Turnouts		
Signs		
Roadside amenities		
Other		

7a) Do you make intermodal transfers?

a. yes (continue to 5b)
b. no (skip to 6a)

7b.) Which mode do you transfer to…

a. rail
b. air

7c.) Do you experience any problems making intermodal changes? Where do you experience intermodal problems and why?

8a) Please describe any other freight hauling needs that are not being adequately served by the Arizona State Highway system.

8b) How do you think ADOT could improve in meeting these needs?

THANK YOU FOR YOUR ASSISTANCE

FOR QUESTIONS CONTACT John Semmens (602-712-3137) OR
jsemmens@dot.state.az.us

If you would like a copy of the final report on this project, please give us your mailing address:

Apendix C - Survey of State Agencies

ORGANIZATION	Arkansas Dept. of Transportation	**RESPONDENT**	Paul Simms
ADDRESS		**TITLE**	Section Head
CITY		**STATE** AR	**ZIP CODE**
PHONE	(501)569-2207	**EMAIL**	pesp210@ahtd.state.ar.us

DATA GATHERED	inbound/outbound products tonnage by freight type tonnage by product type origin/destination	**LACKING DATA**	yes
		DATA NEEDED	TL, LTL support needs
METHOD	survey	**INTERMODAL**	yes
		DESCRIBE	intermodal study

LANE RESTRICTION	no	**HOUR RESCTICTED**	no
DESCRIBE LANE		**DESCRIBE HOURS**	
SPEED RESTRICTED	yes	**CARGO RESTRICTED**	yes
DESCRIBE SPEED	rural highways -65 mph	**RESTRICTION**	hazardous mat. Pulaski County & Little Rock

FEE LOCATION	fixed ports of entry mobile units
ENFORCEMENT	HELP research project (future?)

Apendix C - Survey of State Agencies

ORGANIZATION	ADOT MVD	**RESPONDENT**	Steve Abney/Mark Catchpole
ADDRESS		**TITLE**	Supervisor/Sr. Transportation Planner
CITY	Phoenix	**STATE**	AZ
ZIP CODE			
PHONE	602-712-7181; 602-712-8596	**EMAIL**	sabney@dot.state.az.us; mcatchpole@dot.state.az.us

DATA GATHERED	vehicle classification average annual traffic volumes	**LACKING DATA**	yes
		DATA NEEDED	study of busy freeways to improve design
METHOD	multibank hand held tallyers portable classifying equipment continuous traffic recorders	**INTERMODAL**	no
		DESCRIBE	

LANE RESTRICTION	no	**HOUR RESCTICTED**	yes
DESCRIBE LANE		**DESCRIBE HOURS**	overweight/oversize during commuter hours in Phoenix & Tucson
SPEED RESTRICTED	yes	**CARGO RESTRICTED**	yes
DESCRIBE SPEED	Slower speeds on steep grades slower speed - bridges for overweight	**RESTRICTION**	hazardous cargo thru I10 Phoenix tunnel

FEE LOCATION	Fixed ports of entry mobile enforcement units task force officers
ENFORCEMENT	manuals at no cost electronic permit issuance system credit card payment; escrow accounts; fax requests third party administration; company training

Apendix C - Survey of State Agencies

ORGANIZATION	Motor Fuel Tax Administration	**RESPONDENT**	Ron Pinkett
ADDRESS		**TITLE**	Administrator
CITY		**STATE**	DE
ZIP CODE			
PHONE	(302)744-2730	**EMAIL**	rpinkett@state.de.us

DATA GATHERED	commodity class oversize/overweight vehicle	**LACKING DATA**	no
		DATA NEEDED	
METHOD	permits registration IFP application	**INTERMODAL**	yes
		DESCRIBE	Delaware Area Regional Transit Cape May/Lewes Ferry, cameras Share a ride/bike to work, rail to fair

LANE RESTRICTION	yes	**HOUR RESCTICTED**	yes
DESCRIBE LANE	os/ow vehicles toll plazas during construction	**DESCRIBE HOURS**	not on weekends/holidays daylight only
SPEED RESTRICTED	yes	**CARGO RESTRICTED**	no
DESCRIBE SPEED	superloads on bridges	**RESTRICTION**	

FEE LOCATION	weigh station law enforcement
ENFORCEMENT	DMV law enforcement one stop shop Motor Fuel tax administration

Apendix C - Survey of State Agencies

ORGANIZATION	Florida Dept. of Transportation	**RESPONDENT**	Robert G. Hebert, Jr.
ADDRESS		**TITLE**	Administrator, Ports/Intermodal
CITY		**STATE**	FL
ZIP CODE			
PHONE	(850)414-4546	**EMAIL**	rob.hebert@dot.state.fl.us

DATA GATHERED	truck movement seaport needs	**LACKING DATA**	yes
		DATA NEEDED	future truck movement movement from seaports
METHOD	private studies	**INTERMODAL**	yes
		DESCRIBE	intermodal development program statewide intermodal system plan

LANE RESTRICTION	yes	**HOUR RESCTICTED**	no
DESCRIBE LANE	90000 lbs.- interstates intl. cargo 80000 lbs.- all other arterials	**DESCRIBE HOURS**	
SPEED RESTRICTED	no	**CARGO RESTRICTED**	no
DESCRIBE SPEED		**RESTRICTION**	

FEE LOCATION	weigh stations mobile units motor carrier officer inspections
ENFORCEMENT	surety bond program credit cards accepted cash accepted

Apendix C - Survey of State Agencies

ORGANIZATION	INDOT, Policy & Budget Division	**RESPONDENT**	Glenn Greenlee
ADDRESS		**TITLE**	Policy Analyst
CITY		**STATE**	IN
ZIP CODE			
PHONE	317-842-3784	**EMAIL**	ggreenlee@indot.state.in.us

DATA GATHERED	volume	**LACKING DATA**	no
		DATA NEEDED	
METHOD	electronic counters	**INTERMODAL**	yes
		DESCRIBE	committed

LANE RESTRICTION	no	**HOUR RESCTICTED**	yes
DESCRIBE LANE		**DESCRIBE HOURS**	overweight/oversize-830-1530
SPEED RESTRICTED	yes	**CARGO RESTRICTED**	yes
DESCRIBE SPEED	<26000lbs. - 65mph 26000-60000 lbs. - 60mph >80000 lbs./oversized - 45mph supersize - 15mph	**RESTRICTION**	hazardous materials

FEE LOCATION	Fixed Ports of entry mobile units weigh stations
ENFORCEMENT	fees prearranged station communications

Apendix C - Survey of State Agencies

ORGANIZATION	Louisiana Dept. of Transportation & Dev.	**RESPONDENT**	James B Norman
ADDRESS		**TITLE**	Permits Administrator
CITY		**STATE**	LA
ZIP CODE			
PHONE	225-377-7101	**EMAIL**	jnorman@dotmail.dotd.state.

DATA GATHERED
- vehicle class information
- weight station usage
- special permits issued
- Freight origin-destination by mode
- origin-destination by commodity

LACKING DATA: yes

DATA NEEDED
- geographic detail

METHOD
- Traffic counts
- purchase freight databases

INTERMODAL: yes

DESCRIBE
- intermodal priority in project selection
- truck/rail efficiency improvements

LANE RESTRICTION: no

DESCRIBE LANE

HOUR RESCTICTED: yes

DESCRIBE HOURS
- in metro areas only

SPEED RESTRICTED: no

DESCRIBE SPEED

CARGO RESTRICTED: yes

RESTRICTION
- hazardous materials/explosives

FEE LOCATION
- Fixed Ports of entry
- mobile units

ENFORCEMENT
- one stop shop
- various payment methods
- on the spot collection

Apendix C - Survey of State Agencies

ORGANIZATION	Mississippi Dept. of Transportation	**RESPONDENT**	Carolyn Thornton
ADDRESS		**TITLE**	Traffic Analysis supervisor
CITY		**STATE**	MS
ZIP CODE			
PHONE	(601)359-7685	**EMAIL**	cthornton@mdot.state.ms.us

DATA GATHERED	none	**LACKING DATA**	no
		DATA NEEDED	
METHOD		**INTERMODAL**	yes
		DESCRIBE	continuous movement permit

LANE RESTRICTION	no	**HOUR RESCTICTED**	yes
DESCRIBE LANE		**DESCRIBE HOURS**	daylight
SPEED RESTRICTED	no	**CARGO RESTRICTED**	no
DESCRIBE SPEED		**RESTRICTION**	

FEE LOCATION	fixed ports of entry
	mobile units
ENFORCEMENT	credit card payments
	prepass

Apendix C - Survey of State Agencies

ORGANIZATION	Montana Dept. of Transportation	**RESPONDENT**	Kris Christensen
ADDRESS		**TITLE**	Planner
CITY		**STATE**	MT
		ZIP CODE	
PHONE	(406)444-9240	**EMAIL**	krchristensen@state.mt.us

DATA GATHERED	truck volumes, miles traveled	**LACKING DATA**	yes
	weigh in motion	**DATA NEEDED**	commodities
	border crossings		value
	origin/destination		
	involvement w/ organizations		
		INTERMODAL	yes
METHOD	MDT traffic count program	**DESCRIBE**	transportation plan
	weigh in motion stations		
	port of entry counts		

LANE RESTRICTION	yes	**HOUR RESCTICTED**	yes
DESCRIBE LANE	in spring, lower axle weights only	**DESCRIBE HOURS**	oversize-no weekends
SPEED RESTRICTED	yes	**CARGO RESTRICTED**	yes
DESCRIBE SPEED	65 mph- interstate, urban areas	**RESTRICTION**	hazardous materials
	60 mph day- US93 & other highways		
	55 mph night- US93 & other highways		

FEE LOCATION	fixed port of entry
	mobile units
ENFORCEMENT	prepass system in future

Apendix C - Survey of State Agencies

ORGANIZATION	Nebraska Dept. of Roads	**RESPONDENT**	Ellis Tompkins
ADDRESS		**TITLE**	Intermodal Transportation Engineer
CITY		**STATE**	NE
ZIP CODE			
PHONE	(402)479-3797	**EMAIL**	etompkin@dor.state.ne.us

DATA GATHERED	none	**LACKING DATA**	no
		DATA NEEDED	
METHOD		**INTERMODAL**	no
		DESCRIBE	

LANE RESTRICTION	no	**HOUR RESCTICTED**	yes
DESCRIBE LANE	only by weight for bridges	**DESCRIBE HOURS**	daylight
SPEED RESTRICTED	no	**CARGO RESTRICTED**	no
DESCRIBE SPEED		**RESTRICTION**	

FEE LOCATION	main & district offices
	fixed scales
	temporary scales
ENFORCEMENT	issued by phone/fax
	state patrol

Apendix C - Survey of State Agencies

ORGANIZATION	NH Dept. of Transportation	**RESPONDENT**	John W. Clement
ADDRESS		**TITLE**	Director of Operations
CITY		**STATE**	NH
ZIP CODE			
PHONE	(603)271-3734	**EMAIL**	

DATA GATHERED	none	**LACKING DATA**	yes
		DATA NEEDED	commodity data by route
METHOD	na	**INTERMODAL**	yes
		DESCRIBE	loan program for rail transfer facilities restoring inactive rail corridors

LANE RESTRICTION	no	**HOUR RESCTICTED**	no
DESCRIBE LANE		**DESCRIBE HOURS**	
SPEED RESTRICTED	no	**CARGO RESTRICTED**	yes
DESCRIBE SPEED		**RESTRICTION**	radioactive waste

FEE LOCATION	fixed ports of entry mobile units
ENFORCEMENT	state police registration fees by dept. of safety permit fees by dept. of transportation

Apendix C - Survey of State Agencies

ORGANIZATION	New Jersey Dept. of Transportation	**RESPONDENT**	John Powers & Roman Horodysky
ADDRESS		**TITLE**	
CITY		**STATE**	NJ
ZIP CODE			
PHONE	(609)530-8026	**EMAIL**	johnpowers@dot.state.nj.us & romanhorodysky@dot.state.nj.us

DATA GATHERED	commodity origion/destination terminal location size capacity	**LACKING DATA**	
		DATA NEEDED	
METHOD	proprietary sources consultants staff	**INTERMODAL**	yes
		DESCRIBE	regional planning activities www.state.nj.us/transportation/portway su

LANE RESTRICTION	yes	**HOUR RESCTICTED**	no
DESCRIBE LANE	>10000 lbs. left lane restricted	**DESCRIBE HOURS**	
SPEED RESTRICTED	yes	**CARGO RESTRICTED**	yes
DESCRIBE SPEED	1 axle exceeds limit - <=30mph	**RESTRICTION**	radioactive mat. route controls

FEE LOCATION	IRP IFTA OS/OW permits
ENFORCEMENT	wire services

Apendix C - Survey of State Agencies

ORGANIZATION	Nevada Department of Transportation	**RESPONDENT**	Thomas J. Fronapfel
ADDRESS		**TITLE**	Assistant Director Planning
CITY		**STATE** NV	**ZIP CODE**
PHONE	(775)888-7002	**EMAIL**	tjfronapfel@dot.state.nv.us

DATA GATHERED	2 digit STCC commodity tonnage commodity, present & forecast release by truck, LTL, rail, air	**LACKING DATA**	yes
		DATA NEEDED	pipeline info-fuel, natural gas
METHOD	federal studies Reebie Ass. reports	**INTERMODAL**	yes
		DESCRIBE	long range transportation plan MIS corridor studies individual projects' process

LANE RESTRICTION	no	**HOUR RESCTICTED**	no
DESCRIBE LANE		**DESCRIBE HOURS**	
SPEED RESTRICTED	no	**CARGO RESTRICTED**	yes
DESCRIBE SPEED		**RESTRICTION**	hazardous materials oversize-manufactured homes

FEE LOCATION	fixed ports of entry mobile units dyed fuel testing
ENFORCEMENT	highway patrol mbile command centers laptops

Apendix C - Survey of State Agencies

ORGANIZATION	New York State Depart. of Transportation	**RESPONDENT**	William A. Mohr
ADDRESS		**TITLE**	Intermodal Transportation Specialist I
CITY		**STATE**	NY
ZIP CODE			
PHONE	(518)457-4547	**EMAIL**	amohr@gw.dot.state.ny.us

