CHAPTER TWO

CHALLENGES OF INCREASING TRUCK TRAFFIC

Increasing volumes of truck traffic create many types of challenges for transportation agencies, which vary from state to state and from region to region. This chapter first identifies the types of challenges and problems that can be caused by increasing truck traffic, and then reviews current conditions being experienced in the states to ascertain which challenges are more prevalent and likely to be faced by agencies as they deal with increasing truck traffic. This discussion is based on the responses received from the survey. Because the survey did not define the term "truck," the responses reflect the varying perceptions and perspectives of agencies throughout the country.

TYPES OF CHALLENGES

The types of challenges reported by agencies primarily include those related to the transportation system itself (operations, capacity, safety, and maintenance). However, they also include challenges related to broader social categories, including the environment and the economy. For the purpose of identifying the specific types of challenges and evaluating their frequency of occurrence, this report uses nine categories. In the post-9/11 world, security represents a tenth category of challenge—perhaps one of the most important—but security-related issues are not included in the responses because the survey was conducted before these events. Each category is briefly defined, followed by a list of the specific challenges that survey respondents attributed to increasing truck traffic.

Traffic Congestion

Increasing volumes of trucks can cause or exacerbate traffic congestion, especially because trucks use more highway space than automobiles and because they have slower rates of acceleration and deceleration. Truck-related congestion is most likely to occur in areas with heavy truck volumes or where trucks constitute a high percentage of the traffic stream. Congestion can occur in several types of locations.

- Bottleneck locations, especially near areas with concentrated truck activity—such as terminals, ports, and border crossings;
- Urban streets;
- Urban highways; and
- Intercity roads and highways.

