

LEARNING FROM TRUCKERS: TRUCK DRIVERS' VIEWS ON THE PLANNING AND DESIGN OF URBAN AND SUBURBAN CENTERS

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This study seeks a greater understanding of freight movement problems in urban areas through consultations with particularly knowledgeable sources — truck drivers. Four focus groups of unionized truck drivers who work in urban and suburban centers of metropolitan Seattle, Washington, were organized. Drivers provided specific observations and suggestions concerning curb spaces and alleys, pedestrian interaction, building entrances, loading docks and signage, zoning and design, and technology and equipment. Their suggestions are evaluated for feasibility and classified according to issues and strategies. Seven fundamental issues and strategies are identified that could help guide freight movement planning in U.S. metropolitan areas. Given the range and feasibility of the drivers' ideas reported, it is suggested that truck drivers have the potential to be both creative and practical partners in local freight movement planning.

INTRODUCTION

Managing growth is of concern to communities across the United States and abroad. Many growth management strategies are seeking to reduce urban sprawl by setting urban growth boundaries, channeling growth into existing urban areas, promoting infill development, encouraging densification, and creating urban and suburban centers (Nelson, 1995). Simultaneously, many cities and suburbs are growing denser in response to unplanned market forces, such as rising land prices (Pivo, *et al.*, 1995).

When land use patterns intensify, concerns arise over whether more activity in spatially limited areas will interfere with the movement of urban goods. If a thriving urban environment is, in part, dependent upon the efficient movement of freight, then what can be done to ensure that freight mobility is incorporated into the planning and design of more compact urban areas?

In an earlier study (Klastorin, *et al.*, 1995), it became obvious that those intimately involved with freight delivery — truck drivers — had valuable information to offer concerning the efficient movement of urban goods. Few people know roads, traffic patterns, and freight movement better than truck drivers do. However, other than one earlier report (Christiansen, 1979), little can be found in the recent literature on what truck drivers have to say about urban planning and design.¹ Consequently, a study was conducted to learn what truck drivers currently think are the freight movement problems in the denser parts of metropolitan areas and what they think should be done to address them.

This work is intended to be exploratory. The goal was to gather ideas from drivers that could lead to better planning and design guidelines for metropolitan areas throughout the country. However, it should not be assumed that the drivers' suggestions made in this paper are immediately ready for implementation in any given city or region. They will need to be vetted in various local settings by legal, architectural, trucking, planning, and engineering experts for their economic, political, and technical feasibility. Moreover, the goal of optimally efficient freight movement may have to be balanced in some instances against other goals, such as pedestrian safety or aesthetic quality.

A preliminary analysis of the drivers' suggestions is provided later in the paper. In particular, three questions are asked about the feasibility of each suggestion: Is it expensive? Would it be effective? And, does it conflict with the interests of others? It is shown that although some of their ideas may be problematic, others deserve further serious consideration. Ultimately, any effort to improve freight mobility must confront questions about who benefits and who pays and whether it is worth the effort. We will return to these issues later in the paper.

This project, funded by a grant from the Washington State Department of Transportation, was not intended to reflect the views and experiences of truck drivers in all U.S. cities. The intent was to gain insights that might come from looking closely at one particular setting in order to generate ideas that could be tested for their feasibility and general applicability. The findings reported here should be thought of as "working hypotheses" about what may succeed in various cities. Readers should not assume that the observations are fully transferable to their own situation. They are encouraged, however, to use them as a starting point when investigating the concerns of their local trucking industry.

Some of the data reported below may sound familiar to transportation planners, especially those who have worked closely with freight interests in the planning process under federal law (e.g., metropolitan planning organization's freight advisory boards). However, many planners, designers, and policy makers have not had this experience, and for them, many of these ideas will almost certainly be new. After all, the needs of truck drivers are seldom discussed in professional architecture and planning curricula.

The structure of the paper follows a traditional framework of methods, results, discussion, and recommendations. In the next section, the study approach will be described. Following this are eight sections that report on the drivers' comments about various basic issues. Then there is an analysis of

their suggestions, which is presented in two parts. The first part is an initial exploration of the feasibility and implications of the truck drivers' recommendations. It includes a list of what may be their most generally applicable ideas. The second part of the analysis is a presentation of an issues framework suggested by the drivers' comments. It is offered to help guide the freight mobility planning process in various jurisdictions. It is suggested that there are seven fundamental types of urban freight movement issues and seven types of strategies for addressing them. The paper then concludes with suggestions about what jurisdictions may wish to do about these problems in their own areas.

THE STUDY APPROACH

The study used focus groups to engage truck drivers in guided interviews and discussions (Krueger, 1994). Four focus groups of four to six drivers each were held in the Seattle metropolitan area. Teamsters Union locals were highly instrumental in recruiting drivers for the groups. Participants worked in urban and suburban centers for companies including couriers, private and public intercity carriers, and cartage companies. The firms used a variety of equipment ranging from 20-foot step vans to 53-foot tractor-trailer combinations.

The focus groups were led by the study staff, who were aided by a discussion guide developed through prior interviews with key members of the trucking, logistics, state and regional government, urban design, planning, and real estate development communities. These advisors met three times as a group, and provided advice during the design and implementation process. A literature review also helped with the development of questions for the focus groups.