DATA GATHERED	commodity origin/destination direction of flow ADDT, bridge crossings truck type	**LACKING DATA**	yes
		DATA NEEDED	more detail on commodities weight cost
METHOD	Federal sources toll authorities vendors, studies planning organizations	**INTERMODAL**	yes
		DESCRIBE	Harlem River Intermodal Terminal railroad improvements facility & cargo access programs

LANE RESTRICTION	yes	**HOUR RESCTICTED**	no
DESCRIBE LANE	third and additional lanes restricted	**DESCRIBE HOURS**	
SPEED RESTRICTED	no	**CARGO RESTRICTED**	yes
DESCRIBE SPEED		**RESTRICTION**	explosives in NYC tunnels

FEE LOCATION	1 port of entry mobile units
ENFORCEMENT	state police, DMV, Dept. taxation & finance Dept. of transportation preinspection program, internet common permit for neighboring states

Apendix C - Survey of State Agencies

ORGANIZATION	Oklahoma Dept. of Transportation	**RESPONDENT**	David Streb
ADDRESS		**TITLE**	Assistant Planning Engineer
CITY		**STATE**	OK
ZIP CODE			
PHONE	(405)521-6916	**EMAIL**	dstreb@odot.org

DATA GATHERED	none future intermodal study	**LACKING DATA**	yes
		DATA NEEDED	origin/destination
METHOD	consultant	**INTERMODAL**	yes
		DESCRIBE	future intermodal plan encourage truckers to use short rails

LANE RESTRICTION	yes	**HOUR RESCTICTED**	
DESCRIBE LANE	extra heavy/wide identify routes	**DESCRIBE HOURS**	
SPEED RESTRICTED		**CARGO RESTRICTED**	
DESCRIBE SPEED		**RESTRICTION**	

FEE LOCATION

ENFORCEMENT

Apendix C - Survey of State Agencies

ORGANIZATION	Oklahoma Highway Patrol	**RESPONDENT**	Lt. John Hardridge
ADDRESS		**TITLE**	
CITY		**STATE**	OK
ZIP CODE			
PHONE	(405)521-6103	**EMAIL**	

DATA GATHERED		**LACKING DATA**	
		DATA NEEDED	
METHOD		**INTERMODAL**	
		DESCRIBE	

LANE RESTRICTION	no	**HOUR RESCTICTED**	no
DESCRIBE LANE		**DESCRIBE HOURS**	
SPEED RESTRICTED	no	**CARGO RESTRICTED**	no
DESCRIBE SPEED		**RESTRICTION**	

FEE LOCATION
fixed ports of entry
mobile units

ENFORCEMENT
under current study

Apendix C - Survey of State Agencies

ORGANIZATION	Motor Carrier Division	**RESPONDENT**	Daniel Smyser
ADDRESS		**TITLE**	Chief
CITY		**STATE**	PA
ZIP CODE			
PHONE	717-787-7445	**EMAIL**	smyser@dot.state.pa.us

DATA GATHERED	Standard Weight vehicle class information volume	**LACKING DATA**	
		DATA NEEDED	
METHOD	Roadway Monitoring Data Stations	**INTERMODAL**	yes
		DESCRIBE	committed

LANE RESTRICTION	yes	**HOUR RESCTICTED**	no
DESCRIBE LANE	right lane	**DESCRIBE HOURS**	
SPEED RESTRICTED	no	**CARGO RESTRICTED**	yes
DESCRIBE SPEED		**RESTRICTION**	hazardous materials

FEE LOCATION	mobile units motor vehicle offices
ENFORCEMENT	

Apendix C - Survey of State Agencies

ORGANIZATION	Division of Motor Vehicles	**RESPONDENT**	John DiTomasso
ADDRESS		**TITLE**	Coordinator for Motor Carrier Program
CITY		**STATE**	RI
ZIP CODE			
PHONE	(401)588-3020	**EMAIL**	

DATA GATHERED	none	**LACKING DATA**	no
		DATA NEEDED	na
METHOD	na	**INTERMODAL**	no
		DESCRIBE	

LANE RESTRICTION	yes	**HOUR RESCTICTED**	yes
DESCRIBE LANE	2 right hand lanes	**DESCRIBE HOURS**	oversize/weight -no weekend time of day
SPEED RESTRICTED	no	**CARGO RESTRICTED**	no
DESCRIBE SPEED		**RESTRICTION**	

FEE LOCATION	mobile unit
ENFORCEMENT	future electronic transfers

Apendix C - Survey of State Agencies

ORGANIZATION	South Dakota Dept. of Transportation	**RESPONDENT**	Jerry Ortbahn
ADDRESS		**TITLE**	
CITY		**STATE**	SD
ZIP CODE			
PHONE	(605)773-3155	**EMAIL**	

DATA GATHERED	elevator railcar loadings crop production & forecasts livestock sale volumes truck counts	**LACKING DATA**	yes
		DATA NEEDED	origin/destination
METHOD	other state/federal agencies railroads	**INTERMODAL**	yes
		DESCRIBE	road/grain elevator program designated truck network

LANE RESTRICTION	no	**HOUR RESCTICTED**	no
DESCRIBE LANE		**DESCRIBE HOURS**	
SPEED RESTRICTED	yes	**CARGO RESTRICTED**	no
DESCRIBE SPEED	spring- certain roadways	**RESTRICTION**	

FEE LOCATION	fixed ports of entry mobile units
ENFORCEMENT	weigh in motion

Apendix C - Survey of State Agencies

ORGANIZATION	Tennessee Dept. of Transportation	**RESPONDENT**	Bob Byrd
ADDRESS		**TITLE**	Manager
CITY		**STATE**	TN
ZIP CODE			
PHONE	(615)741-4863	**EMAIL**	bbyrd@mail.state.tn.us

DATA GATHERED	general information	**LACKING DATA**	no
		DATA NEEDED	
METHOD	3 meetings per year	**INTERMODAL**	no
		DESCRIBE	

LANE RESTRICTION	no	**HOUR RESCTICTED**	no
DESCRIBE LANE		**DESCRIBE HOURS**	
SPEED RESTRICTED	no	**CARGO RESTRICTED**	no
DESCRIBE SPEED		**RESTRICTION**	

FEE LOCATION	mobile units scales
ENFORCEMENT	

Apendix C - Survey of State Agencies

ORGANIZATION	Motor Carrier Division	**RESPONDENT**	Richard Clasby
ADDRESS		**TITLE**	Administrator
CITY		**STATE**	UT
ZIP CODE			
PHONE		**EMAIL**	rclasby@dot.state.ut.us

DATA GATHERED

LACKING DATA

DATA NEEDED

METHOD

INTERMODAL

DESCRIBE

LANE RESTRICTION yes

DESCRIBE LANE left lane->3 lanes exist & >12000 lbs.

HOUR RESCTICTED yes

DESCRIBE HOURS daylight->10'w, 92'l, 14'h

SPEED RESTRICTED no

DESCRIBE SPEED

CARGO RESTRICTED yes

RESTRICTION hazardous materials

FEE LOCATION

fixed ports of entry

mobile units

ENFORCEMENT

weigh in motion

automatic vehicle identification

Apendix C - Survey of State Agencies

ORGANIZATION	Virginia DOT	**RESPONDENT**	Theodore H. Taylor, Jr.
ADDRESS		**TITLE**	Asst. Permit Operations Program Mgr.
CITY		**STATE** VA	**ZIP CODE**
PHONE	(804)786-7645	**EMAIL**	tay1lor_th@vdot.state.va.us

DATA GATHERED	permit information height, weight, width, length- vehicle	**LACKING DATA**	no
		DATA NEEDED	
METHOD	application phone	**INTERMODAL**	no
		DESCRIBE	

LANE RESTRICTION	no	**HOUR RESCTICTED**	yes
DESCRIBE LANE		**DESCRIBE HOURS**	overwidth- night moves
SPEED RESTRICTED	yes	**CARGO RESTRICTED**	no
DESCRIBE SPEED	overweight - on bridges/culverts	**RESTRICTION**	

FEE LOCATION	mobile units weigh stations (permanent)
ENFORCEMENT	courts e-commerce in future

Apendix C - Survey of State Agencies

ORGANIZATION	Wisconsin State Patrol	**RESPONDENT**	Jeff Lorentz
ADDRESS		**TITLE**	Lieutenant
CITY		**STATE**	WI
ZIP CODE			
PHONE	608-267-0325	**EMAIL**	Jeffrey.Lorentz@dot.state.wi.us

DATA GATHERED	volume vehicle class direction road conditions/wear crash data	**LACKING DATA**	no
		DATA NEEDED	
METHOD	highway sensors crash reports	**INTERMODAL**	yes
		DESCRIBE	intermodal plan

LANE RESTRICTION	no	**HOUR RESCTICTED**	yes
DESCRIBE LANE		**DESCRIBE HOURS**	oversize
SPEED RESTRICTED	no	**CARGO RESTRICTED**	no
DESCRIBE SPEED		**RESTRICTION**	

FEE LOCATION	fixed ports of entry mobile units state patrol
ENFORCEMENT	weigh in motion scales electronic citations

Apendix C - Survey of State Agencies

ORGANIZATION	WYDOT	**RESPONDENT**	John Lane
ADDRESS		**TITLE**	Systems Planning Engineer
CITY		**STATE**	WY
ZIP CODE			
PHONE	(307)777-4180	**EMAIL**	jlane@state.wy.us

DATA GATHERED	volumes vehicle classification	**LACKING DATA**	yes
		DATA NEEDED	pass-through freight
METHOD		**INTERMODAL**	no
		DESCRIBE	

LANE RESTRICTION	yes	**HOUR RESCTICTED**	yes
DESCRIBE LANE	2 outside lanes only	**DESCRIBE HOURS**	daylight
SPEED RESTRICTED	no	**CARGO RESTRICTED**	no
DESCRIBE SPEED		**RESTRICTION**	

FEE LOCATION	fixed ports of entry mobile units
ENFORCEMENT	pre-pass Commercial Vehicle Information Systems Network

Apendix C - Survey of State Agencies

ORGANIZATION	Vermont Agency of Transportation	**RESPONDENT**	Ellen Churchill
ADDRESS	National Life Building, Drawer 35	**TITLE**	Intermodal Planner
CITY	Montpelier	**STATE**	VT
ZIP CODE	05633-5001		
PHONE	(802)828-5790	**EMAIL**	eleni.churchill@state.vt.us

DATA GATHERED	type, volume, weight of commodities origin destination route info	**LACKING DATA**	yes
		DATA NEEDED	uncertain
METHOD	roadside surveys survey of shipper/carriers purchsed databases	**INTERMODAL**	yes
		DESCRIBE	state freight study in future

LANE RESTRICTION	no	**HOUR RESCTICTED**	no
DESCRIBE LANE		**DESCRIBE HOURS**	
SPEED RESTRICTED	no	**CARGO RESTRICTED**	no
DESCRIBE SPEED		**RESTRICTION**	

FEE LOCATION	mobile units
ENFORCEMENT	centralized computerized service

Apendix C - Survey of State Agencies

ORGANIZATION	Connecticut Department of Transportation	**RESPONDENT**	Gerald Jennings
ADDRESS	2800 Berlin Trunpike P.O Box 317546	**TITLE**	Transportation Supervisory Planner
CITY	Newington	**STATE**	CT
ZIP CODE	06131-7546		
PHONE	(860)594-2134; 594-2140	**EMAIL**	

DATA GATHERED	commodity	**LACKING DATA**	no
		DATA NEEDED	
METHOD	purchased	**INTERMODAL**	yes
		DESCRIBE	intermodal management system port development plans state rail plans

LANE RESTRICTION	yes	**HOUR RESCTICTED**	yes
DESCRIBE LANE	left lane prohibition	**DESCRIBE HOURS**	overweight/size- daylight weekday
SPEED RESTRICTED	no	**CARGO RESTRICTED**	no
DESCRIBE SPEED		**RESTRICTION**	

FEE LOCATION	
ENFORCEMENT	state police collected by state

Apendix C - Survey of State Agencies

ORGANIZATION	NCDOT	**RESPONDENT**	Mike Bruff
ADDRESS	P.O. Box 25201	**TITLE**	Sustems Planning Engineer
CITY	Raleigh	**STATE**	NC
ZIP CODE	27611		
PHONE		**EMAIL**	bruff@dot.state.nc.us

DATA GATHERED	none	**LACKING DATA**	yes
		DATA NEEDED	short distance hauling
		INTERMODAL	no
METHOD		**DESCRIBE**	done by NC dept. of commerce

LANE RESTRICTION	yes	**HOUR RESCTICTED**	no
DESCRIBE LANE	outer 2 lanes	**DESCRIBE HOURS**	
SPEED RESTRICTED	no	**CARGO RESTRICTED**	yes
DESCRIBE SPEED		**RESTRICTION**	limit twin trailers limit mobile homes

FEE LOCATION	mobile units weigh stations
ENFORCEMENT	Division of motor vehicles

Apendix C - Survey of State Agencies

ORGANIZATION	SCDOT	**RESPONDENT**	Richard A. Torbik
ADDRESS	955 Park St.P.O. Box 191	**TITLE**	Chief of Statewide Planning
CITY	Columbia	**STATE**	SC
ZIP CODE	29202-0191		
PHONE	803-737-1440	**EMAIL**	torbikra@dot.state.sc.us

DATA GATHERED	vehicle class truck weight	**LACKING DATA**	yes
		DATA NEEDED	commodity type truck from adjacent states
METHOD	WIM ATR sites	**INTERMODAL**	yes
		DESCRIBE	study on port

LANE RESTRICTION	no	**HOUR RESCTICTED**	no
DESCRIBE LANE		**DESCRIBE HOURS**	
SPEED RESTRICTED	no	**CARGO RESTRICTED**	no
DESCRIBE SPEED		**RESTRICTION**	

FEE LOCATION	Fixed Ports of entry
ENFORCEMENT	working with Dept. of public safety