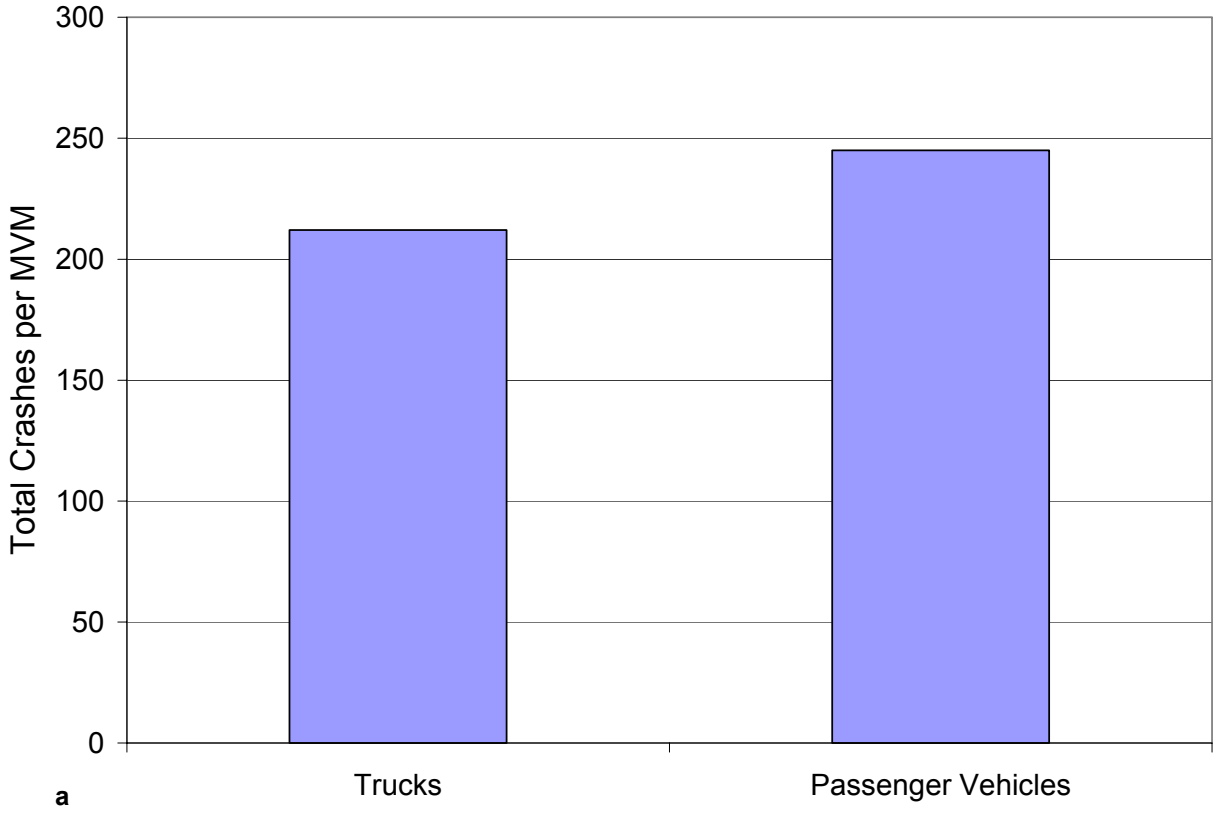
Transportation System Deficiencies

Increasing volumes of trucks can accentuate functional obsolescence and operational changes in the transportation system, such as

- Substandard geometrics—Large trucks can have difficulty maneuvering safely and efficiently on roadways with substandard geometrics (such as narrow lanes, small-radius curves, or curb returns) and in work zones where the operational problems of narrow lanes are compounded by the need for weaving maneuvers. The problems caused by these geometric shortcomings are magnified as traffic or truck volumes increase, when trucks unable to maneuver effectively impede other traffic.
- Insufficient truck parking—Federal regulations restrict the number of consecutive hours that truck drivers are permitted to operate their vehicles; therefore, truck drivers require parking for resting and eating, as well as for refueling. Areas designated specifically for truck parking are limited, and the rest and service areas provided along highways may not have sufficient parking for the volume of trucks desiring to use them. Commercial development is prohibited within the rights-of-way of Interstate highways, so parking is often available only at off-highway truck stops, which are often inconvenient for truck drivers.
- Inadequate directional signing—Truck drivers often drive on roads that are unfamiliar to them, delivering goods to and from locations which they may not visit frequently. These drivers depend on good directional signing to help them reach their destinations (or highway access ramps) easily. Without adequate signing, these drivers may take unnecessary and circuitous detours before they reach their destination.

Safety

Nationwide statistics indicate that total crash rates for large trucks are lower than for passenger vehicles, although fatal crash rates are higher (Figure 1). In 2000, large trucks were involved in 212 total crashes per 100 million vehicle-miles (MVM) and 2.2 fatal crashes per 100 MVM, whereas passenger vehicles were involved in 245 total crashes per 100 MVM and 1.3 fatal crashes per 100 MVM (*6*). Increasing volumes of truck traffic can be expected to increase the