Focus groups are a form of qualitative research in which purposely-selected participants are interviewed in a group setting. Such a setting increases the efficiency of interviewing, and interaction among group members can lead to more insightful responses than those attained through individual interviews. Success is not based on quantitative measures of reliability or confidence levels; rather, it is attained at the point when the leader of a group can anticipate responses on specific topics based on a pattern of responses that he or she has heard from previous groups. Such a pattern suggests the probability of a generalized view within the population being studied.

Comments collected from the prior interviews with drivers, planners, logistics experts, and builders tended to fall into several general categories, which formed the basis for the focus group discussion guide. Categories included curb space issues, alleys, loading docks, congestion, coexistence with other modes, zoning and design, technology, and changes in the freight delivery industry. We use these headings below to summarize the main points and themes from the four focus groups; direct quotes from participants are shown in italics.

CURB SPACE ISSUES

In the context of this study, curb space sharing is primarily a downtown issue. In more suburban areas, curbs are replaced by parking lots surrounding retail and commercial malls.

When asked to draw a graph depicting volume of delivery activity and curb space demand, drivers, almost universally, drew a graph line that showed constant high demand from early morning until evening. This is different from Habib's (1985) findings in downtown San Francisco that showed a felicitous sequencing of curb space needs in which commuter, delivery, and shopping demand fit neatly into different time segments during the business day (see Figure 1).

In Habib's findings, freight and package pick-up, for example, ended at 4:00 P.M., just as the afternoon commuter rush was starting. This variation in peak demand among curb space users allowed San Francisco to utilize what Habib called "the shared-zone concept" in which certain curbside locations were managed differently as the day progressed. During the morning and afternoon rush hours,

FIGURE 1. Curb spacing sharing. Focus group participants were presented with a graph (A) from which the freight portion had been removed. They were asked to draw in their freight delivery and pick-up patterns during a typical day. Their results (B) showed a fairly constant level of freight activity from early morning until evening, implying that some curb space loading and unloading capacity needs to be dedicated throughout the business day.

parking was prohibited to maximize traffic flow capacity. During the late morning, when commuting declined and demand for freight delivery was at its peak, curb space was reserved for freight deliveries. In the afternoon, before the commuter rush and when shopping demand was high and freight deliveries were declining, the zones were opened to anyone. The observations reported by the drivers in the present study would suggest that this approach would no longer satisfy the needs of all users. According to the drivers we interviewed, demand for freight deliveries is high during all times of the day. If they are correct in their assessment, then efforts to restrict curbside access for freight delivery during the commute hours, or to allow shoppers to park in freight delivery zones, would create more conflict with freight delivery needs today than they did 20 years ago when Habib did his study.²

The focus group participants reported that a variety of factors have changed the pattern of package and freight delivery:

- There is increased competition among package delivery services; there are simply more companies operating in an unregulated environment.
- There now exist a great array and segmentation of time-sensitive delivery, second-day air delivery, and regular package delivery. This has the effect of extending the delivery day, with drivers making two, three, or four delivery stops at the same urban location during the course of a business day.
- There is freight customer demand to expand the business day with earlier and later pick-ups. For example, a wholesale office paper supplier would prefer less-than-truckload (LTL) pick-ups very early in the morning before the rush hour, so that commercial customers can get delivery at the start of the business day.³
- Late afternoon, time-sensitive pick-ups continue past 5:00 P.M. and would go even later, but courier drivers, for example, must return to their base by 6:10 P.M. in order to get packages on flights at the airport for next morning delivery.

Loading and unloading occur in three principle ways: at loading docks internal to buildings in a ground floor or underground loading facility, at loading docks external to buildings facing an alley or parking area, or at curbside.

Impediments to the use of curbside loading zones that were identified by the drivers include the following:

- Not enough zones may be designated. In one extreme example, a courier driver regularly delivers to a suburban city hall that has no designated loading zones. The driver must park illegally in order to serve city offices.
- Loading areas can be made too short to accommodate 20 to 30 foot package delivery trucks. Many existing sites were described as being the length of a pick-up truck. This is of particular concern as the package and parcel industry moves to larger trucks.
- The typical 30-minute time limit can be too short, especially when multiple deliveries must be made in larger office buildings.
- Spaces can be taken up by luxury cars with commercial plates. The drivers in the focus groups believed that loading zones should be for truck deliveries, not sales representatives, and that their use by sales reps is an unfair abuse of the system.
- Exclusive curbside bus lanes on major downtown streets for use during peak rush hour periods (7:00 to 9:00 A.M. and 4:00 to 6:00 P.M.) can remove loading zones from truck use. This forces drivers to park in bus lanes and risk fines, or find parking on other streets.

In the downtown with curbside truck zones, it is not uncommon at all (for carriers) to circle the block six or eight times and go by a truck zone, because you can't get in it because of the (luxury cars) that are sitting in the truck zone with the commercial trucks. ... The downtown businesses, they can't get their merchandise in a timely manner, so they get frustrated. ... They say, "To heck with you, I'll go to the suburbs."

The drivers' suggestions for improving curbside loading zones included the following:

- Make the zones at least 30 feet long.
- Locate zones at the ends of blocks (as they often are) so trucks are not hemmed in at both the front and back by other vehicles (see Figure 2).
- Where there are alleys on side streets, locate the loading zones on either side of the alley entrances (see Figure 3).
- Reserve loading zones exclusively for truck loading and unloading; ban autos with commercial plates.

ALLEYS

Alleys are often heavily used in central business districts and in the central, usually older, portions of smaller metropolitan cities. Alleys provide freight and service access that is protected from through-traffic. However, the potential for alleys to provide access is often not maximized for a variety of reasons, according to the participants.