Apendix C - Survey of State Agencies

ORGANIZATION	Georgia Dept. of Transportation	**RESPONDENT**	Phillip Allen
ADDRESS	935 E. Confederate Ave.	**TITLE**	Administrator
CITY	Atlanta	**STATE**	GA
ZIP CODE	30316-2531		
PHONE	(404)635-8529	**EMAIL**	Phillip.Allen@DOT.state.ga.us

DATA GATHERED

LACKING DATA

DATA NEEDED

METHOD

INTERMODAL

DESCRIBE

LANE RESTRICTION: yes

DESCRIBE LANE: left lane restricted; cannot enter Atlanta without delivery

HOUR RESCTICTED: yes

DESCRIBE HOURS: daylight; no peak commuter hours

SPEED RESTRICTED: no

DESCRIBE SPEED

CARGO RESTRICTED: yes

RESTRICTION: hazardous materials

FEE LOCATION: mobile units; weigh stations

ENFORCEMENT: CVISN

Apendix C - Survey of State Agencies

ORGANIZATION	Maine Dept. of Transportation	**RESPONDENT**	Tim Bolton
ADDRESS	16 State House Station	**TITLE**	Transportation Planning Specialist
CITY	Augusta	**STATE**	ME
ZIP CODE	4333		
PHONE	(207)287-2680	**EMAIL**	tim.bolton@state.me.us

DATA GATHERED	origin/destination commodity type roads used perceived problems	**LACKING DATA**	yes
		DATA NEEDED	more detail origin/destination
METHOD	mail in surveys interviews private databases	**INTERMODAL**	yes
		DESCRIBE	integrated Freight plan new facilities, border crossings rest areas, rail access program

LANE RESTRICTION	no	**HOUR RESCTICTED**	yes
DESCRIBE LANE		**DESCRIBE HOURS**	daylight for overweight
SPEED RESTRICTED	no	**CARGO RESTRICTED**	no
DESCRIBE SPEED		**RESTRICTION**	

FEE LOCATION	off road weigh areas mobile units
ENFORCEMENT	one stop shop state police secretary of state link state motor carrier databases

Apendix C - Survey of State Agencies

ORGANIZATION	Michigan Dept. of Transportation	**RESPONDENT**	Gary D. Taylor
ADDRESS	425 Ottawa, P.O. Box 30050	**TITLE**	Chief Engineer
CITY	Lansing	**STATE**	MI	**ZIP CODE**	48909
PHONE	(517)373-1884	**EMAIL**	

DATA GATHERED	freight projection on commodities	**LACKING DATA**	yes
		DATA NEEDED	more specific information
			size and weight of vehicles
METHOD	public/private databases	**INTERMODAL**	yes
	interviews	**DESCRIBE**	water to truck-bulk
			pipelines
			Detroit Intermodal Freight Terminal

LANE RESTRICTION	yes	**HOUR RESCTICTED**	no
DESCRIBE LANE	right two lanes->10000 lbs.	**DESCRIBE HOURS**	
SPEED RESTRICTED	yes	**CARGO RESTRICTED**	yes
DESCRIBE SPEED	>10000 lbs.-55 mph on freeways	**RESTRICTION**	explosives in Detroit
	<150000 lbs. -55 mph on all roads		flammable liquids in Detroit
	>150000 lbs. -45 mph on all roads		

FEE LOCATION	weigh stations
	weigh in motion
	fixed sites
	mobile units
ENFORCEMENT	state police
	CVIS
	CVIEW

Apendix C - Survey of State Agencies

ORGANIZATION	Iowa Dept. of Transportation	**RESPONDENT**	Stanley D. Peterson
ADDRESS	800 Lincoln Way	**TITLE**	Systems Planning
CITY	Ames	**STATE**	IA
ZIP CODE	50010		
PHONE	(515)239-1386	**EMAIL**	speters@ia.dot.e-mail.com

DATA GATHERED	truck volumes by type & segment tons moved between Iowa & others truck movement intermodal facility, access barriers	**LACKING DATA**	yes
		DATA NEEDED	origin/destination rates future capacity, modal share
METHOD	automated traffic recorders purchased data interviews site surveys	**INTERMODAL**	yes
		DESCRIBE	eliminate access barriers equipment, improvements rail loan fund

LANE RESTRICTION	no	**HOUR RESCTICTED**	no
DESCRIBE LANE		**DESCRIBE HOURS**	
SPEED RESTRICTED	no	**CARGO RESTRICTED**	no
DESCRIBE SPEED		**RESTRICTION**	

FEE LOCATION	weigh stations
ENFORCEMENT	one stop shop, extended hours, on site renewal internet access, credit card accepted, laptops, intrastate & interstate USDOT numbers, bar codes weigh in motion, one-time credentials

Apendix C - Survey of State Agencies

ORGANIZATION	North Dakota Dept. of Transportation	**RESPONDENT**	Jack Olson
ADDRESS	608 E. Boulevard Ave.	**TITLE**	Intermodal Transportation Planner
CITY	Bismarck	**STATE**	ND
ZIP CODE	58505-0700		
PHONE	(701)328-1029	**EMAIL**	jolson@state.nd.us

DATA GATHERED	agricultural movements ESAL's	**LACKING DATA**	yes
		DATA NEEDED	manufacturing data major shipping points
METHOD	USDA	**INTERMODAL**	yes
		DESCRIBE	rail assistance program

LANE RESTRICTION	no	**HOUR RESCTICTED**	no
DESCRIBE LANE		**DESCRIBE HOURS**	
SPEED RESTRICTED	no	**CARGO RESTRICTED**	yes
DESCRIBE SPEED		**RESTRICTION**	hazardous waste

FEE LOCATION	fixed ports of entry mobile units
ENFORCEMENT	highway patrol

Apendix C - Survey of State Agencies

ORGANIZATION		**RESPONDENT**	Jan Skouby
ADDRESS	P.O. Box 270	**TITLE**	Planning Coordinator
CITY	Jefferon City	**STATE**	MO
ZIP CODE	65012		
PHONE	573-526-3649	**EMAIL**	skoubj@mail.modot.state.mo.

DATA GATHERED	volume	**LACKING DATA**	yes
		DATA NEEDED	Commodity type
			truck routes
			freight centers
		INTERMODAL	yes
METHOD	Axle Counter	**DESCRIBE**	freight plans

LANE RESTRICTION	no	**HOUR RESCTICTED**	no
DESCRIBE LANE		**DESCRIBE HOURS**	
SPEED RESTRICTED	no	**CARGO RESTRICTED**	no
DESCRIBE SPEED		**RESTRICTION**	

FEE LOCATION	weigh stations
	mobile units
ENFORCEMENT	oversize & special permits through one office

Apendix C - Survey of State Agencies

ORGANIZATION	Texas Dept. of Transportation	**RESPONDENT**	Monty G. Chamberlain
ADDRESS	125 E. 11th St.	**TITLE**	Administrative Manager
CITY	Austin	**STATE**	TX
ZIP CODE	78701		
PHONE	(512)465-3573	**EMAIL**	mchanbe@mailgw.dot.state.tx.us

DATA GATHERED	origin/destination commodity	**LACKING DATA**	yes
		DATA NEEDED	annual surveys
METHOD	on-site surveys	**INTERMODAL**	yes
		DESCRIBE	plan

LANE RESTRICTION	no	**HOUR RESCTICTED**	yes
DESCRIBE LANE		**DESCRIBE HOURS**	oversize- daylight cylindrical bales- daylight houses- no holidays
SPEED RESTRICTED	no	**CARGO RESTRICTED**	yes
DESCRIBE SPEED		**RESTRICTION**	hazardous materials

FEE LOCATION	fixed ports of entry mobile units
ENFORCEMENT	one stop shop web site future improvements to web site

Apendix C - Survey of State Agencies

ORGANIZATION	Colorado Dept. of Transportation	**RESPONDENT**	Dave Busby
ADDRESS	4201 E. Arkansas Ave.	**TITLE**	
CITY	Denver	**STATE**	CO	**ZIP CODE**	80222
PHONE	(303)757-9700	**EMAIL**	dave.busby@dot.state.co.us

DATA GATHERED	vehicle classification average AADT percent of trucks WIM data	**LACKING DATA**	yes
		DATA NEEDED	weights miles traveled, times
METHOD	roadway loops, poe's ATR's ramp metering radar, WIM equipment	**INTERMODAL**	yes
		DESCRIBE	Senate bill 37/rail State infrastructure bank
LANE RESTRICTION	yes	**HOUR RESCTICTED**	yes
DESCRIBE LANE	left lane of I76	**DESCRIBE HOURS**	restricted commuter hours
SPEED RESTRICTED	yes	**CARGO RESTRICTED**	yes
DESCRIBE SPEED	mountainous terrain	**RESTRICTION**	hazardous material
FEE LOCATION	fixed units mobile units		
ENFORCEMENT	Weigh in motion automated ID workshops, newsletter laptops		

Apendix C - Survey of State Agencies

ORGANIZATION	Caltrans, Traffic Operations	**RESPONDENT**	Casey Robb
ADDRESS	1120 N St., MS 36, Truck Size & WIM, Att: Steven Sowers	**TITLE**	Truck Services
CITY	Sacramento	**STATE**	CA
ZIP CODE	95814		
PHONE	(916)654-5741	**EMAIL**	casey_robb@dot.ca.gov

DATA GATHERED	vehicle classification truck counts origin/destination multimodal tonnage heavy duty truck data	**LACKING DATA**	yes
		DATA NEEDED	shipping/receiving info bill of ladings
		INTERMODAL	yes
METHOD	weigh in motion surveys floating cars purchased data	**DESCRIBE**	in planning - 3 documents

LANE RESTRICTION	yes	**HOUR RESCTICTED**	yes
DESCRIBE LANE	right hand lane	**DESCRIBE HOURS**	extralegal loads only poe's closed at night
SPEED RESTRICTED	yes	**CARGO RESTRICTED**	yes
DESCRIBE SPEED	55 mph	**RESTRICTION**	hazardous materials

FEE LOCATION	fixed ports of entry mobile units weigh stations
ENFORCEMENT	combines fees with registration credit card payment prepass system at weigh stations

Apendix C - Survey of State Agencies

ORGANIZATION	Oregon Dept. of Transportation	**RESPONDENT**	Steve Kale
ADDRESS	555 13th St. NE	**TITLE**	Senior Planner/Economist
CITY	Salem	**STATE**	OR	**ZIP CODE**	97301-4178
PHONE	(503)986-4130	**EMAIL**	steven.r.kale@state.or.us

DATA GATHERED	commodity perceptions capacity intermodal facilities	**LACKING DATA**	yes
		DATA NEEDED	origin/destinations trailer/container commodities
METHOD	public/private sources surveys consultants	**INTERMODAL**	yes
		DESCRIBE	intermodal management system "Freight moves the Oregon Economy" 2 intermodal studies

LANE RESTRICTION	yes	**HOUR RESCTICTED**	yes
DESCRIBE LANE	80000 lbs. max. federal bridge formula	**DESCRIBE HOURS**	daylight, no weekends, holiday commuter hours noninterstate
SPEED RESTRICTED	yes	**CARGO RESTRICTED**	yes
DESCRIBE SPEED	55 mph	**RESTRICTION**	hazardous material

FEE LOCATION	fixed ports of entry mail in person registration office
ENFORCEMENT	mail/in person phone web page

Apendix C - Survey of State Agencies

ORGANIZATION	Transportation Economic Partnerships Division	**RESPONDENT**	Larry Weldon
ADDRESS	P.O. box 47300	**TITLE**	Administrator, Freight Mobility
CITY	Olympia	**STATE**	WA
ZIP CODE	98504-7300		
PHONE	(360)664-2902	**EMAIL**	

DATA GATHERED	Commodity Flows origin-destinations truck counts vehicle classification Air Freight movement waterborne commerce	**LACKING DATA**	no
		DATA NEEDED	
METHOD	survey federal sources	**INTERMODAL**	yes
		DESCRIBE	Eastern Washington Intermodal Study see http://fmsib.wa.gov
LANE RESTRICTION	yes	**HOUR RESCTICTED**	yes
DESCRIBE LANE	left restricted-commercial trucks	**DESCRIBE HOURS**	holidays
SPEED RESTRICTED	yes	**CARGO RESTRICTED**	yes
DESCRIBE SPEED	60 mph	**RESTRICTION**	flammable materials-tunnels I90

FEE LOCATION	fixed ports of entry mobile units portable scales weigh in motion systems
ENFORCEMENT	electronic verification

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION		**RESPONDENT**	John Adkins
ADDRESS	740 Enterprise	**TITLE**	President
CITY		**STATE**	AZ **ZIP-CODE**	
PHONE	(520) 855-5414	**EMAIL**		**COPY?**	yes

TRUCK TYPE	a) Standard vans	**HAUL TYPE**	
			short distance hauls
	d) Flatbeds	**RURAL/URBAN**	urban areas
		INTER/INTRA	interstate- origin/destination in AZ
	g) curtain vans		

REGULATORY PROBLEMS		**LOCATION**
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION	time restrictions	portable
PORTS		
OTHERS		

ROADWAY ISSUES		
PAVEMENT	poor construction	ASR 95; LHC to I-40
CAPACITY		
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	No	**MODE SWITCH**	
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS	IRP in remote locations		

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	A & C Transport	RESPONDENT	
ADDRESS	P.O. Box 1376	TITLE	
CITY	Glendale	STATE	AZ
ZIP-CODE	85311		
PHONE		EMAIL	
COPY?			

TRUCK TYPE	c) Refrigerated units	HAUL TYPE	short distance hauls
RURAL/URBAN	urban areas		
INTER/INTRA	interstate - origin /destination in AZ		

REGULATORY PROBLEMS

		LOCATION
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION	No need to inspect domestic products if inspected at shipping point/ i	
PORTS	Port of entry officers not knowledgable on exempt products	Erinberg, Yuma
OTHERS		

ROADWAY ISSUES

PAVEMENT		
CAPACITY		
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	No	MODE SWITCH	
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS			

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	A & M Diaz Trucking	**RESPONDENT**	Orlando M. Diaz
ADDRESS	1168 N. Bankerd Ave.	**TITLE**	Dispatcher
CITY	Nogales	**STATE**	AZ
ZIP-CODE	85621		
PHONE	(520) 287-4963	**EMAIL**	omdza@aol.com
COPY?			