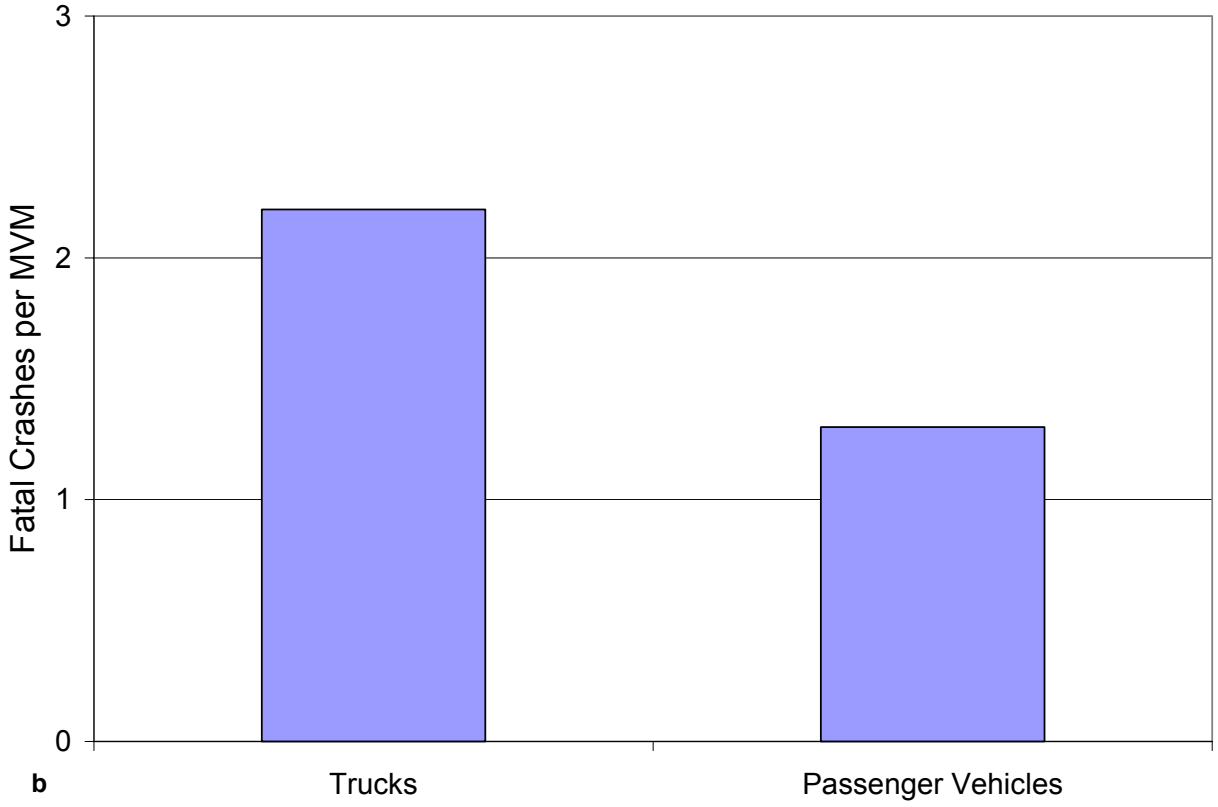


FIGURE 1 Year 2000 nationwide: (a) total crash rate; (b) fatal crash rate. MVM = million vehicle-miles.

number and severity of crashes, thereby reducing the level of safety on highways and streets.

For the sake of differentiating between crashes that relate solely to trucks and those that involve vehicle conflicts (truck–automobile or truck–truck), the survey used two categories of crashes when considering the issue of safety: (1) truck crashes (single vehicle) and (2) multivehicle crashes.

Infrastructure Deterioration

The sheer size and weight of trucks puts a great strain on the highways and bridges that they traverse, resulting in more rapid deterioration of pavement and structures as truck volumes increase. To differentiate between the challenges of pavement damage and structural damage, the survey used two categories: (1) pavement deterioration and (2) bridge structure deterioration.

Multimodal Connections

The rapid increase in the volume of freight moving through the transportation system places particular strains on the critical points in the shipping chain where goods are transferred from one mode to another, or from one truck to another. Inefficient operations, inadequate size, or ineffective design, often attributable to adapting available facilities instead of designing new ones, cause strains at key transfer points that can delay time-sensitive deliveries, impair the economic chain, or spill excess truck traffic onto the adjacent roadway system. For purposes of problem identification, the modal connection issues are separated by mode.

- Rail–truck connectivity,
- Air–truck connectivity,
- Water–truck connectivity, and
- Truck–truck connectivity.

Environmental Impacts

Trucks can create significant impacts on the environment, especially in terms of air pollution and noise, and increasing truck volumes can exacerbate these impacts. Diesel truck engines emit more nitrogen oxides, reactive hydrocarbons, and particulate matter per mile of travel than automobile internal combustion engines (*7*). As a result, a substantial increase in truck volumes can affect public health by contributing to degraded air quality either regionally or locally, where trucks pass close to sensitive receptors such as homes or schools. Increasing truck volumes also increase noise levels in adjacent areas, because trucks generate substantially more noise than automobiles. High levels of truck noise are particularly undesirable near residential neighborhoods, schools, parks, and other locations where there are high levels of outdoor activity. Specific environmental challenges addressed in the survey include air quality (emissions) and noise.