- It can be too easy to get stuck in an alley with vehicles ahead or in back.
- Alleys can be so narrow that it is impossible for two vehicles to pass one another.
- Alleys can be too cluttered with other objects, such as garbage dumpsters that protrude into alleys and fire escapes.
- Homeless people and drug abusers can be using alleys. Drivers reported having to physically move individuals out of their paths. Drug paraphernalia and unhygienic conditions can make alleys unpleasant and unhealthy.
- Travel direction conventions may not be followed. Alley

FIGURE 2. Suggestions for improving curbside loading zone: make the zones at least 30 feet long and locate them at the ends of blocks.

protocol in Seattle, for example, has been to travel one way — south to north. If this system breaks down, the potential of getting “caught” in an alley increases. Drivers want to avoid backing up as much as possible, because it is dangerous, especially in congested areas.

That’s the biggest fear I think most of our people have — getting in an alley and having another truck get in front of you, and either you’re going to have to back out of it or you can’t get out at all. The scenario that all of us truck drivers are taught: you back out as a last resort.

Drivers serving Seattle’s suburbs reported two phenomena related to delivering goods to the back doors of stores in strip malls (the suburban equivalent of the alley). One is increased fear of crime: small shop owners, who often operate alone or with few personnel, are sometimes afraid to open their rear doors to receive deliveries. In some cases, regular drivers have developed special signals or knocks that announce their presence; in others, the drivers must arrange to deliver through the front door.

Second, most fast food restaurants and many convenience stores will only accept back door, consolidated deliveries at specified times. By minimizing the number of deliveries, these operations reduce the personnel required to staff a receiving area and reduce the threat of crime from a second, unprotected entrance to the building.

Participants suggested several ways to maximize the potential of alleys for the efficient delivery of goods:

- Widen sections to create passing zones for vehicles.
- Design building walls to include alcoves for garbage dumpsters, thereby freeing the full width of the alley for vehicles.
- Re-emphasize one-way etiquette.
- Enforce no-alley-parking rules for non-commercial vehicles.
- Design building fire escapes for minimum clearance (13'6" above grade).
- Clean, patrol, and light alleys.
- Maintain alley surfaces.

I would suggest that one of the things architects and engineers should design into ... malls would be a window in back doors where they could see out, but you could not see in. So when they have an intercom system and a door buzzer, when they go to the back, they can look through the door and see who it is ... Then they would not be afraid to open the door.

FIGURE 3. Suggestion for improving curbside loading zone. Locate curbside loading zones on either side of alleys to avoid trucks being blocked in by cars parking in front of and behind them.

LOADING DOCKS

Architects receive five years of schooling to get a degree, and they don't spend five minutes on a loading dock. I realize that there are factors involved in it that are beyond the architect's control — financial considerations, the expense of doing the job right — but I swear that if the architect had to back this tractor and trailer into the dock, it would have never been arranged this way.

Drivers identified three varieties of loading dock situations in urban and suburban centers:

- the urban office building ground-floor or underground facility,
- the urban grocery or commercial store, and
- the suburban grocery or commercial store.

Urban Office

Both physical design features and facilities management play significant roles in making urban office loading docks functional or nonfunctional from the drivers' perspective.

The approach to a building makes a big difference for drivers. The worst examples had trucks approaching underground loading docks by going down a steep hill, on a one-way street, into a "tight" entrance, at a right angle to the street. This requires a large truck to swing wide to enter, blocking one or two lanes of traffic. More level entrances at milder angles to the street are preferable.

Drivers also have problems when there are no street level signs indicating whether loading dock space is available and when there is a combined entrance/exit. They prefer having an information sign at the street level indicating space availability, as well as separate entrances and exits so that pass-through is possible (see Figure 4). One particular building was often cited as an example of excellence in combining design and management solutions in a limited space. The loading area is a large turntable, like a railroad roundhouse or cable car turnaround. The driver enters the turntable

and the loading area manager turns the truck to the selected loading dock. After unloading has been completed, the truck is pointed forward to the exit of the building.

Urban Grocery and Commercial

Supermarkets are a common land use in dense residential areas. According to the focus groups, the trend for delivering foods such as milk and bread is to ship in larger and larger tractor-trailer combinations, up to 53 feet long. Drivers pointed out that larger vehicles make deliveries to densely developed neighborhoods increasingly difficult. They bemoaned the small allowances for loading dock access (often a matter of inches on each side of the truck) and the tendency to locate utility meters and garbage dumpsters immediately ad-

FIGURE 4. Street-level signs. Signs or signals at street level announcing space availability are very helpful for drivers, who can find themselves "stuck" in a full loading dock when not provided with this information before entering.

acent to loading docks. Such items are easily damaged. Moreover, once a driver has navigated a tight approach, they may find the loading dock to be at an awkward height for safe, efficient cargo off-loading. The drivers reported a wide variance in loading dock height. One store has a height-adjustable dock plate, which was greatly appreciated by the drivers.

They have this great dock plate that must be ... six feet long and it lifts up — and it sets down inside the back of your truck. It's fantastic.

While the trend is to use larger trucks in both the LTL (less-than-truckload) and package delivery markets, several drivers asserted that a small, 24- to 28-foot truck could deliver the same amount of goods during a day, with less driver stress, because the driver could get around much more easily. Milk deliveries to two supermarkets in Seattle's densest residential neighborhood are now made in 22-foot straight trucks rather than in semi-trailers.