TRUCK TYPE	c) refrigerated units	**HAUL TYPE**	short distance hauls
		RURAL/URBAN	both
		INTER/INTRA	interstate - origin/destination in AZ

REGULATORY PROBLEMS		**LOCATION**
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS		
OTHERS		

ROADWAY ISSUES		
PAVEMENT		
CAPACITY		
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	No	**MODE SWITCH**	
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS			

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	ABF Freight System Inc.	**RESPONDENT**			
ADDRESS	1305 N. 27th Ave.	**TITLE**			
CITY	Phoenix	**STATE**	AZ	**ZIP-CODE**	
PHONE		**EMAIL**		**COPY?**	

TRUCK TYPE	b) double trailers	**HAUL TYPE**	long distance hauls
		RURAL/URBAN	both
		INTER/INTRA	interstate - origin/destination in AZ

REGULATORY PROBLEMS	**LOCATION**
LANES	I-10 Phoenix area
HOURS	
CARGO	
WEIGHT	
INSPECTION	
PORTS	
OTHERS	

ROADWAY ISSUES

PAVEMENT	
CAPACITY	I-10 & I-17 Phoenix area
SAFETY	
TURNOUTS	
SIGNAGE	
AMENITIES	
OTHER	

INTERMODAL	Yes	**MODE SWITCH**	rail, air
PROBLEMS	no		
OTHER_NEEDS	lack of capacity		
IMPROVEMENTS	more lanes; possible commercial lanes		

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Citizen Express Lines	**RESPONDENT**	Enrique Rodriguez
ADDRESS	# 67 E. Baffert Dr.	**TITLE**	Vice President of freight
CITY	Nogales	**STATE**	AZ
ZIP-CODE	85621		
PHONE	(520) 881-0400	**EMAIL**	kiki_citizens@yahoo.com
COPY?			

TRUCK TYPE	a) Standard vans	**HAUL TYPE**	
	b) double trailers		short distance hauls
RURAL/URBAN	both		
INTER/INTRA	intrastate - in Az only		

REGULATORY PROBLEMS

		LOCATION
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS		
OTHERS		

ROADWAY ISSUES

PAVEMENT		
CAPACITY	congested from 3-7PM	I-19 & I-10 junction
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	Yes	**MODE SWITCH**	rail, air
PROBLEMS	rail - Union Pacific closes too early & are not open on weekends in Phoenix		
OTHER_NEEDS			
IMPROVEMENTS			

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Con-Way Western Express	**RESPONDENT**	Michael P. Sorensen
ADDRESS	858 South 3760 West	**TITLE**	
CITY	Salt Lake City	**STATE**	UT
ZIP-CODE	84104		
PHONE	(801)954-0709	**EMAIL**	sorensen.michael@con-way.com
COPY?	yes		

TRUCK TYPE	a) Standard Vans b) Double trailers	**HAUL TYPE**	long distance hauls short distance hauls
RURAL/URBAN	both		
INTER/INTRA	interstate - origin/destination in AZ		

	REGULATORY PROBLEMS	**LOCATION**
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS	delays, trucks backed out onto eastbound I-10	I-10 Erinberg
OTHERS		

	ROADWAY ISSUES	
PAVEMENT	construction	I-17 from I-10 to 101 loop
CAPACITY	construction,	I-17 from I-10 to 101 loop, US 60 from phoeni
SAFETY	construction,	I-17 from I-10 to 101 loop, US 60 from phoenix to Wickenburg, US 93 from Wickenburg to I-40
TURNOUTS	construction,	I-17 from I-10 to 101 loop, US 60 from phoenix to Wickenburg, US 93 from Wickenburg to I-40
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	Yes	**MODE SWITCH**	air, water
PROBLEMS	yes but not in AZ. Do not use rail due to poor service.		
OTHER_NEEDS	Increase number of highway patrol officers & increase # of patrols on I-8, I-10, I-17 & I-40 (in particular I-10 & I-8).focus on unsafe equipment in inspections.		
IMPROVEMENTS	ADOT could work with DPS at ports to operate more efficiently - more manpower & expanded facilities US60 from Phoenix to Wickenberg & US 93 from Wickenberg to I-40 should be a freeway. US89 from Flagstaff to Utah should be 4 lanes or freeway.		

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Craig Motor Craft	**RESPONDENT**	Terry Craig
ADDRESS	12 S. Tegner St.	**TITLE**	Owner
CITY	Wickenburg	**STATE**	AZ
ZIP-CODE	85390		
PHONE	(520) 684-7862	**EMAIL**	
COPY?			

TRUCK TYPE

d) flatbeds

g) transfer end dump

HAUL TYPE

short distance hauls

RURAL/URBAN both

INTER/INTRA intrastate

REGULATORY PROBLEMS

		LOCATION
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS		
OTHERS		

ROADWAY ISSUES

PAVEMENT		
CAPACITY		
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	No	**MODE SWITCH**	
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS			

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	CTI	**RESPONDENT**	Able Chelette
ADDRESS	4010 S. 30th St.	**TITLE**	President
CITY	Phoenix	**STATE**	AZ **ZIP-CODE**
PHONE	(602) 243-5426	**EMAIL**	**COPY?** yes

TRUCK TYPE	a) Standard vans	**HAUL TYPE**	long distance hauls
	b) Double trailers		short distance hauls
	c) Refrigerated units		
	d) Flatbeds	**RURAL/URBAN**	both
		INTER/INTRA	interstate - origin/destination in AZ

REGULATORY PROBLEMS		**LOCATION**
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS		
OTHERS		

ROADWAY ISSUES		
PAVEMENT	Road and bridges are rough	I-19 between Nogales & Tucson
CAPACITY	Should have 3 lanes	I-10 between Phoenix & Tucson
SAFETY		
TURNOUTS	not enough turnouts or places to pull over so truckers can relax	everywhere
SIGNAGE		
AMENITIES	need more with larger parking lots for trucks	everywhere
OTHER		

INTERMODAL	Yes	**MODE SWITCH**	air, water
PROBLEMS	takes too long to load & unload		long beach
OTHER_NEEDS	need to get warehouses to unload their own freight, I.e. grocers.		
IMPROVEMENTS			

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	DATS Trucking Inc.	**RESPONDENT**	Dale Ipson
ADDRESS	321 N. Old Highway 91	**TITLE**	
CITY	Hurricane	**STATE**	UT
ZIP-CODE	84737		
PHONE	(435) 673-1886	**EMAIL**	dali@datstrucking.com
COPY?			

TRUCK TYPE	a) standard vans	**HAUL TYPE**	a)long distance hauls
	b) Double trailers		short distance hauls
		RURAL/URBAN	both
	f) Tanks	**INTER/INTRA**	interstate- origin, destination in AZ

REGULATORY PROBLEMS		**LOCATION**
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS		
OTHERS		

ROADWAY ISSUES		
PAVEMENT		
CAPACITY	dangerous	US 93
SAFETY	capacity	US 93
TURNOUTS		
SIGNAGE		
AMENITIES	rest area that closed a hardship to drivers	I-15, cedar pockets rest area
OTHER		

INTERMODAL	No	**MODE SWITCH**	
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS			

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Dionne Transportation Services In	**RESPONDENT**	Rick Dionne
ADDRESS	P.O. Box 17090	**TITLE**	President
CITY	Fountain Hills	**STATE**	AZ
ZIP-CODE	85269		
PHONE	(602) 256-6334	**EMAIL**	Dionnetrans@aol.com
COPY?	yes		

TRUCK TYPE	a) Standard vans	**HAUL TYPE**	long distance hauls
			short distance hauls
RURAL/URBAN	both		
INTER/INTRA	interstate - origin/destination in AZ		

REGULATORY PROBLEMS		**LOCATION**
LANES	none	
HOURS	none	
CARGO	none	
WEIGHT	none	
INSPECTION	Need program similar to CA. If passed inspection, issued compliance s	entire state; especially Phoenix
PORTS	none	
OTHERS		

ROADWAY ISSUES		
PAVEMENT	ruts in right lane tend to throw tractor trailer from 1 lane to another	I-10 westbound between Tolleson & Tonopah
CAPACITY	good	
SAFETY	good	
TURNOUTS	turnouts not long enough to pull truck off & stop and also to merge back on to highway with enough speed	most rural highways 93, 60, 79, 87
SIGNAGE	good	
AMENITIES	good	
OTHER		

INTERMODAL	Yes	**MODE SWITCH**	rail, air
PROBLEMS	none		
OTHER_NEEDS	generally good		
IMPROVEMENTS	It is better to have truck traffic stay towards center of highway rather than restrict it to the right lane because of safety and on ramps getting backed up. State should not reduce speed limit of haulers or restrict them to right lane.		

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Englund Equipment Co	RESPONDENT	W.C. Englund
ADDRESS	P.O. Box 250	TITLE	
CITY	Cashion	STATE	AZ
ZIP-CODE	85329		
PHONE	(623) 936-3365	EMAIL	
COPY?	yes		

TRUCK TYPE	a) standard vans	HAUL TYPE	long distance hauls
			short distance hauls
RURAL/URBAN	both		
INTER/INTRA	interstate - origin/destination in AZ		

REGULATORY PROBLEMS	LOCATION
LANES	
HOURS	
CARGO	
WEIGHT	
INSPECTION	
PORTS	
OTHERS	

ROADWAY ISSUES	
PAVEMENT	
CAPACITY	
SAFETY	
TURNOUTS	
SIGNAGE	
AMENITIES	
OTHER	

INTERMODAL	No	MODE SWITCH	
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS			

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Francis Trucking	**RESPONDENT**	Randall D. Francis
ADDRESS	8505 W. Country Gables Dr.	**TITLE**	Owner
CITY		**STATE**	AZ **ZIP-CODE**
PHONE	(623) 815-1330	**EMAIL**	ranfran321@aol.com **COPY?** yes

TRUCK TYPE	c) Refrigerated units	**HAUL TYPE**	long distance hauls
		RURAL/URBAN	both
		INTER/INTRA	interstate - origin, destination in AZ

	REGULATORY PROBLEMS	**LOCATION**
LANES	daily traffic changes, never know where detours are located	I-101 between Glendale ave. & I-10
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS	10-15 min. delays, only 1 booth open	Westbound I-10 NM to AZ
OTHERS	Construction repairs cause rough intersection, speed bumps resulting i	I-8

	ROADWAY ISSUES	
PAVEMENT		
CAPACITY	overcapacity for 2 lane highway	I-10 between Phoenix & Tucson
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES	repairs take too long resulting in rest area cloasure for long periods	rest areas (in general)
OTHER		

INTERMODAL	No	**MODE SWITCH**	
PROBLEMS			
OTHER_NEEDS	AZ licensing program doesn't compete adequately with other states to attract base plating equipment in AZ. Large companies are doing this out of OK to avoid costs of operating in AZ during certain periods.		
IMPROVEMENTS	IFTA program revenues need to compete better with other states so that AZ companies could licsence equipment in AZ. ADOT would make more money also		

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Freeport Transportation	**RESPONDENT**	Steve Bruschke
ADDRESS	431 N. 47th Ave.	**TITLE**	Transportation Manager
CITY	Phoenix	**STATE**	AZ
ZIP-CODE	85043		
PHONE	(602) 233-3891	**EMAIL**	sbruscke@freeport-logistics.com
COPY?			

TRUCK TYPE	a) Standard vans	**HAUL TYPE**	
			short distance hauls
	c) refrigerated units		
	d) flatbeds	**RURAL/URBAN**	urban areas
		INTER/INTRA	intrastate

REGULATORY PROBLEMS

		LOCATION
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS		
OTHERS		

ROADWAY ISSUES

PAVEMENT		
CAPACITY		
SAFETY	unsafe auto drivers	everywhere
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	Yes	**MODE SWITCH**	rail
PROBLEMS	delays at rail yard		
OTHER_NEEDS			
IMPROVEMENTS	build the outer loop, ASAP		

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Greg Moore enterprises Inc.	**RESPONDENT**	
ADDRESS	244 W. Euclid Ave.	**TITLE**	
CITY	Phoenix	**STATE**	AZ
ZIP-CODE			
PHONE	(602) 305-9973	**EMAIL**	
COPY?	yes		

TRUCK TYPE	a) Standard vans	**HAUL TYPE**	long distance hauls
			short distance hauls
	d) Flatbeds	**RURAL/URBAN**	both
		INTER/INTRA	interstate- origin, destination & passthrough

	REGULATORY PROBLEMS	LOCATION
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS	congestion	CA entering AZ
OTHERS		

ROADWAY ISSUES

PAVEMENT		
CAPACITY		
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	No	**MODE SWITCH**	
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS			

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Hour Express Inc.	RESPONDENT	M. Lawlor
ADDRESS	P.O. Box 2285	TITLE	
CITY	Sun City	STATE	AZ
ZIP-CODE	85372		
PHONE	(623) 566-8725	EMAIL	hourex@aol.com
COPY?	yes		

TRUCK TYPE	d) flatbeds	HAUL TYPE	long distance hauls
RURAL/URBAN	both		
INTER/INTRA	interstate - origin/destination in AZ or passthrough		

REGULATORY PROBLEMS

		LOCATION
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS		
OTHERS		

ROADWAY ISSUES

PAVEMENT		
CAPACITY		
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	No	MODE SWITCH	
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS			

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Jim Thompson & Sons Trucking, I	**RESPONDENT**	James E. Thompson
ADDRESS	6243 N. 47th Dr.	**TITLE**	
CITY	Glendale	**STATE**	AZ
ZIP-CODE	85301		
PHONE	(602) 931-1451	**EMAIL**	
COPY?	yes		

TRUCK TYPE	d) flatbeds	**HAUL TYPE**	long distance hauls
		RURAL/URBAN	both
		INTER/INTRA	interstate - origin/destination in AZ

	REGULATORY PROBLEMS	LOCATION
LANES	construction	US-93
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS		
OTHERS		

ROADWAY ISSUES		
PAVEMENT		
CAPACITY		
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	No	**MODE SWITCH**	
PROBLEMS			
OTHER_NEEDS	need a set freight rate structure to stop out of state haulers from undercutting		
IMPROVEMENTS	have ADOT set standard freight rate		

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Kreuziger Trucking Inc.	**RESPONDENT**	David L. kreuziger
ADDRESS	4340 E. Capistrano Ave.	**TITLE**	
CITY	Phoenix	**STATE**	AZ
ZIP-CODE	85044		
PHONE	(480) 496-9932	**EMAIL**	
COPY?	yes		

TRUCK TYPE	a) Standard vans	**HAUL TYPE**	long distance hauls
RURAL/URBAN	urban areas		
INTER/INTRA	interstate - origin/destination in AZ		

REGULATORY PROBLEMS		**LOCATION**
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS		
OTHERS		

ROADWAY ISSUES		
PAVEMENT		
CAPACITY		
SAFETY	more lights are needed & traffic should not be allowed to switch lanes	I-10 Phoenix tunnel
TURNOUTS		
SIGNAGE	advisory signs needed on ramps to remind motorists to merge every other car; signs to use headlights in tunnel	I-10 between 99th Ave. & I-17; I-10 tunnel
AMENITIES	better phone system needed, few have dial tones.	all rest areas
OTHER	Trucks should not have to stop for traffic lights at bottom of ramps	merging ramps everywhere

INTERMODAL	No	**MODE SWITCH**	
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS	whereever there are black tire marks along freeways, a problem exists due to poor design, sings, or lane markings. Is there a citizen discussion group I can become involved in?		