Quality of Life

Addressing the effects of trucks on the quality of life poses a serious dichotomy for public agencies. On the one hand, it is desirable to accommodate and optimize truck movements: the distribution of goods by truck makes it possible and economical for U.S. consumers to obtain the food and other commodities they desire when they wish to have them. On the other hand, the quality of life for nearby residents can be impaired when trucks travel in areas where they are not intended or desired to be. For example, trucks may take shortcuts through residential communities to avoid congested arterials, or because of regulations that force them off a nearby highway. In addition, trucks may be parked in residential areas because they are driven home at night or because there is insufficient parking space for a truck in the area where they would prefer to park. In either case, the community residents are faced with the noise and emissions of trucks that do not properly belong on community streets.

Thus, agencies are often faced with complaints about the negative effects of trucks on the quality of life, even while trucking is essential to local economic success and the overall quality of life (*8*). In the survey, quality-of-life issues focus on the localized impacts: (1) trucks driving through residential communities and (2) trucks parking in residential areas.

Economic Development

Increasing movement of freight brings associated pressures to develop land for freight-related uses. Industrial uses are constructed to manufacture and assemble the goods demanded by the public. Warehouses and terminal facilities are developed to store and transfer the goods in the distribution process. Such uses in turn spawn the need for nearby suppliers and support uses. Problems may occur if these uses are located adjacent to other types of uses with which they are not compatible. For example, residential areas would not be considered compatible with industrial and terminal uses, owing to the noise and other impacts they impose on the neighboring environment. Another type of challenge may occur if development of freight-related uses discourages other types of uses—which the locality and residents consider more beneficial—from locating in the area. These challenges are categorized as: (1) incompatible:

land uses and (2) truck-related uses that discourage desirable development.

Losses in Productivity Due to Congestion

The potential impact on the economy has been frequently cited as a challenge associated with traffic congestion, as trucks inefficiently spend time in slow-moving traffic, perhaps even missing critical delivery deadlines as a result. The increasing use of just-in-time delivery means that a larger share of truck movements are time sensitive, and even though shippers plan their schedules to account for recurring congestion, they cannot always allow enough slack to account for traffic incidents or unusual delays. With delays, and the need to accommodate them, transportation costs may rise and productivity across the supply chain fall. These challenges are characterized as (1) increased transport costs and (2) productivity loss.

CURRENT CHALLENGES

The preceding discussion was intended to portray the types of potential challenges that are associated with increasing truck traffic. Some are the direct result of increasing volumes of truck movements, whereas others are caused by larger forces operating on the economy or transportation system, but which are linked with increasing truck traffic.

To ascertain the truck-related challenges being faced in the United States today, the survey asked DOTs and MPOs to identify whether they are facing the challenges described previously, as well as the breadth (localized or widespread) and severity (moderate or serious) of each challenge.

State Challenges

The responses of 28 state DOTs are summarized in Table 1. The issues identified most often (by 26 of the 28 states responding) as challenges (either moderate or serious) are congested urban highways and insufficient truck parking.

The other most-often cited challenges (either moderate or serious) are congested urban streets (cited by 25 of the 28 responding states), pavement deterioration and bridge structure deterioration (23 states), congested intercity roads (22 states), and noise (22 states). Each challenge described in the previous section was identified as such by at least eight of the responding states, indicating that all of these issues are being faced in various locations throughout the United States.

The challenges most frequently cited as serious (cited by 12 of the 28 responding states as either localized or widespread) include

- Congested urban highways (widespread—4 states; localized—8 states);
- Congested intercity roads (widespread—2 states; localized—10 states); and
- Air quality (widespread—2 states; localized—10 states).

In most of the states, these are considered localized challenges.