Drivers indicated that having the combination of a loading dock and adjacent non-dock commercial parking is an ideal arrangement.

Maybe they can design a common loading dock and have an area off to the side with adequate parking, safe, well lit for when maybe you don't need a loading dock. If maybe you're (a courier driver), and you have 10 pounds and 3 cartons, you don't need a loading dock for that. But you do need a place to pull over and park. You do need a safe haven to be able to handle your merchandise.

Suburban Grocery and Commercial

Landscaped islands and dividers commonly break up parking areas in suburban shopping malls. However, drivers of large trucks said these features can make backing up to loading docks very difficult when they are placed to accommodate cars and not 50-foot trucks.

The drivers reported that the suburban city of Kirkland, adjacent to Seattle, has found a solution that makes trucks more acceptable to nearby residential areas. The loading dock in one of its new supermarkets is enclosed, soundproofed and lidded, so that light is not diffused into surrounding homes. Also, as in Seattle, truck operations are restricted during the evening hours.

In some shopping areas, such as strip malls, there may be no loading docks at all. Daytime deliveries must be made through the store's front door, shared with retail customers. There may be no trucks-only parking areas, and when that occurs, the drivers have to compete with customers for parking spaces.

Shopping mall deliveries are frequently made by hand trucking packages through the mall to individual stores. In one suburban shopping mall, trucks were segregated into "service courts" from which hand delivery is made to one of four sectors in the mall. Many drivers suggested having centralized loading and delivery facilities at malls and major shopping and office complexes to speed up freight delivery.

The truckers complained that it is common in suburban warehouse and distribution centers for buildings to have been packed in, one against another, with little thought of how trucks would access loading docks and facilities. One approach the drivers suggested is shared loading docks:

I have no experience as a driver with (the courier) business ... but I know as an LTL carrier, typically the freight that we deliver is considerably heavier, (there) is usually more of it, at least for one particular account. So any time an LTL carrier can go into a loading dock, it's always advantageous. It's faster and it's safer for the product because you do not have to jump up and down out of the back of the trailer and put the cartons on the ground. It's less handling. Everybody gains by a loading dock. Maybe the architects in the design of these strip malls might say, "Suite D is not large enough to warrant their own loading dock, but suite G has more square footage and in conjunction with eight or nine of these small businesses in the mall, we can provide a common dock."

Although there was general agreement on the value of shared loading areas, one participant had experienced problems with such an arrangement because of conflicts among deliverers, especially at peak pick-up periods in the afternoon.

Participants identified two examples of tunnels that provide excellent, grade-separated freight access to major public facilities — one at Seattle's international airport and one at a regional shopping mall in north Seattle. Several drivers mentioned this as a desirable design approach. The courier company driver who services the airport appreciated having a secure environment with easy access to the many commercial establishments in the sprawling facility. Several drivers supported the idea of using the downtown Seattle bus tunnel for freight delivery during evening hours, when buses do not operate. The bus tunnel extends for approximately two miles under downtown Seattle's main shopping district and office corridor and was built to accommodate faster bus movements and future light-rail transit.

CONGESTION

Almost by definition, urban centers are congested places with multiple activities occurring in a limited geographic space. Delays and uncertainty caused by traffic congestion and crowded loading facilities were mentioned as major issues in the focus groups. Drivers said that one strategy for keeping traffic flowing is to limit the length of stay in loading zones, thus maximizing curb space turnover. This approach is being taken by some office building managers who limit the stay of a delivery vehicle to 30 minutes at underground loading facilities. However, the groups indicated that a 30-minute wait at high-rise buildings is inadequate. Courier drivers will often make 30 stops and deliver over 200 packages in a single building, and internal deliveries may take over two hours in some downtown buildings. A driver with a downtown route may stop at only three or four buildings a day, driving only 10 to 20 miles.

To shorten delivery time, it was suggested that personnel other than a driver could make deliveries to a central package center in a building for internal distribution. Although drivers indicated that time-sensitive deliveries to a central distribution point in an office building are not favored by customers or delivery companies, they themselves would like such a system. One national courier service employs

part-time workers to deliver airfreight packages within buildings when volumes warrant; drivers like this too, although their union opposes the use of part-time workers.

Slow elevator service in buildings increases the time needed to make individual deliveries. This increases the significance of congestion-related delays. If slower traffic could be offset with faster elevator service, then congestion would be of somewhat less concern to the drivers. Delivery and service workers may be required to use freight elevators in most Class A office buildings. But there may often be only one freight elevator. Freight elevators normally return to the bottom of a building after a stop, which makes delivering to a 40-story building even slower. Some building managers can convert certain elevators for delivery use, and do so during peak periods. However, other building managers strictly segregate elevator use, which adds time for deliveries — and contradicts policies that limit truck stays to less than 30 minutes. At some buildings, more time for loading zone parking might help overcome elevator use restrictions.

Drivers commented on increased road congestion in suburban areas, especially along arterial collectors. Commuter and school-related traffic cause long backups. One suggestion proposed by the drivers was to create school bus pull out load and unload zones, which would protect school children while allowing traffic to pass. School buses could use the signal city buses use that requires traffic to yield as buses re-enter the main traffic lane.

One driver cited Sacramento, California, as an example of a city that reduced downtown traffic congestion by creating centralized parking garages and pedestrian-only downtown areas, while building a light rail system that allows people to arrive downtown without a car. There, truck drivers can deliver from door to door without so much car traffic.