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Los Angeles Yuma Freight Lines, I	**RESPONDENT**	Don Washum
ADDRESS	800 Pacific Ave.	**TITLE**	
CITY	Yuma	**STATE**	AZ
ZIP-CODE	85366-4849		
PHONE	(520) 782-2503	**EMAIL**	
COPY?	yes		

TRUCK TYPE	b) Double trailers	**HAUL TYPE**	long distance hauls
	d) Flatbeds		short distance hauls
RURAL/URBAN	both		
INTER/INTRA	intrastate; interstate - origin/destination in AZ		

REGULATORY PROBLEMS	**LOCATION**
LANES	
HOURS	
CARGO	
WEIGHT	
INSPECTION	
PORTS	
OTHERS	

ROADWAY ISSUES

PAVEMENT	Deep ruts -bad section of road	I-85 between Gila Bend & Mohawk pass
CAPACITY		
SAFETY		I-85 between Gila Bend & Mohawk pass
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	No	**MODE SWITCH**	
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS	satisfied with status quo		

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	M&D Terminals Inc.	**RESPONDENT**	M. Dennis Simmons
ADDRESS	1400 N. 19th Ave.	**TITLE**	
CITY	Phoenix	**STATE**	AZ
ZIP-CODE	85009		
PHONE	(602) 254-6782	**EMAIL**	
COPY?			

TRUCK TYPE	a) Standard vans	**HAUL TYPE**	
	b) Double trailers		short distance hauls
	d) flatbeds		
		RURAL/URBAN	both
		INTER/INTRA	interstate - origin/destination in AZ

REGULATORY PROBLEMS		**LOCATION**
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS		
OTHERS		

ROADWAY ISSUES		
PAVEMENT		
CAPACITY	need more lanes	I-93 from Wickenberg to Kingman
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	Yes	**MODE SWITCH**	rail
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS			

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	M.S. Carriers	**RESPONDENT**	Mick Vaill
ADDRESS	6021 W. Sherman St.	**TITLE**	Safety Manager
CITY	Phoenix	**STATE**	AZ
ZIP-CODE	85382		
PHONE	(602)353-4035	**EMAIL**	Vaillm@mscarriers.com
COPY?			

TRUCK TYPE	a) Standard vans	**HAUL TYPE**	long distance hauls
			short distance hauls
		RURAL/URBAN	both
		INTER/INTRA	interstate - origin/destination in AZ, passthrough

REGULATORY PROBLEMS	**LOCATION**
LANES	
HOURS	
CARGO	
WEIGHT	
INSPECTION	
PORTS	
OTHERS	

ROADWAY ISSUES

PAVEMENT	rough road	I-10 downtown phoenix to Tonopah
CAPACITY	congestion	I-10 exit 138-109
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	No	**MODE SWITCH**	
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS			

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	MST Trucking, Inc.	**RESPONDENT**	Karl Mann
ADDRESS	1611 S. 27th Ave.	**TITLE**	V.P. Of Operations
CITY	Phoenix	**STATE**	AZ
ZIP-CODE	85009		
PHONE	(602)272-5991	**EMAIL**	
COPY?	yes		

TRUCK TYPE	a) Standard vans b) Double trailers	**HAUL TYPE**	long distance hauls
RURAL/URBAN	urban areas		
INTER/INTRA	interstate - origin/destination in AZ		

	REGULATORY PROBLEMS	LOCATION
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS		
OTHERS		

	ROADWAY ISSUES	
PAVEMENT		
CAPACITY		
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	No	**MODE SWITCH**	
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS			

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Official Fast Freight LLC	**RESPONDENT**	Sam Hudson
ADDRESS	3836 W. Buckeye Rd. #E	**TITLE**	Co-owner
CITY	Pheonix	**STATE**	AZ
ZIP-CODE	85009		
PHONE	(602) 352-1000	**EMAIL**	
COPY?	yes		

TRUCK TYPE	a) Standard vans	**HAUL TYPE**	
	b) Double trailers		short distance hauls
RURAL/URBAN	urban areas		
INTER/INTRA	intrastate		

REGULATORY PROBLEMS

LANES	
HOURS	
CARGO	
WEIGHT	
INSPECTION	
PORTS	
OTHERS	

LOCATION

ROADWAY ISSUES

PAVEMENT		
CAPACITY		
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	No	**MODE SWITCH**	
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS			

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Old Dominion Freight	**RESPONDENT**	
ADDRESS	3836 W. Buckeye	**TITLE**	Operating Manager
CITY	Phoenix	**STATE**	AZ
ZIP-CODE			
PHONE	(602) 233-0930	**EMAIL**	
COPY?			

TRUCK TYPE	a) Standard vans	**HAUL TYPE**	long distance hauls
	b) Double trailers		short distance hauls
RURAL/URBAN	both		
INTER/INTRA	interstate - origin/desitnation in AZ, passthrough		

REGULATORY PROBLEMS

		LOCATION
LANES	Construction	I-17 north; I-10 west
HOURS	shut down to one lane	I-17; I-10
CARGO		
WEIGHT		
INSPECTION		
PORTS		
OTHERS		

ROADWAY ISSUES

PAVEMENT	congestion, poor railroad crossings, poor condition	51st Ave.; 43rd Ave,; 35th Ave.
CAPACITY		
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	No	**MODE SWITCH**	
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS			

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Road Warriors Transportation	**RESPONDENT**	Rose Pfluger
ADDRESS	P.O.Box 532	**TITLE**	President
CITY		**STATE**	AZ **ZIP-CODE**
PHONE	(623) 388-9435	**EMAIL**	**COPY?** yes

TRUCK TYPE	g) lowboys - grain trailers	**HAUL TYPE**	long distance hauls
		RURAL/URBAN	both
		INTER/INTRA	interstate - origin/destination in AZ

REGULATORY PROBLEMS		**LOCATION**
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS		
OTHERS		

ROADWAY ISSUES		
PAVEMENT		
CAPACITY		
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER	needs to connect to I-10 with ramp	303 loop

INTERMODAL	No	**MODE SWITCH**	
PROBLEMS			
OTHER_NEEDS	more safe places to sleep alongside highway especially Phoenix & Tucson		
IMPROVEMENTS			

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Robert Petty Transport Inc.	**RESPONDENT**	Robert Petty
ADDRESS	1428 N. 24th St.	**TITLE**	President
CITY	Phoenix	**STATE**	AZ
ZIP-CODE	85009		
PHONE	(602) 278-0116	**EMAIL**	rvpetty @aol.com
COPY?	yes		

TRUCK TYPE	d) flatbeds	**HAUL TYPE**	long distance hauls
		RURAL/URBAN	both
		INTER/INTRA	interstate - passthrough

REGULATORY PROBLEMS		**LOCATION**
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS	poor entry for long w/b trucks	Parker, AZ; Erhenberg, AZ
OTHERS		

ROADWAY ISSUES		
PAVEMENT	rutted lanes	I-10 mp 112, through mp 85 WB
CAPACITY		
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	No	**MODE SWITCH**	
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS	excellent job overall. Port problems are due to poor design. In Ehrenberg money spent on improvements resulted in worse conditions.		

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	S & M Transport, Inc.	**RESPONDENT**	
ADDRESS	1725 W. Culver	**TITLE**	
CITY	Phoenix	**STATE**	AZ
ZIP-CODE	85007		
PHONE	(602) 254-4122	**EMAIL**	
COPY?	yes		

TRUCK TYPE

c) refrigerated units

HAUL TYPE

long distance hauls

RURAL/URBAN

both

INTER/INTRA

interstate - origin/destination in AZ, passthrough

REGULATORY PROBLEMS

		LOCATION
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS		
OTHERS		

ROADWAY ISSUES

PAVEMENT		
CAPACITY		
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	No	**MODE SWITCH**	
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS			

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Sierra West Express	**RESPONDENT**	Manuel Torres
ADDRESS	2100 S. 15th Ave.	**TITLE**	
CITY	Phoenix	**STATE**	AZ
ZIP-CODE			
PHONE	(602) 462-1100	**EMAIL**	
COPY?	yes		

TRUCK TYPE	a) Standard vans	**HAUL TYPE**	
	b) Double trailers		short distance hauls
RURAL/URBAN	both		
INTER/INTRA	interstate- origin/destination in AZ		

REGULATORY PROBLEMS	**LOCATION**
LANES	
HOURS	
CARGO	
WEIGHT	
INSPECTION	
PORTS	
OTHERS	

ROADWAY ISSUES

PAVEMENT		
CAPACITY		
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	Yes	**MODE SWITCH**	rail
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS			

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Tri-City Trucking Inc.	**RESPONDENT**	Thomas H. Butcher
ADDRESS	3016 s. 38th St.	**TITLE**	
CITY	Phoenix	**STATE**	AZ
ZIP-CODE	85040		
PHONE	(602) 437-9557	**EMAIL**	
COPY?			

TRUCK TYPE

a) Standard vans

d) flatbeds

HAUL TYPE

short distance hauls

RURAL/URBAN both

INTER/INTRA intrastate - in AZ only

REGULATORY PROBLEMS

		LOCATION
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS		
OTHERS		

ROADWAY ISSUES

PAVEMENT		
CAPACITY		
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL No

MODE SWITCH

PROBLEMS

OTHER_NEEDS

IMPROVEMENTS ADOT is doing a fine job

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	USF Bestway	**RESPONDENT**	John Benisek
ADDRESS	17200 N. Perimeter Dr.	**TITLE**	Director, marketing
CITY	Scottsdale	**STATE**	AZ **ZIP-CODE** 85255
PHONE	(480) 760-1816	**EMAIL**	jbenisek@usfbestway.com **COPY?**

TRUCK TYPE	b) double trailers	**HAUL TYPE**	long distance hauls
		RURAL/URBAN	both
		INTER/INTRA	interstate-passthrough primarily

REGULATORY PROBLEMS		**LOCATION**
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS	85% of time noone manning office or checking scale	eastbound I-10
OTHERS		

ROADWAY ISSUES		
PAVEMENT	Lanes rutted by trucks, bridges & highway don't match	I-10 west- m/p 129, 127, 95-44
CAPACITY		Litchfield rd, Bullard Hwy, Miller rd.
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	No	**MODE SWITCH**	
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS			

Apendix D - Survey of Freight Haulers in the State of Arizona

ORGANIZATION	Western Refrigerated Systems Inc	RESPONDENT	
ADDRESS	P.O. Box 40	TITLE	
CITY	Tolleson	STATE	AZ
ZIP-CODE	85353		
PHONE		EMAIL	
COPY?			

TRUCK TYPE	c) refrigerated units	HAUL TYPE	short distance hauls
RURAL/URBAN	both		
INTER/INTRA	interstate - origin/destination in AZ		

REGULATORY PROBLEMS		LOCATION
LANES		
HOURS		
CARGO		
WEIGHT		
INSPECTION		
PORTS		
OTHERS		

ROADWAY ISSUES		
PAVEMENT		
CAPACITY		
SAFETY		
TURNOUTS		
SIGNAGE		
AMENITIES		
OTHER		

INTERMODAL	No	MODE SWITCH	
PROBLEMS			
OTHER_NEEDS			
IMPROVEMENTS			

APPENDIX E

Excerpted from the HPMS Field Manual
Chapter IV: Universe & Sample Data Requirements

Item 33 -- Annual Average Daily Traffic (AADT) (Numeric; Integer)
This item provides basic existing traffic inventory information for selected sections. It is extensively used for apportionment, administrative, legislative, analytical, and national highway data base purposes. Code this numeric data item for all PAS, NHS, standard sample, and donut area supplementary sample sections; leading zeros are not required. Coding is optional for remaining sections. Code "0" when AADT is not coded. Enter the section AADT for the data year. For two-way facilities, provide the AADT for both directions; provide the directional AADT if part of a one-way couplet or for one-way streets. Since many applications, including travel estimates, are based on section AADTs, States should provide AADT values that are count-based (actual counts adjusted to represent AADT) rather than estimated values. Update reported AADT values annually. All counts must reflect application of day of week, seasonal, and axle correction factors, as necessary. Growth factors must be applied if the AADT is not derived from current year counts. Specific guidance for the frequency and size of traffic data collection programs, factor development, age of data, and other applications is contained in Appendix F and the *Traffic Monitoring Guide*. REMINDER: Metropolitan planning organizations and other local governmental agencies may use an average weekday traffic volume for local purposes. The HPMS requires reported AADT to be an average daily value that represents all days of the reporting year.