The challenge most frequently reported as widespread (cited by 15 of the 28 responding states as either serious or moderate) is pavement deterioration. Other widespread challenges include bridge structure deterioration (cited by 12 states) and insufficient truck parking (12 states). Most of the states consider these widespread challenges as moderate rather than serious.

The challenges most often cited as being both serious and widespread are pavement deterioration (6 of 28 states) and multivehicle crashes (5 of 28 states).

These results lead to the following conclusions about truck-related challenges in the states:

- Virtually all responding states are already facing at least some of the challenges discussed earlier in this chapter.
- All of the challenges are currently being encountered in some of the states.
- The challenges that are most problematic (frequently cited as both serious and widespread) include congested urban highways, insufficient truck parking, and pavement deterioration.
- Generally, problems of congestion and infrastructure deterioration are most often cited as serious or widespread challenges, whereas those pertaining to economic development and quality of life are least cited as serious or widespread challenges.

Metropolitan Area Challenges

The responses of the eight MPOs are summarized in Table 2. The smaller number of responses makes it more difficult to identify clear trends and differences between the various issues. However, there are clear differences in perspective when these results are compared with those of the states, reflecting the different responsibilities of an MPO.

The truck-related challenge being faced by all eight responding MPOs is noise. The challenges cited by seven of the eight include congested roadways (urban streets, urban

TABLE 1
CHALLENGES ATTRIBUTABLE TO INCREASING TRUCK TRAFFIC—STATE DEPARTMENTS OF TRANSPORTATION

Question 1: DOT Responses*	0 Not Studied	1 Minor Issue	2 Moderate Localized	3 Serious Localized	4 Moderate Widespread	5 Serious Widespread	2+3 Localized	4+5 Widespread	2+4 Moderate	3+5 Serious
(a) Congestion										
Bottlenecks near terminals, ports, border crossings, etc.	2	4	11	7	1	2	18	3	12	9
Congested urban streets	2	1	14	7	2	2	21	4	16	9
Congested urban highways	1	1	9	8	5	4	17	9	14	12
Congested intercity roads	0	5	8	10	2	2	18	4	10	12
(b) Transportation System										
Substandard geometrics	1	8	7	6	3	1	13	4	10	7
Insufficient truck parking	0	1	9	6	7	4	15	11	16	10
Inadequate directional signing	0	13	10	1	1	0	11	1	11	1
(c) Safety										
Truck crashes (single vehicle)	1	7	11	4	2	1	15	3	13	5
Multivehicle crashes (especially auto-truck)	1	11	6	2	1	5	8	6	7	7
(d) Infrastructure										
Pavement deterioration	0	3	6	3	9	6	9	15	15	9
Bridge structure deterioration	0	3	6	5	10	2	11	12	16	7
(e) Environment										
Air quality (emissions)	1	7	7	10	0	2	17	2	7	12
Noise	0	5	12	4	4	2	16	6	16	6
(f) Intermodal Connections										
Rail/truck connectivity	3	7	9	2	1	4	11	5	10	6
Air/truck connectivity	5	9	6	3	2	2	9	4	8	5
Truck/truck connectivity	5	11	4	5	1	1	9	2	5	6
Water/truck connectivity	6	9	5	4	0	3	9	3	5	7
(g) Quality of Life										
Trucks driving through residential communiites	2	8	8	6	3	0	14	3	11	6
Trucks parking in residential communities	3	12	7	3	2	0	10	2	9	3
(h) Economic Development										
Incompatible land uses	3	10	3	5	3	2	8	5	6	7
Trucks that discourage "desirable" development	5	12	4	1	1	2	5	3	5	3
(i) Losses in Productivity Due to Congestion										
Increased transport costs	5	6	7	3	0	4	10	4	7	7
Productivity loss	8	5	5	4	1	2	9	3	6	6

*What challenges attributable to increasing truck traffic is your agency facing?
Notes: Survey data (28 states responding).

highways, and intercity roads), substandard geometrics, air quality, incompatible land uses, and increased transport costs. All of the challenges were cited by at least half (four) of the MPOs. Those cited the least often were bridge structure deterioration and trucks parking in residential areas.