CO-EXISTING WITH OTHER MODES

Focus group participants related various accounts of sharing the road with other modes of motorized and non-motorized transport.

Trucks

All agreed that the easiest group to get along with comprises other truck drivers who deliver in the same area because as colleagues, they understand the pressures and constraints of maneuvering and delivering in an urban center. Cooperation among drivers, many of whom work the same districts or routes over time, is key to utilizing scarce curbside space, watching over trucks and cargoes, and spotting parking opportunities or traffic problems.

Cars

Truckers wished that car drivers understood the difficulties of turning, stopping, and even seeing from trucks. Car drivers often cut in back or in front of trucks, whose stopping time is much greater than the car's. One driver told this story in exasperation:

I had a lady that hit [my truck], so help me God. She literally told the cops, "I know you'll never believe this, but I didn't see him. I heard his horn but I did not see him." What is it you can't see about this 48-foot great big red and white trailer with a huge S on it for Safeway? She said, "All I heard was a horn." People need to be educated.

Pedestrians

Truck drivers who regularly work in the downtown core seemed to understand that people make the urban center vibrant and interesting. The idea of wider sidewalks at street crossings was not a threat to them, and they did not think it would impede their ability to turn corners. But several of the urban drivers felt that the pedestrian's "right-of-way" makes turning corners too dangerous. They suggested

that an “all-way pedestrian-only” phase on traffic signals would be a desirable option. With such an arrangement, the roadway would be clear of people during the “all-vehicle” phase.

The suburban drivers generally wanted physically to separate motorized vehicles from pedestrians. They suggested building pedestrian underpasses at some street crossings.

Bicyclists

The drivers identified bicycle riders as a problem for two primary reasons. The first is the erratic and unpredictable behavior of some cyclists. The second has to do with fairness: truck drivers are held to very stringent safety and operating standards, while some bicyclists seem to feel unaccountable to any laws. Bike messengers (who are paid by the delivery) generally were cited as the greatest offenders, compared to bicycle commuters.

Taxicabs

Several drivers identified taxi drivers as the worst group with which to try and share the road. One participant told the story of a cab driver who, when stuck in traffic, simply jumped the curb and drove down the sidewalk for a block.

ZONING AND DESIGN

The drivers frequently said they dislike strip malls. They complained that strip malls often do not have loading docks or zones, nor back-alleys or back door receiving areas. They wanted parking to be set aside for commercial deliveries, whether on or off the street. They said the area should be large enough for a driver to safely maneuver a truck, close to the point of delivery, and separated from customer parking. They indicated that alleys and centralized delivery docks also are desirable.

Redmond City Hall (a Seattle suburb) doesn't have a loading dock or an off-loading dock. I have to park in front of the City Hall, in the fire zone. And I have city fire officials telling me, making a joke, "You know I could give you a ticket." So I have to go to every office in the City of Redmond with my hand truck, you know, wheel it around people. That's not professional. It also creates a hazard in emergency situations. Because now our vehicles sit in the emergency spots. So where am I supposed to park?

The drivers wanted loading docks to have standardized entrance heights, angles of approach, and dock heights; they felt that noise and light controls should be incorporated as well. The standard clearance for a trailer is 13 feet, 6 inches, but drivers reported several newer buildings with only 12- or 11-foot entrances.

The drivers also felt that landscaping used in retail parking areas should be spaced more generously along truck paths and approaches. Street trees should be selected to have their lowest limbs start above truck cab sight lines. Where landscaping is combined with narrow sidewalks, it should be designed to allow easy hand trucking from curbs to buildings.

Sign controls were of less concern to the drivers than the ability to find address numbers on both residential and commercial structures.

Focus group participants all agreed that the views and experiences of trucker drivers should be included in urban planning processes. They felt they should be asked more often to meet with designers, engineers and planners when plans and development projects are being considered.

The next meeting that I would be interested in attending would have a summary of what we've said here, with architects, somebody from the city council, from the State Department of Transportation, from the State Patrol, and traffic engineers.

TECHNOLOGY

For the most part, drivers said they had little or no access to modern communications technology, such as cellular phones or Intelligent Vehicle Systems. They felt that such technology could greatly assist them by warning them about unusual or difficult loading, parking or traffic conditions at their destinations before they arrive. Some trucks were equipped with cell phones for emergency use only. Others had phone systems that could only reach dispatchers.

STRESSFUL CHANGES IN THE INDUSTRY

The truckers said their lives are often stressful. Contributing factors mentioned include competition and restructuring in the freight industry, traffic congestion, and the disappearance of central receptionists in large buildings.

The line between package delivery and less-than-truckload service, which once was clearly marked, is becoming blurred. Drivers for one national courier can now deliver shipments of up to 150 pounds, while LTL drivers are taking semi-trailers to home-based businesses in residential areas. Each segment increasingly competes for the other's customers by offering personal delivery services. For LTL drivers, accustomed to dock unloading by the pallet load, the personal services expected by a small shop owner receiving a hand truck supply of beauty aids can represent a new service duty for which they feel unprepared.

Growing traffic congestion was widely viewed as stressful on many levels. For example, they reported the need to complete deliveries and pick-ups in a strictly enforced time period (courier drivers must return air packages by 6:10 P.M.). There also was frustration about harried car drivers who were viewed as increasingly taking chances by cutting in front of trucks without understanding their need for greater braking time.