Item 34 -- Number of Through Lanes (Numeric; Integer)
This item provides basic inventory information on the amount of public road supply. It is extensively used for apportionment, administrative, legislative, analytical, and national highway data base purposes. Code this numeric data item for all HPMS sections except those on the rural minor collector and the rural and urban local functional systems; leading zeros are not required. Code "0" when data not provided. Code the number of through lanes according to the striping, if present, on multilane facilities, or according to traffic use or State/local design guidelines if no striping or only centerline striping is present. Enter the prevailing number of through lanes in both directions carrying through traffic in the off-peak period (Figure IV-3). Exclude what are defined as auxiliary lanes, such as collector-distributor lanes, weaving lanes, frontage road lanes, parking and turning lanes, acceleration/deceleration lanes, toll collection lanes and truck climbing lanes. See the *AASHTO Design Guide* for additional information on auxiliary lanes.

Item 62 -- Widening Feasibility (Numeric; Codes)
This item provides a measure of whether it is feasible to widen an existing sample section. It is used in investment requirements modeling to estimate needed capacity improvements. Enter the code which best represents the extent to which it is feasible to widen the existing road. Consider mainly the physical features along the roadway section, such as large single family residences or office buildings, shopping centers and other large enterprises, severe terrain, cemeteries, wet lands, and park land, as well as where widening would be otherwise cost or environmentally prohibitive. Do not consider restrictions because of current right-of-way width, State practices concerning widening, politics or projected traffic. The code is to represent the lanes that could be added in both directions; e.g., if a lane could be added for each direction of the roadway, then use code "4"; if one full lane only can be added,

use code "3"; if only minor widening or widening narrow lanes can occur, use code "2". Restriping to narrower lanes, resulting in an additional lane on a multilane facility, does not constitute widening feasibility. When coding this item, also consider medians and other areas already within the right-of-way to be available for widening.

Code Description
1 No Widening is Feasible
2 Yes, Partial Lane
3 Yes, One Lane
4 Yes, Two Lanes
5 Yes, Three Lanes or More

Item 82 -- Percent Average Daily Single Unit Trucks (Numeric; Integer)
This item provides information on truck use on a sample section. It is used in investment requirements modeling to estimate pavement deterioration and operating speeds, in the cost allocation pavement model, and in the truck size and weight analysis process. Code single unit truck traffic as a percentage of section AADT to the nearest wholepercent. This value should be representative of all single unit truck activity over all days of the week and seasons of the year as a percent of total annual traffic. Single unit trucks include vehicle classes 4 through 7 (buses through four-or-more axle, single-unit trucks). Further information on vehicle classes is included in Chapter III. Avoid using a single statewide value or statewide values by functional system. It is preferable to use values derived from classification station data on the same route or on a similar route with similar traffic in the same area.

Item 84 -- Percent Average Daily Combination Trucks (Numeric; Integer)
This item provides information on truck use on a sample section. It is used in investment requirements modeling to estimate pavement deterioration and operating speeds, in the cost allocation pavement model, and in the truck size and weight analysis process. Code combination truck traffic as a percentage of section AADT to the nearest whole percent. This numeric value should be representative of all combination truck activity over all days of the week and seasons of the year as a percent of total annual traffic. Combination trucks include vehicle classes 8 through 13 (four-or-less axle, single-trailer trucks through seven-or-more axle, multi-trailer trucks). Further information on vehicle classes is included in Chapter III. Avoid using a single statewide value or statewide values by functional system. It is preferable to use values derived from classification station data on the same route or on a similar route with similar traffic in the same area.

Item 95 -- Peak Capacity (Software Calculated)
This item provides existing peak hour capacity for a sample section. It is used in investment requirements modeling to calculate capacity, in the cost allocation pavement model, and in congestion, delay, and other analyses. **The rural** and urban peak capacity values are calculated by procedures in the HPMS software provided to the States. The procedures used in the software for determining highway capacity conform to the Highway Capacity Manual (HCM). The capacity calculations are based on service flow rates for level of service E. Capacity calculation procedures are described in Appendix N. All urban capacity is for the peak direction as is rural capacity for freeways and other multi-lane facilities. If a rural facility has 2 or 3 lanes with one-way operation, it is considered to be a multi-lane facility for determining capacity. The capacity for rural facilities with 2 or 3 lanes and two-way operation is for both directions. The State may override the calculated capacity if it determines

that the capacity is too low or too high because of operational conditions that are not appropriately reflected in the HPMS data items used in the calculation.

Item 96 -- Volume/Service Flow Ratio (V/SF) (Software Calculated)
This item is a computed value reflecting peak hour congestion for a sample section. It is used in investment requirements modeling to estimate needed capacity improvements, in the national highway data base, and for congestion, delay, and other data analyses. This value is generated by the HPMS software from HPMS data; procedures are described in Appendix N.

APPENDIX F

Excerpted from the HPMS Field Manual

APPENDIX N

PROCEDURES FOR ESTIMATING HIGHWAY CAPACITY

HPMS SOFTWARE

The procedures used in the HPMS software for determining highway capacity conform to the Highway Capacity Manual (HCM), Special Report 109, Third Edition, 1998. Updated chapters have a December 1997 date. The capacity calculations are based on service flow rates for level of service E and are for the peak direction. The capacity coded in HPMS is used for system planning analysis, not project level analysis. The number of peak lanes (number of through lanes used in the peak period in the peak direction) coded in HPMS (Item 87) is used in the procedures for determining capacity. The number of through lanes coded in HPMS (Item 34) is used in the procedures to determine the number of lanes on the facility. The equations for determining the volume/service flow ratio (V/SF) are shown at the end of this Appendix along with tables that contain the data items used in the capacity calculations and in the V/SF ratio.

All references to chapters, tables, etc., are to the HCM. The tables are not reproduced in this Appendix. Since the HCM has not been converted to metric units, all calculations and values in the Appendix are in English units; i.e., miles per hour (mph), feet, miles, etc. The assumptions made by FHWA for adjustment factors used in the procedures are consistent with the recommended values in the HCM. The reference to the data item value in the procedures indicates the way the data item is coded in the HPMS.

RURAL CAPACITY

Rural capacity (service flow for the peak hour) is calculated for all paved arterial and major collector standard sample sections. If a standard sample is entirely on a structure, a capacity is not calculated. The procedures outlined in the HCM are used for rural 2-lane facilities (Chapter 8), multilane facilities--divided and undivided (Chapter 7), and freeways by design (Chapter 3). If a multilane facility has a signalized intersection, the procedures in Chapter 9 are used. The capacity is for one direction on all multilane facilities and for both directions on 2- or 3-lane facilities.

Freeways by Design

Freeways are divided facilities with full access control. A divided facility is a roadway with 4 or more through lanes and a median width of 4 feet or greater or a median type of positive barrier (median type code 2) or curbed (median type code 1). The capacity is calculated for one direction only. Procedures for freeway capacity are found in Chapter 3.

CAP = MSF * Lanes One Direction * FHV * FP

Where : CAP = capacity for the facility (service flow) in one direction

MSF = maximum service flow rate (service level E) in passenger cars per hour per lane (pcphpl), (HCM, Table 3-1)
Lanes One Direction = number of peak lanes (HPMS, Item 87)
FHV = adjustment factor for heavy vehicles in the traffic stream
FP = adjustment factor for driver population, (HCM, Table 3-7); assume .95

When selecting MSF from HCM Table 3-1, the free flow speed (FFS) for the facility is determined by the following equations from NCHRP Report 387, *Planning Techniques to Estimate Speeds and Service Volumes for Planning Applications*, Transportation Research Board, 1997:

FFS = (0.88 * Speed Limit (HPMS, Item 80)) + 14, for speed limits > 50 mph
FFS = (0.79 * Speed Limit (HPMS, Item 80)) + 12, for speed limits <= 50 mph

If the speed limit coded in HPMS is "999" set the speed limit to 75.

The ideal maximum service flow rate and capacity must be reduced to account for the presence of heavy vehicles in the traffic stream. This adjustment is made using a passenger car equivalent for each truck by the type of terrain. The following equation is used for the heavy vehicle adjustment factor:

FHV = (1.00 / (1.00 + (PT * (ET - 1.00))))

Where: FHV = adjustment for heavy vehicles
PT = peak percent single unit trucks/buses + peak percent combination trucks (HPMS, Items 81, 83)
ET = passenger car equivalents for trucks and buses, (HCM, Table 3-2)

Multilane Facilities -- Divided and Undivided

Divided and undivided multilane facilities are those which do not have full access control and have 4 or more through lanes. If a facility has one-way operation with 2 or 3 through lanes, it is considered to be an undivided multilane facility for determining capacity. The capacity for a multilane facility with signalized intersections is calculated using the procedures outlined in Chapter 9, Signalized Intersections. If the signal density (signals per mile) is low, the highway tends to function more like an uninterrupted flow rural facility. The capacity calculation for a facility with signal density less than .5 per mile assumes that the highway is not signalized and uses the procedures for multilane facilities. The following equation is used to determine the capacity for one direction:

CAP = MSF * Lanes One Direction * PHF * FHV

Where: CAP = capacity (service flow) for the facility in one direction
MSF = maximum service flow rate per lane (pcphpl), (HCM, Table 7-1)
Lanes One Direction = number of peak lanes (HPMS, Item 87)
PHF = peak hour factor; assume .85 (HCM, page 7-12)
FHV = adjustment for heavy vehicles in the traffic stream

The maximum service flow rate per lane is determined by the free flow speed (FFS) for the facility at level of service E. The equation for FFS is:

FFS = FFSE - FM - FLW - FLC - FA

Where: FFS = free flow speed in mph
FFSE = estimated free flow speed for ideal conditions - weighted design speed (HPMS, Item 79)
FM = adjustment for the type of median, (HCM, Table 7-2)
FLW = adjustment for lane width, (HCM, Table 7-3)
FLC = adjustment for lateral clearance, (HCM, Table 7-4)
FA = adjustment for access-point density, (HCM, Table 7-5)

HCM Table 7-4 presents the adjustment for lateral clearance to fixed obstructions on the roadside or in the median. The table shows the appropriate reduction in free flow speed based on the total lateral clearance, which is defined as the lateral clearance from the right edge of the travel lanes (right shoulder width (HPMS, Item 59), maximum 6 feet) and lateral clearance from the left edge of the travel lanes to obstructions in the median (left shoulder width (HPMS, Item 60), maximum 6 feet). For undivided roadways, there is no adjustment for left-side lateral clearance. The undivided design itself is taken into account by the median adjustment. Therefore, in order to use HCM Table 7-4 for undivided facilities, the lateral clearance on the left edge is always 6 feet. The table also uses the number of through lanes (HPMS, Item 34) to obtain the value for the adjustment--4 lanes or 6 or more lanes. If the facility is one-way operation with 2 lanes, the value in the table for 4 lanes is used. The value for 6 lanes is used for a facility with 3 lanes and one-way operation.

The access-point density (number of intersections per mile) is determined using the number of intersections with stop signs and other or no control coded in HPMS Items 93and 94, plus an assumption for other access points. The assumption for access points is set by design type. For a divided roadway, 2 additional access points per mile are assumed. An undivided roadway is assumed to have an additional 3 access points per mile. The reduction in free flow speed for each access point per mile is .25 mph.

The maximum service flow rate (MSF) per lane for level of service E is determined by the free flow speed (FFS) from HCM Table 7-1. The maximum service flow rate (pcphpl) is set using the ranges below for the free flow speed (mph):

FFS <= 47	MSF = 1,900
FFS > 47 and <= 52	MSF = 2,000
FFS > 52 and <= 57	MSF = 2,100
FFS > 57	MSF = 2,200

The adjustment for the heavy vehicles in the traffic stream uses the passenger car equivalents by type of terrain found in HCM Table 7-7. The equation is:

$$FHV = (1.00 / (1.00 + (PT * (ET - 1.00))))$$

Where: FHV = adjustment for heavy vehicles
PT = peak percent single unit trucks/buses + peak percent combination trucks (HPMS, Items 81,83)
ET = passenger car equivalents for trucks/buses, (HCM, Table 7-7)

Multilane with Signalized Intersections

The procedures for signalized intersections are outlined in Chapter 9. In using these procedures, FHWA assumes that:

- ⇨ the intersection has a left turn lane and no right turn lane;
- ⇨ no parking on the facility;

- ⇨ no local buses that stop on the facility blocking the intersection; and
- ⇨ the adjustment factor for area type = 1.00 ("all other areas")

A separate capacity is computed for each lane group approaching an intersection. A lane group is defined as one or more lanes that accommodate traffic and have a common stop line and capacity shared by all vehicles.

SFR = ISF * N * FW * FHV * FG * FP * FBB * FA * FLU * FRT * FLT

Where:
- SFR = saturation flow rate for the lane group in vehicles per hour green time
- ISF = ideal SFR per lane, usually 1,900 passenger cars per hour green per lane (pcphgpl)
- N = number lanes in lane group in one direction (number of lanes in the through lane group is the number of peak lanes (HPMS, Item 87)
- FW = adjustment for lane width, (HCM, Table 9-5)
- FHV = adjustment for heavy vehicles in the traffic stream
- FG = adjustment factor for approach grade, (HCM, Table 9-7)
- FP = adjustment factor for the existence of a parking lane; assume none exist; factor = 1.00
- FBB = adjustment factor for the blocking effect of local buses; assume no buses since HPMS data has no information about local buses; factor = 1.00
- FA = adjustment factor for area type, (HCM, Table 9-10)
- FLU = adjustment factor for lane utilization, (HCM, Table 9-4)
- FRT = adjustment factor for right turns in the lane group, (HCM, Table 9-11)
- FLT = adjustment factor for left turns in the lane group, (HCM, Table 9-12)

The capacity is the adjusted saturation flow rate for each lane group multiplied by the percent green time for the intersection. The capacity is determined for two lane groups--left turn lane group and through lane group with an adjustment factor applied for the shared lane for right turns.