The most serious challenge (cited by five MPOs as either localized or widespread) is congested urban highways. Among challenges considered serious by four of the eight MPOs are congestion bottlenecks, substandard geometrics, insufficient truck parking, trucks driving through residential areas, and incompatible land uses. None of the MPOs considered single-vehicle truck crashes as a serious challenge.

The most widespread challenges to the MPOs are air quality and increased transport costs, which were cited by seven of the eight (as either serious or moderate). Additional issues most often cited as widespread challenges are productivity losses (six MPOs) and pavement deterioration (five MPOs).

None of the quality-of-life or economic development issues were considered as widespread by any of the MPOs.

The issue cited most often (by three of the eight MPOs) as being both serious and widespread is congested urban highways.

SUMMARY OF CURRENT CHALLENGES

Numerous types of challenges associated with increasing truck traffic are already being addressed at the state and metropolitan level, and virtually all states and metropolitan

areas are grappling with some types of truck-related issues. The most prevalent issue reported in survey responses from both states and metropolitan areas is congested urban highways. At the state level, the other most prevalent issues are insufficient truck parking and pavement deterioration. At the metropolitan level, the other most prevalent issues are environmental (air quality and noise) and economic (transport costs and productivity).

TABLE 2
CHALLENGES ATTRIBUTABLE TO INCREASING TRUCK TRAFFIC—METROPOLITAN PLANNING ORGANIZATIONS

Question 1: MPO Responses*	0 Not Studied	1 Minor Issue	2 Moderate Localized	3 Serious Localized	4 Moderate Widespread	5 Serious Widespread	2+3 Localized	4+5 Widespread	2+4 Moderate	3+5 Serious
(a) Congestion										
Bottlenecks near terminals, ports, border crossing, etc.	2	0	1	2	1	2	3	3	2	4
Congested urban streets	1	0	3	1	1	2	4	3	4	3
Congested urban highways	1	0	1	2	1	3	3	4	2	5
Congested intercity roads	1	0	3	1	1	2	4	3	4	3
(b) Transportation System										
Substandard geometrics	0	1	2	3	1	1	5	2	3	4
Insufficient truck parking	2	0	1	4	1	0	5	1	2	4
Inadequate directional signing	1	1	2	1	2	1	3	3	4	2
(c) Safety										
Truck crashes (single vehicle)	2	0	2	0	4	0	2	4	6	0
Multivehicle crashes (especially auto-truck)	2	0	1	2	3	0	3	3	4	2
(d) Infrastructure										
Pavement deterioration	1	1	0	1	3	2	1	5	3	3
Bridge structure deterioration	2	2	1	1	1	1	2	2	2	2
(e) Environment										
Air quality (emissions)	1	0	0	0	5	2	0	7	5	2
Noise	0	0	4	1	2	1	5	3	6	2
(f) Intermodal Connections										
Rail/truck connectivity	1	1	3	1	2	0	4	2	5	1
Air/truck connectivity	1	1	3	1	2	0	4	2	5	1
Truck/truck connectivity	2	0	3	1	2	0	4	2	5	1
Water/truck connectivity	1	2	2	0	2	1	2	3	4	1
(g) Quality of Life										
Trucks driving through residential communities	2	0	2	4	0	0	6	0	2	4
Trucks parking in residential communities	4	0	1	3	0	0	4	0	1	3
(h) Economic Development										
Incompatible land uses	1	0	3	4	0	0	7	0	3	4
Truck uses that discourage "desirable" development	2	0	3	3	0	0	6	0	3	3
(i) Losses in Productivity Due to Congestion										
Increased transport costs	1	0	0	0	5	2	0	7	5	2
Productivity loss	2	0	0	0	5	1	0	6	5	1

*What challenges attributable to increasing truck traffic is your agency facing?
Notes: Survey data (8 MPOs responding).