The drivers also observed that the modern office is changing because of down-sizing and greater reliance on electronic messaging. Since central receptionists are disappearing, deliveries must be made to individuals located somewhere on an office tower floor, and authorizing signatures, if needed, must be obtained there. Finding time-sensitive delivery destinations is growing ever harder even as the demand for more exact delivery performance increases.

The drivers felt the responsibility and danger of maneuvering large pieces of equipment, containing tons of cargo, on highways and urban streets. And their livelihoods are directly affected by law enforcement practices. For example, double-parking is a violation that typically goes on a driver's record. The driver usually must pay traffic tickets (although couriers will pay for standard parking infractions). Several such violations require them to take a driver's education course and that can cause their licenses to be suspended.

TOWARD PLANNING AND DESIGN GUIDELINES

It would be useful to translate the issues and suggestions offered by the drivers into urban planning and design guidelines. However, as was noted in the introduction, this will require a closer examination of their costs and benefits than can be accomplished here.

An interdisciplinary team of experts should perform a full analysis of the drivers' suggestions. Moreover, since the guidelines may require trade-offs to be made, such as between the needs of truckers and sales representatives for curbside parking, the development of guidelines should be done in collaboration with interested groups and their elected representatives.

Notwithstanding these caveats, this section presents a framework for evaluating the trucker's suggestions and an initial evaluation of their feasibility.

Ervin, *et al.*, (1977) observed that there are three major criteria which are typically used by planners and policy makers to judge the rationality or feasibility of proposed actions: efficiency, or whether the benefits outweigh the costs; equity, or whether there are specific groups that are benefitted or disadvantaged; and political acceptability, or whether there are enough supporters to defeat the opponents. Efficiency is an economic concept based upon the difference between total costs, regardless of who pays them, and total benefits, regardless of who enjoys them. It is concerned with the net gain (or loss) to society. Equity, on the other hand, is concerned with *who* pays and *who* benefits. For example, if the cost of installing signs to promote one-way etiquette in alleys is paid for by the public sector (citizens), benefits truck companies through better truck traffic flows, but generates no public benefits (such as lower congestion or lower costs for goods to the consumer), then the action could be deemed unfair because it amounts to a transfer of wealth from taxpayers to trucking companies. If on the other hand, the taxpayers' investments produce better traffic flows and cheaper goods and services, then the action might be considered equitable. Political acceptability often is a function of the efficiency and equity of a proposed action, but it can also be affected by other issues and values in a community, such as a belief system that views any action that facilitates freight delivery as contributing to consumerism or too much driving. Thus, one way to measure the wisdom and practicality of adopting the drivers' recommendations is in terms of these three considerations — efficiency, equity, and political acceptability. The best suggestions would be those that have benefits that far outweigh their costs, are perceived as resulting in a fair allocation of resources, and would be supportable by a majority of political actors in a community.

These are not easy judgements to make. While it might be rather easy to estimate the cost of implementing these ideas, it is typically much more difficult to establish with any degree of precision the benefits they would produce, especially the indirect ones. Do we really know, for example, whether less time consuming freight delivery would result in lower costs to the consumer or measurably less congestion? A certain amount of educated guessing must frequently go into making these kinds of determinations. But such estimates must be made if the full costs and benefits and their distribution are going to be discussed. Lacking more scientific information on these issues, it is important to seek input from a variety of experts when trying to establish acceptable estimates of costs and benefits.

In Table 1, the suggestions made by the truck drivers are partially analyzed in this fashion. Efficiency is examined in terms of cost (public-sector or private) and effectiveness. Equity and political concerns are examined in terms of the degree to which a recommended solution would impinge on the goals or interests of certain social groups. Obviously, these are very simple ways of operationalizing the multidimensional concepts of efficiency, equity, and political acceptability and additional measures, such as the expected benefits, should be projected in more comprehensive analyses. Nevertheless, they do provide a reasonable basis for the initial study presented here.

Further evaluation of the suggestions, using these and other criteria, would best be done separately for individual communities (although the impacts they consider should not stop at their corporate boundaries). Community-specific studies are preferable to more generic assessments because an accurate evaluation of the drivers' suggestions requires information on such things as how widespread a given problem is in a particular place and how difficult or costly it would be to implement a given recommendation within a certain urban setting. Therefore, Table 1 should be taken as illustrative of what might be done for individual jurisdictions. Furthermore, in keeping with the initial nature of the present analysis, each recommendation is rated in simple, nominal terms (i.e., yes or no) rather than in more precise terms using an interval or ratio scale.

The scores in Table 1 are based on judgements made by the authors, drawing from their own experience and comments made by the project advisory committee of trucking, logistics, urban design, planning, government and real estate experts. There are, admittedly, no facts or studies offered here

TABLE 1. Evaluation of truck drivers' recommendations.