To determine the adjustment factor for the effect of heavy vehicles in the traffic stream, the equation at the bottom of HCM Table 9-6 is used. The equation is :

FHV = (1.00 / (1.00 + (PT * (ET - 1.00))))

Where:
- FHV = adjustment for heavy vehicles in the traffic stream
- PT = peak percent single unit trucks/buses + peak percent combination trucks (HPMS, Items 81,83)
- ET = passenger car equivalent for trucks and buses

The passenger car equivalent for trucks and buses is by type of terrain (HPMS, Item 70). If the terrain is level (terrain = 1), the ET = 1.5; rolling terrain (terrain = 2), ET = 3.0; and for mountainous terrain (terrain = 3), ET = 6.0.

The adjustment factor for approach grade is obtained from HCM Table 9-7. For a facility with level terrain, the factor is set to 1.00. If the facility has a rolling terrain, the factor is set to .98; mountainous terrain uses a factor of .95.

The percent green time for the intersection uses the coded valued if it is coded (HPMS, Item 91); otherwise, it is set by facility type. The coded percent green time is presumed to be for the through lanes. For a divided facility , the percent green time is set to .75. For an undivided facility, the percent green time is set to .70. The through lane group uses the number of peak lanes coded for the peak direction (HPMS, Item 87). The adjustment factor for the shared right turn lane is from HCM Table 9-11B, assuming zero pedestrians–factor .85.

For the left turn lane group, one lane is assumed and the left turn is assumed to be permitted phasing. The adjustment factor for left turns is set to .65. The percent green time for left turns is assumed to be 30 percent of the green time for the through lane group.

The capacity for one direction for a facility with a signalized intersection is the sum of the capacity for the through lane group and the left turn lane group.

2- or 3-Lane Facility

The capacity for a 2- or 3-through lane facility with two-way operation is calculated for both directions. The ideal capacity for a two-lane facility is 2,800 passenger cars per hour (pcph). For a 3-lane facility, the ideal capacity is 4,000 pcph. For a 3-lane facility, it is assumed that one direction is used as a single lane with no passing, and the opposite direction has 2 lanes, allowing passing. The direction with one lane is analyzed as one direction of a 2-lane highway with no passing opportunities. The direction with 2 lanes is analyzed as one direction of a 2-lane facility with 100-percent passing sight distance.

For a 2-lane facility, the following equation from Chapter 8 is used:

$$CAP = 2800 * (V/C) * FD * FW * FHV$$

Where:
- CAP = total service flow for both directions (2,800 is the ideal capacity for both directions)
- V/C = ratio of flow rate to ideal capacity for level of service E, (HCM, Table 8-1)
- FD = adjustment factor for directional distribution of traffic, (HCM, Table 8-4)
- FW = adjustment factor for narrow lanes and restricted shoulder width, (HCM, Table 8-5)
- FHV = adjustment factor for the presence of heavy vehicles in the traffic stream

The equation takes an ideal capacity of 2,800 passenger cars per hour and adjusts it to reflect a V/C ratio appropriate for the desired level of service, directional distributions other than a 50/50 split, narrow lanes and restricted shoulder width, and heavy vehicles in the traffic stream. All the V/C values in HCM Table 8-1 are for a 50/50 directional distribution of traffic on a 2-lane highway. For other directional distributions, the factors shown in HCM Table 8-4 must be applied to HCM Table 8-1 values.

The adjustment for heavy vehicles in the traffic stream is computed as :

$$FHV = (1.00 / (1.00 + (PT * (ET - 1.00))))$$

Where:
- FHV = adjustment for heavy vehicles
- PT = percent peak single unit trucks/buses + percent peak combination trucks (HPMS, Items 81,83)
- ET = passenger car equivalent for trucks, (HCM, Table 8-6)

For a 3-lane facility, the capacity calculation uses the same equation as above for two lanes with an ideal capacity of 4,000 pcph. The factor for level of service from HCM Table 8-1 is an average of the value for 100 percent restricted passing and zero percent restricted passing, by type of terrain. Flat terrain would be 1.00, rolling terrain .935, and mountainous terrain .845. The capacity for a 1-lane facility with no intersection or an intersection with no control uses the same equation as above for two lanes with an ideal capacity of 1,400 pcph.

URBAN CAPACITY

Urban capacity (service flow for the peak hour) is calculated for all standard sample sections coded as small urban or urbanized (HPMS, Item 13). If a standard sample is entirely on a structure a capacity is not calculated. The procedures outlined in the HCM are used for freeways by design (Chapter 3), multilane facilities--divided and undivided (Chapter 7), signalized intersections (Chapter 9), and stop-controlled intersections (Chapter 10). For all urban facilities, the capacity is calculated for one direction.

Freeways by Design

Freeways are divided facilities with full control of access. By definition, a facility is divided if it has 4 or more through lanes with a median width of 4 feet or greater or a median type of positive barrier (median type code 2) or curbed (median type code 1). The capacity is for one direction on urban freeways. Chapter 3 outlines the procedures for freeway capacity.

CAP = MSF * N * FHV * FP

Where: CAP = capacity for the facility (service flow) in one direction
MSF = maximum service flow rate per lane (pcphpl), (HCM, Table 3-1)
N = number of peak lanes (HPMS, Item 87)
FHV = adjustment factor for heavy vehicles in the traffic stream
FP = adjustment factor for driver population, (HCM, Table 3-7); assume .97

When selecting MSF from HCM Table 3-1,. The free flow speed (FFS) for the facility is determined by the following equations from NCHRP Report 387, *Planning Techniques to Estimate Speeds and Service Volumes for Planning Applications*, Transportation Research Board, 1997:

FFS = (0.88 * Speed Limit) + 14, for speed limits > 50 mph
FFS = (0.79 * Speed Limit) + 12, for speed limits <= 50 mph

If the speed limit coded in HPMS is "999" set the speed limit to 75.

The capacity and ideal maximum service flow rate must be reduced to account for the presence of heavy vehicles in the traffic stream. This adjustment is made using a passenger car equivalent for each truck by type of terrain. The factors for the car equivalents are obtained from HCM Table 3-2 assuming a level type of terrain for all urban freeways. The equation for the heavy vehicle adjustment is:

FHV = (1.00 / (1.00 + (PT * (ET - 1.00))))

Where: FHV = adjustment for the heavy vehicles
PT = peak percent single unit trucks/buses + peak percent combination trucks (HPMS, Items 81, 83)
ET = passenger car equivalents for trucks and buses, (HCM, Table 3-2); assume level terrain, ET = 1.5

Multilane Facilities -- Divided and Undivided

Multilane facilities with signalized intersections use the procedures outlined in Chapter 9. If a multilane facility has an intersection which is stop-controlled, the capacity is determined using the procedures outlined in Chapter 10. For determining capacity, a 2- or 3-lane facility with one-way operation is considered to be an undivided multilane facility. All remaining urban multilane facilities use the procedures outlined in Chapter 7. The capacity is calculated for one direction.

CAP = MSF * N * PHF * FHV

Where: CAP = capacity (service flow) for one direction
MSF = maximum service flow rate per lane (pcphpl), (HCM, Table 7-1)
N = number of peak lanes (HPMS, Item 87)
PHF = peak hour factor
FHV = adjustment for heavy vehicles in the traffic stream

The maximum service flow rate per lane is determined by the free flow speed (FFS) for the facility at level of service E. The estimated free flow speed for ideal conditions uses the weighted design speed. If the weighted design speed is not coded, the maximum service flow is set to 1,900 which assumes a free flow speed less than or equal to 47 mph. The equation for free flow speed is:

FFS = FFSE - FM - FLW - FLC - FA

Where: FFS = free flow speed in mph
FFSE = estimated free flow speed for ideal conditions -- weighted design speed (HPMS, Item 79)
FM = adjustment for the type of median, (HCM, Table 7-2)
FLW = adjustment for the lane width, (HCM, Table 7-3)
FLC = adjustment for lateral clearance, (HCM, Table 7-4)
FA = adjustment for access-point density, (HCM, Table 7-5)

HCM Table 7-4 presents the adjustment for lateral clearance to fixed obstructions on the roadside or in the median. The table shows the appropriate reduction in free flow speed based on the total lateral clearance, which is defined as the lateral clearance from the right edge of the travel lanes (right shoulder width (HPMS, Item 59), maximum 6 feet) and lateral clearance from the left edge of the travel lanes to obstructions in the median (left shoulder width (HPMS, Item 60), maximum 6 feet). For undivided roadways, there is no adjustment for left-side lateral clearance. The undivided design itself is taken into account by the median adjustment. Therefore, in order to use HCM Table 7-4 for undivided facilities, the lateral clearance on the left edge is always 6 feet. A facility with a continuous left turn lane is considered to be a divided highway and the lateral clearance on the left edge is considered to be 6 feet. The table also uses the number of through lanes to obtain the value for the adjustment--4 lanes or 6 or more lanes. A one-way facility with 2 lanes uses the value in the table for 4 lanes. The value for 6 lanes is used for a one-way facility with 3 lanes.

The access-point density (intersections per mile) is determined from the number of intersections which have other or no control (HPMS, Item 94) plus an assumption for other access points per mile. The assumption for other access points is set by the roadway design and the area. For a divided roadway in a small urban area, the number of additional access points per mile is 8; for undivided, 12. If the roadway is in an urbanized area, an additional 12 access points are assumed for a divided facility and 18 for an undivided facility. The maximum number of access points for a small urban area is 20 per mile; the minimum number of access points for an urbanized area is 21 per mile. The reduction in free flow speed for each access point per mile is .25 mph.

The maximum service flow rate (MSF) per lane for level of service E is determined by the free flow speed (FFS) from HCM Table 7-1. The maximum service flow rate (pcphpl) is set using the ranges below for the free flow speed in mph:

FFS <= 47	MSF	=	1,900
FFS > 47 and <= 52	MSF	=	2,000
FFS > 52 and <= 57	MSF	=	2,100
FFS > 57	MSF	=	2,200

The capacity in one direction is determined by the maximum service flow times the number of lanes in one direction with adjustments for the peak hour factor and the effect of heavy vehicles in the traffic stream. The peak hour factor is set to .90 when the roadway is in a small urban area and to .95 for an urbanized area (HCM, page 7-12). The equation to adjust the capacity for heavy trucks/buses is:

FHV = (1.00 / (1.00 + (PT * (ET - 1.00))))

Where: FHV = adjustment for the effect of heavy vehicles in the traffic stream
PT = peak percent single unit trucks/buses + peak percent combination trucks (HPMS, Items 81,83)
ET = passenger car equivalents for trucks and buses, (HCM, Table 7-7); assume level terrain with a factor of 1.5

If the roadway has an intersection with other/no control coded (HPMS, Item 94) and left turns are permitted with no left turn lane (HPMS, Item 88), the capacity is adjusted for the left turn movement. The calculated capacity for the intersection is reduced by taking 96 percent of the value to account for the effect of the left turns in the traffic stream.

Roadways with Signalized Intersections

The capacity on a roadway with signal intersections uses the procedures outlined in Chapter 9. The procedures for signalized intersection capacity are the same regardless of the number of through lanes on the facility. The capacity is calculated for one direction. The saturation flow rate is determined for each lane group that exists on the roadway: left turn lane group, through lane group and right turn lane group. Each saturation flow rate for the lane group is multiplied by the percent green time for that lane group. The capacity is the adjusted saturation flow rate for the lane group times the percent of green time for the lane group. The capacity for the section is the sum of the capacity for each lane group. If left turns are permitted with no left turn lane, the left turns are shared with the through lane group and an adjustment factor is applied to the through lane group for the left turns. If right turns are permitted at the intersection with no right turn lane, the right turns are shared with the through lane group and the through lane group is adjusted for the right turns. The percent green time coded in HPMS Item 91 is for the through lanes; it is adjusted for any left turn only green time.

SFR = ISF * N * FW * FHV * FG * FP * FBB * FA * FLU * FRT * FLT

Where: SFR = saturation flow rate for the lane group in vehicles per hour green time
ISF = ideal SFR per lane, usually 1,900 pcphgpl
N = number lanes in one direction in lane group
FW = adjustment for lane width, (HCM, Table 9-5)
FHV = adjustment for heavy vehicles,(HCM, Table 9-6) or equation below the table
FG = adjustment factor for approach grade, (HCM, Table 9-7); assume level terrain; factor 1.00
FP = adjustment factor for the existence of a parking lane adjacent to the lane group and the parking activity in that lane, (HCM, Table 9-8)
FBB = adjustment factor for local buses, (HCM, Table 9-9); assume no local buses since HPMS data has no information on buses; factor 1.00
FA = adjustment factor for area type, (HCM, Table 9-10)
FLU = adjustment factor for lane utilization, (HCM, Table 9-4)
FRT = adjustment factor for right turns in the lane group, (HCM, Table 9-11)
FLT = adjustment factor for left turns in the lane group, (HCM, Table 9-12)

The adjustment for the heavy vehicles uses the equation at the bottom of HCM Table 9-6. The equation is:

FHV = (1.00 / (1.00 + (PT * (ET - 1.00))))

Where: FHV = adjustment factor for the effect of heavy vehicles in the traffic stream
PT = peak percent single unit trucks/buses + peak percent combination trucks (HPMS, Items 81,83)
ET = passenger car equivalent for trucks; equation uses 2.0 passenger cars per heavy vehicle

The parking adjustment factor, FP, accounts for the effect of a parking lane on the flow in the adjacent lane group, as well as the blocking of the adjacent lane by vehicles moving in and out of the parking spaces. Each parking maneuver is assumed to block traffic in the lane next to the parking lane for an average of 18 seconds. If the parking is adjacent to an exclusive turn lane group, the factor only applies to that lane group. On a one-way street, parking on the left side will affect the left most lane group. If parking is on both sides of a single-lane group, as in a one-way street with no turning lanes, the number of maneuvers used is the total for both sides of the lane group. If peak parking is allowed on a street in a small urban area, the number of maneuvers per hour is set to 10. For a street in an urbanized area with peak parking allowed, the number of maneuvers is set to 20. If the street has one-way operation with parking on both sides and only one lane group, the number of maneuvers is increased by 10. The adjustment factor for parking is determined by the equation below HCM Table 9-8 which is:

$$FP = (N - 0.1 - (18 * Nm / 3600)) / N$$

Where: FP = adjustment factor for the existence of a parking lane adjacent to the lane group
N = number of lanes in the lane group
Nm = number of parking maneuvers per hour

The adjustment factor for the area type, FA, is obtained from HCM Table 9-10 and is set by area type. If the roadway is in a small urban area with peak parking coded, the factor is set to .92; otherwise, it is set to 1.00. For a roadway in an urbanized area, the factor is set to .95--a value between the value for CBD and all other areas.