	[A]	[B]	[C]	[D]
[A] Does fix seem inexpensive? 1=yes, 0=no				
[B] Does Fix seem effective? 1=yes, 0=no				
[C] Does fix seem compatible with others' interests? 1=yes, 0=no				
[D] Total unweighted score				
				[A][B][C][D]
<i>Curbsides</i>				
Increase the number of curbside loading zones (CLZs)	1	1	0	2
Make CLZs at least 30 feet	1	1	0	2
Locate CLZs at end of blocks	1	1	1	3
On side streets w/ alleys, locate CLZ on either side of alley entrances	1	1	1	3
Ban autos w/ commercial plates from CLZs	1	1	0	2
<i>Alleys</i>				
Widen alleys; add pullouts	0	1	0	1
Add alcoves to alley walls for dumpsters	0	1	0	1
Re-emphasize one-way etiquette	1	1	1	3
Enforce no-parking restrictions on non-commercial vehicles	1	1	1	3
Provide clearance below fire escapes	0	1	1	2
Clean, patrol, light alleys	0	1	1	2
Maintain alley surfaces	0	0	1	1
Design back doors with one-way windows	1	1	1	3
<i>Urban Office Loading Docks</i>				
Provide less steep and angled entrances	0	1	0	1
Place signs announcing dock space availability	1	1	1	3
Utilize loading area turntables	0	1	0	1
<i>Urban Grocery and Commercial Loading Docks</i>				
Avoid very tight allowances for loading dock access	1	1	1	3
Do not place utility meters, etc. adjacent to docks	1	1	1	3
Provide comfortable dock height for cargo off-loading and/or adjustable dock plates	1	1	1	3
Use 22-28 foot trucks for deliveries in densest areas	1*	1	1	3
Provide a combination of loading docks with adjacent non-dock commercial parking	1	1	0	2
<i>Suburban Grocery and Commercial Loading Docks</i>				
Arrange landscaped islands and dividers in parking lots with truck movement in mind	1	1	0	2
Enclose sound proof and lid loading docks near homes	0	1	0	1
Restrict truck operations during evening hours	1	1	0	2
Provide on- or off-street parking zones where no loading docks exist	1	1	0	2
Provide centralized loading and delivery facilities at malls and major shopping/office complexes	0	1	1	2
Provide shared loading docks for individual stores and offices in multi-tenant projects that are too small for their own dock	1	1	1	3
Provide freight tunnel access to major facilities (e.g. airports, regional malls)	0	1	1	2
<i>Congestion</i>				
Limit length of stay in loading zones	1	1	0	2
Allow deliveries to central package centers in office buildings and shopping malls	0	1	1	2
Increase freight elevator capacity, convert passenger elevators to freight during peak times	0	1	0	1
Provide more bus and school bus pull outs on suburban arterials	0	1	1	2
<i>Co-Existing with Other Modes</i>				
Increase driver education about truck stopping distances and movements	1	1	1	3
Provide "pedestrians-only" and "vehicles-only" phases on selected downtown traffic signals	1	1	0	2
Provide pedestrian underpasses	0	1	0	1
Enforce road rules with bicyclists (especially messengers)	1	1	1	3
<i>Zoning and Design</i>				
In suburban strip malls, provide alleys, loading docks, on-street pullouts, or truck-only off-street parking — all near point of delivery	1	1	0	2
Prune lowest limbs on street trees to above truck cab sight lines	1	1	1	3
In downtowns, design curb planting strips to allow easy hand-trucking from curb-side loading zones to building entrances	1	1	1	3
Ensure address numbers are easily seen from the street	1	1	1	3
Invite truck drivers to participate in the drafting of city plans, ordinances, and building plans	1	1	1	3
<i>Technology</i>				
Increase the use of cell phones or intelligent vehicle technology to alert drivers of parking conditions at their next destination	1**			113

*This assumes freight companies would have to purchase new, smaller trucks.

**This would be inexpensive if done with just cell phones; more expensive if done through the installation of intelligent vehicle technology.

to back up the determinations. However, as was said above, they are intended to be illustrative, not conclusive, and should not be used in lieu of more detailed evaluative studies.

According to the analysis, there could be difficulties with some of the drivers' ideas when their costs and impacts on other interests and objectives are considered. About 60 percent of the suggestions could be expensive to implement and about 50 percent could come into conflict with other concerns. It could be expensive to building owners and firms, for example, to provide centralized package distribution centers in office buildings. And it could be expensive to cities and counties to construct more bus pull-outs on suburban streets. Moreover, downtown retailers, who are often interested in keeping traffic flowing and maintaining on-street customer parking in front of their shops, may oppose the introduction of a third "pedestrian-only" traffic signal phase and the allocation of more curb space to truck loading zones. While the costs and concerns might be offset in the long run by more efficient, lower cost freight movement and related economic development, it would be hard to measure these benefits in advance and thus, regardless of the long term advantages, some resistance to these ideas can be expected. Notwithstanding these concerns, the suggestions may still be valid and supportable if further study found that their benefits outweighed their costs, and if fair means of covering the costs and mitigating the secondary consequences could be found.

While several suggestions could be hard to implement, about a third of them would probably be rather inexpensive and effective, and would not come into conflict with other issues or interests. These items are shown as having received a total unweighted score of 3 in Table 1. These may be some of the more feasible suggestions for development into operational guidelines. They include:

- placing curb-side loading zones adjacent to street corners or alleys to prevent trucks from being blocked-in by cars parked in front and behind,
- promoting one-way alley etiquette,
- providing better driver education on truck maneuverability,
- increasing the policing of bicycle messengers and loading zone parking restrictions,
- notifying truck drivers of loading dock availability and road conditions with signs, cell phones, or other technologies before they reach dock areas,
- maintaining wider loading dock bays that are free of meters, dumpsters, and other obstructions,
- providing loading docks of a comfortable height for loading and unloading,
- using 22 to 28 foot trucks for deliveries in the densest urban neighborhoods,
- installing shared loading docks for several smaller establishments,
- using more freight-sensitive landscaping,
- installing more easily viewed street addresses, and
- including more truck drivers or freight experts in city planning and design activities.