The adjustment factor for the lane utilization, FLU, is obtained from the default values in HCM Table 9-4. If a lane group has more lanes than the number shown in the table, the smallest FLU shown for that type of lane group is used. The number of lanes for the through lane group is the coded number of peak lanes (HPMS, Item 87). For the exclusive left turn lane group (left turns are permitted with a left turn lane (HPMS, Item 88 = 1,2,3)), the number of lanes in the group is 2 if the type of left turn is multiple (HPMS, Item 88 = 1); otherwise, the number of lanes is considered to be 1. For the exclusive right turn lane group (right turns are permitted with a right turn lane (HPMS, Item 89 = 1,2,3)), if the type of right turn is coded as multiple (HPMS, Item 89 = 1) the number of lanes in the group is 2; otherwise, the number of lanes is 1.

The capacity for the lane group is the adjusted SFR times the green time for the lane group.

Determine the lane groups:
The through lane group is always used for determining capacity at a signalized intersection. If left turns are permitted at the intersection with a left turn lane, the left turn lane group is also used to determine the capacity. If right turns are permitted at the intersection with a right turn lane, the right turn lane group is also used to determine the capacity. If no right turns and no left turns are permitted at the intersection, the through lane group is the only group used for determining capacity; the left turn adjustment (FLT) and right turn adjustment (FRT) are set to 1.00. If right turns are permitted at the intersection with no right turn lane, the FRT is applied to the through lane group. If left turns are permitted at the intersection with no left turn lane, the FLT is applied to the through lane group.

Saturation Flow Rate for the Left Turn Lane Group:

If left turns are permitted with a left turn lane (HPMS, Item 88 = 1,2,3), the saturation flow rate (SFR) is determined for a left turn lane group. The number of lanes in the left turn lane group is 2 if the type of left turn lane is multiple (HPMS, Item 88 = 1). For all other types of left turn lanes (HPMS, Item 88 = 2,3), the number of lanes in the left turn lane group is considered to be 1. If the street is one-way with parking on both sides (HPMS, Item 61 = 2), the left turn lane group saturation flow rate must be adjusted for parking. The adjustment factor for parking is determined from the equation given above. In no other situation is the left turn lane group adjusted for parking. The adjustment factor for left turns in the lane group is obtained from HCM Table 9-12, assuming protected phasing with permitted turns. A value of .97 is used. The green time for the left turn lane is a percent of the green time coded for the through lanes set by the functional system. For principal arterials, the left turn green time is assumed to be 35 percent of the coded through lane green time (HPMS, Item 91). The left turn percent green time for all other functional systems is set to 25 percent of the through lane green time.

Saturation Flow Rate for the Right Turn Lane Group:
If right turns are permitted with a right turn lane (HPMS, Item 89 = 1,2,3), the SFR is determined for a right turn lane group. If the type of right turn lane is multiple (HPMS, Item 89 = 1), the number of lanes in the right turn lane group is 2. For all other types of right turn lanes (HPMS, Item 89 = 2, 3), the number of lanes in the lane group is 1. If parking is permitted on the street (HPMS, Item 61 = 1,2), the saturation flow rate for the right turn lane group must be adjusted for parking. The parking adjustment factor is determined by the equation shown above. The adjustment factor for right turns in the right turn lane group is obtained from HCM Table 9-11B. For small urban areas, assume zero pedestrians at the intersection and a factor of .85; urbanized areas, assume 50 pedestrians per hour at the intersection with a factor of .83. The percent green time for the right turn lane group is the percent green time coded for the through lanes (HPMS, Item 91).

Saturation Flow Rate for the Through Lane Group:
The number of lanes in the through lane group is the number of peak lanes (HPMS, Item 87). The percent green time applied to the saturation flow rate is the percent green time coded in HPMS Item 91 for the intersection. If left turns are permitted with left turn lanes (HPMS, Item 88 = 1,2,3), the adjustment factor for left turns (FLT) in the through lane group is set to 1.00. If right turns are permitted with a right turn lane (HPMS, Item 89 = 1,2,3), the adjustment factor for right turns (FRT) in the through lane group is set to 1.00.

If right turns are permitted at the intersection with no right turn lane (HPMS, Item 89 = 4), the adjustment factor for right turns in the through lane group is obtained from HCM Table 9-11B. For small urban areas assuming zero pedestrians at the intersection, the FRT is set to .85. Assuming 50 pedestrians per hour at the intersection in urbanized areas, FRT is set to .83.

If left turns are permitted at the intersection with no left turn lane (HPMS, Item 88 = 4), the adjustment factor for left turns in the through lane group is obtained from HCM Table 9-12, assuming protected-plus-permitted left turn phasing. For the left turn factor, the formula is:

$$FLT = (1400 - Vo) / [(1400 - Vo) + (235 + 0.435 * Vo) * Plt] \quad \text{when } Vo <= 1{,}220 \text{ vph}$$

$$= 1 / (1 + (4.525 * Plt)) \quad \text{when } Vo > 1{,}220 \text{ vph}$$

Where:
- Vo = AADT * K * (1 - D); this is the opposing flow in the off peak direction
- AADT= annual average daily traffic (HPMS, Item 33)
- K = K-factor (HPMS, Item 85)
- D = the directional factor for the peak direction (HPMS, Item 86)
- Plt = proportion of left turns; assume proportion of left turns is 20 percent

Once the FLT is determined, the green time for the protected portion is determined and added to the coded through green time to compute the lane group capacity. On the lower functional classes, it is assumed that

totally permissive phasing exists by assuming no green time for the "protected" phase. For the principal arterials, it is assumes the green time is 30 percent of the through green time; for minor arterials, 20percent; and for collectors, 0 percent.

To determine if a parking adjustment factor, FP, must be applied to the SFR for the through lane group (equation shown on page N-9), the roadway is checked for parking conditions (HPMS, Item 61). Parking conditions are checked in the order listed below:

⇨ Parking exists on both sides of a one-way street (HPMS, Item 61 = 2, Item 27 = 1)
- left turns are permitted with no turn lane, or no left turns are permitted (HPMS, Item 88 = 4,5)
- a right turn lane exists for the intersection (HPMS, Item 89 = 1,2,3)

When these conditions exist the parking lane is adjacent to the through lanes on only the left side of the street and the number of maneuvers (Nm) for the equation to determine FP is for one side - 10 if the street is in a small urban area; 20 for an urbanized area.

⇨ Parking exists on both sides of a one-way street (HPMS, Item 62 = 2, Item 27 = 1)
- left turns are permitted with no turn lane or no left turns are permitted (HPMS, Item 88 = 4,5)
- no right turn lane exists for the intersection (Item 89 = 4,5)

When these conditions exist the parking lane is adjacent to the through lanes on both sides of the street and the number of maneuvers (Nm) is increased by 10. In the equation to determine FP, if the street is in a small urban area Nm is 20 and for an urbanized area Nm is 30.

⇨ Parking is permitted on the street (HPMS, Item 62 = 1, 2)
- right turns are permitted with no right turn lane or no right turns are permitted (HPMS, Item 89 = 4,5)

When these conditions exist the parking lane is adjacent to the through lane group and effects only the right side of the street. The number of maneuvers (Nm) for the equation to determine FP is 10 when the street is in a small urban area; 20 in an urbanized area.

⇨ Parking is permitted on the street (HPMS, Item 62 = 1, 2)
- right turns are permitted with a right turn lane (HPMS, Item 89 = 1,2,3)

When these conditions exist, the adjustment factor for the existence of a parking lane is applied to the right turn lane group, and the FP for the through lane group is set to 1.00.

⇨ When no parking is permitted on the street (HPMS , Item 61 = 3), FP is set to 1.00.

The capacity for the roadway is the sum of the saturation flow rate for each of the lane groups that exist for the intersection--left turn lane group, through lane group, and right turn lane group.

Stop-Controlled Intersections

The procedures for the capacity for a stop-controlled (unsignalized) intersection are outlined in Chapter 10. The capacity of a stop-controlled intersection is significantly limited by the delay of conflicting movements from opposing approaches of the intersection. The HPMS data has no information about the other intersection approach volumes or the type of stop control present; therefore, to estimate the capacity for stop-controlled intersections, it is necessary to make several assumptions about the intersection. The procedure used assumes two-way stop-controlled intersections with four-legs between a pair of two-way two-lane streets with the stop signs on the minor street and the traffic volume on the major street higher than the minor street. Left turn movements at the intersection are specifically considered.

If no left turns are permitted at the intersection, the capacity is set to 500.
(HCM Figure 10-3 with a conflicting volume of 500 pcph)

If left turns are permitted with no left turn lane, the capacity is reduced somewhat by the left turns, and set to 475.

If left turns are permitted with left turn lane, the capacity is increased slightly and set to 525.

If right turns are permitted with a right turn lane, the capacity will be increased by 100. The addition of the right turn lane is assumed to indicate the existence of a significant turning movement, with modest conflicting movement.

The procedure also assumes that a second lane on a one-way street or a street with two-way operation (number of peak lanes = 2), increases the capacity by 75. For sections with stop signs, it is also assumed that having more than two lanes in one direction has no effect on the capacity.

2- or 3-Lane Facility with No Intersections or Intersections with No Control

The capacity for surface streets with no intersections or intersections with no control is considered to be uninterrupted. The ideal capacity is assumed to be 1,450 passenger cars per lane. If the street has three lanes, the peak direction is assumed to have two lanes.

$$CAP = 1450 * N * FW * FHV * FP * FA * FLU$$

Where:
- CAP = peak capacity in one direction
- N = number of peak lanes (HPMS, Item 87)
- FW = adjustment for the lane width, (HCM, Table 9-5)
- FHV = adjustment factor for the effect of heavy vehicles in the traffic stream, obtained from the equation at the bottom of HCM Table 9-6
- FP = adjustment factor for the existence of a parking lane adjacent to the through lanes
- FA = adjustment factor for the area type, (HCM, Table 9-10)
- FLU = adjustment factor for lane utilization, (HCM, Table 9-4)

The adjustment factor for the effect of heavy vehicles in the traffic stream is:

$$FHV = (1.00 / (1.00 + (PT * (ET - 1.00))))$$

Where:
- FHV = adjustment factor for the effect of heavy vehicles in the traffic stream
- PT = peak percent single unit trucks/buses + peak percent combination trucks (HPMS, Items 81, 83)
- ET = passenger car equivalent for trucks and buses; equation uses 2.0 passenger cars per heavy vehicle

The adjustment factor for the existence of a parking lane, FP, is set by the number of peak lanes (HPMS, Item 87) on the street. If no parking exists (HPMS, Item 61 = 3) on the street, FP is set to 1.00. For one peak lane, the factor is set to .875; for two peak lanes, the factor is .937; and for more than two peak lanes, .959. HCM Table 9-8 is used to obtain the values.

The adjustment factor for the area type, FA, is from Table 9-10. For a small urban area with no peak parking (HPMS, Item 61 = 3), the factor is set to 1.00. A factor of .92 is used for small urban areas with peak parking (HPMS, Item 61 = 1,2). A factor of .95 if used for all urbanized areas.

The adjustment factor for lane utilization, FLU, is obtained from the default values in HCM, Table 9-4. If the number of peak lanes is one, FLU is 1.00. When the number of peak lanes is two, FLU is .95

If the street has an intersection with other control/no control coded in the HPMS (Item 94 > 0) and left turns are permitted with no left turn lane (HPMS , Item 88 = 4), the capacity is adjusted for the left turn movements. The adjustment is 96 percent of the capacity. There is no adjustment for right turn movements at the intersection.

HPMS Data Items Used in Capacity Calculations

Item Numbe	Description	Item Numbe	Description
17	Functional System	79	Weighted Design Speed
27	Type of Facility	80	Speed Limit
30	Section Length	81	Percent Peak Single Unit Trucks
33	AADT - **Urban**	83	Percent Peak Combination Trucks
34	Number of Through Lanes	85	K Factor - **Urban**
54	Lane Width	86	Directional Factor - **Urban**
55	Access Control	87	Number of Peak Lanes
56	Median Type	88	Left Turning Lanes/Bays
57	Median Width	89	Right Turning Lanes/Bays
59	Right Shoulder Width	91	Typical Peak Percent Green Time
60	Left Shoulder Width	92	Number At-Grade Intersections - Signals
61	Peak Parking - **Urban**	93	Number At-Grade Intersections – Stop Signs
70	Type of Terrain - **Rural**	94	Number At-Grade Intersections – Other /No Control
78	Percent Passing Sight Distance - **Rural**		

Volume/Service Flow Ratio (V/SF)

The volume-to-service flow (capacity) ratio is determined for each paved rural sample section and all urban sample sections. It is used as a measurement for congestion. The equations to determine the volume-to-service flow ratio are by type of facility. V/SF is not calculated for a sample section that is entirely on a structure (HPMS, Item 27 = 3,4).

Rural 2- or-3-lane facility:

V/SF = (AADT (HPMS, Item 33) * K-factor (HPMS, Item 85)) / Peak Capacity (HPMS, Item 95)

Rural Multilane and All Urban facilities:

V/SF = (AADT (HPMS, Item 33) * K-Factor (HPMS, Item 85) * Directional Factor (HPMS, Item 86))
/ Peak Capacity (HPMS, Item 95)

HPMS Data Items Used in V/SF Ratio

Item Number	Description
33	AADT
85	K-Factor
86	Directional Factor
95	Peak Capacity