AN ISSUES AND STRATEGIES CLASSIFICATION SYSTEM

The specific issues and suggestions generated by the Seattle drivers may not be the same as those that would be identified in other cities and regions. However, they do imply broader categories of issues and strategies that may be faced by many different communities. If such a classification system could be developed, it could help guide the identification and resolution of these issues in various locations.

An analysis of the drivers' comments yielded the classification system presented in Table 2. It is a two-dimensional system, containing seven issue areas and seven types of strategies for addressing them. The seven issue areas include site access, locating destinations, driver safety, congestion management, intermodal conflict, neighborhood impacts, and driver representation in planning and design. In addition, there are seven kinds of strategies for responding to the issues based on the drivers' ideas: street and alley design, traffic and parking enforcement, building design, site planning, communications, public education, and operations/organization.

Each of the drivers' suggestions can be sorted into one or more of the cells in the classification system. This is done in Figure 2 for all of the ideas that were found to be most feasible (those shown

TABLE 2. Issues and strategies classification system related to urban planning for freight movement in urban and suburban centers. (Note: Selected examples given to illustrate types, additional suggestions given in paper, most feasible suggestion shown in italics.)

Issues/Strategies	Street/alley design	Traffic and parking enforcement	Building design	Site planning	Communications	Public education	Operations and organization
Site access	<i>place curb side loading zones as close to street corners as possible</i>	ban all autos from curb loading zones	<i>build truck bays without utility obstructions; install shared loading docks for small firms</i>	<i>design landscapes with truck movement in mind</i>	<i>promote one-way alley etiquette</i>		
Locating destinations			<i>improve street address signs on buildings</i>		increase use of cell phones		
Driver safety	clean, patrol, and light alleys		<i>design docks to comfortable heights</i>				
Congestion management			include loading area turnables		<i>use signs to announce dock availability</i>		use 22-28 foot trucks in congested areas
Intermodal conflicts	build pedestrian under/over passes	<i>increase enforcement of bicycling rules and loading zone use restrictions</i>				increase driver education on truck movements	add pedestrian only traffic signal phases in downtown locations
Neighborhood impacts			enclose, sound proof docks				restrict hours of delivery operations
Driver input in planning and design					<i>involve drivers during plan making</i>		

in italics) as well as a few of the others in order to illustrate the kinds of ideas that would fall into the various cells of the matrix. Empty cells indicate that the drivers made no suggestions that would fall into that particular combination of issue area and strategy.

An examination of Table 2 suggests two interesting observations about the drivers' recommendations. First, the drivers suggested at least one feasible strategy in nearly every issue area. Second, they had at least some ideas for solving each type of issue. These observations suggest that truck drivers have the potential to be both creative and practical partners in local freight movement planning.

Table 2 makes two additional points about the issues and strategies themselves. First, it shows how the kinds of issues of concern to drivers are multi-dimensional — they are not just interested in getting good access to sites, they are concerned with a variety of things ranging from driver safety to avoiding conflicts with other types of vehicles. Second, freight movement issues can be addressed in a variety of ways extending from greater policing to more public education. Given these choices, most communities should be able to find at least some ways to address their own freight movement problems that fit well with their particular situation.

SOME CLOSING RECOMMENDATIONS

The information obtained through our research comes from the vantage point of professionals intimately involved with urban goods delivery. The challenge is to reflect on how this information might be used to develop guidelines for retrofitting existing urban centers, and for developing new ones, that foster the coexistence of goods movement and other facets of urban vitality. To do that, we recommend that truck drivers, industry leaders, building owners and managers, public officials, architects, and planners do the following:

- Establish a forum to explore the implications of the findings presented here and to learn from one another.
- Analyze the feasibility of a variety of the suggestions arising from this study by comparing them with existing codes, regulations, enforcement processes, and measuring, where possible, the benefits and impacts of implementing these suggestions.
- Develop guidelines for implementing current city plans while maintaining and enhancing the ability to safely and efficiently truck goods in our increasingly compactly developed urban regions.

If these actions are accomplished, it should be possible for cities and regions to accommodate plans and trends toward urban densification while minimizing their impact upon the movement and delivery of urban freight goods and services.

NOTES

1. The only one found in our literature search was published in 1993 by the City of Toronto: *Retrofit Strategies for Loading/Delivery Facilities in the Central Area*.
2. Habib's findings were based on several days of field observation by the author. The finding here that delivery demand has changed since Habib's study deserves further scrutiny in follow up studies due to the differences in methods employed in the two studies and the validity issues associated with both. The different methods make comparability questionable. Moreover, Habib's work did not account for how much the shared zone strategy might itself have been affecting delivery patterns, while the drivers' accounts reported here may be less accurate than studies based on direct observation in the field or the examination of delivery time records. Nevertheless, it is reasonable to hypothesize that, as with commuter behavior, there has been a lengthening of the peak period of demand for freight deliveries during the past 20 years.
3. LTL freight service refers to pick-ups and deliveries, most often at commercial locations, of goods that do not completely fill a truck box or trailer. Generally speaking, shipments are heavier and larger (300 pounds or more) than those carried by package delivery services such as United Parcel Service or Roadway Package Service. The distinction between package delivery service and LTL is becoming increasingly blurred, as couriers will now handle freight weighing up to 150 pounds and LTL will handle freight of less than 150 pounds.

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