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Abridgment

Security Considerations in the Design and Operation of Rapid Transit Stations

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Design principles for rapid transit stations and off-peak transit ridership as a function of personal security are discussed. A survey was conducted at two rapid transit stations in Cleveland, Ohio, for the purpose of determining user attitudes toward personal security and developing station design principles based on the findings. The major finding is that a "critical mass" of station patronage seems to be required before people feel secure in rapid transit stations. People avoid underused stations (which exacerbates the problem of poor patronage) and avoid riding in off-peak time periods at all stations. In both cases, survey respondents stated that they feel vulnerable in a transit station when there are few people around. Ironically, poor station patronage, which is considered to be a security problem, is largely a marketing problem, and improving off-peak ridership, which is generally considered a marketing problem, is largely a security problem. People provide the best security. It is concluded that, although traditional security measures such as good lighting, well marked stations, and security patrols are beneficial, improved security and improved transit marketing are closely associated and should be considered together in transit planning.

This paper discusses an issue that is of critical concern to mass transit riders--personal security. A poor reputation for security can undo the public goodwill engendered through efforts to improve public transit. This paper argues that security measures need to be considered in the design of new transit stations and in the refurbishing of existing stations. Neighborhood and microenvironment characteristics need to be considered early in the design process. The selection of major bus-rail transfer stations must also be considered to encourage a "critical mass" of people at each station.

This paper also argues that there is more to increasing off-peak ridership than improving service frequency or destination opportunities. There is considerable evidence that people actively avoid off-peak use of transit for security reasons even though transit would otherwise be convenient. It is necessary to change this before other improvement measures can have the desired effect. This paper suggests that an investment in improved transit security may be an essential first step for troubled systems before public transit can become a full-service travel mode for the average citizen.

The problem that prompted this study is the extremely low rate of use (approximately 250 boardings/day) of the East 120th Street rapid transit station in Cleveland. The view of the station from the street is blocked, because of its location in an industrial railroad right-of-way, and

the station must be entered through a tunnel that has a blind turn and a steep stairway. The station also forms a boundary between two neighborhoods that are markedly different in ethnic composition. The combination of a physical design that prevents transit riders from being seen from the street and a location that suffers from neighborhood friction has earned the East 120th Street station the reputation of being unsafe.

By comparison, the University Circle station, located only one stop away, is heavily used. Although this station also suffers from tunnel access with blind turns, it is a major bus-rail transfer center and has denser adjoining land uses.

A platform survey was conducted at each of these two stations on Thursday and Friday, May 3 and 4, 1979, to determine user perceptions of personal security and to test user reactions to proposed security improvements. Although riders perceive the stations quite differently, there are key similarities in the way they perceive personal security. From the survey responses, a set of design principles and operational practices that make for safer rapid transit stations were developed. These principles are presented below and are followed by an analysis of the survey results.

DESIGN PRINCIPLES AND OPERATIONAL PRACTICES

Several design principles and practices that provide guidelines for improving the security of the Cleveland rapid transit system in general and the East 120th Street station in particular emerged from the traveler interviews conducted at the two Cleveland rapid transit stations:

1. A critical mass of people is required in a rapid transit station before people feel secure. The very fact that station use is low, for whatever reasons, will discourage additional users.

2. When a station is shared by two or more neighborhoods that have distinctly different ethnic composition, each neighborhood should have its own access to the station area. Although people will mix satisfactorily on the station platform, they are reluctant to cross neighborhood boundaries to enter a station.

3. People perceive certain stations as safe and others as unsafe depending on the time of day.

Table 1. Summary of selected survey results.

Question	Percentage of Respondents	
	East 120th Street Station	University Circle Station
Are the following station improvements important to improve security? ^a		
Presence of attendant at all times	81	73
TV surveillance	69	65
Security officer	80	89
Visibility from street	66	57
Relocation of station	23	NA
Would you feel safer at a relocated station? ^b		
Going to the station	43	13
In the station	42	17
On the platform	38	15
Do you feel safe now? ^c		
In your neighborhood	94	93
Getting to the station	85	91
Riding the bus	69	89
Riding the rapid transit system	91	91
In the station	61	77

^a Responses indicate those who answered "very important" or "moderately important".

^b Responses indicate those who answered "yes".

^c Responses indicate those who answered "yes" and "mostly".

Stations that have low off-peak use and poor visibility from the street are most often perceived as dangerous.

4. Because of the safety differences between stations--both real and perceived--good lighting and station identification are important. People fear missing the correct stop because of difficulty in reading station signs at night.

5. Enclosed walkways are universally perceived as dangerous, especially if there are blind turns. This is true both day and night. Steep and deteriorating stairways in tunnels add the danger of accident to the risk of crime.

6. Certain bus routes are perceived as dangerous whereas others are considered safe. Identifying hazardous routes and improving security on these routes would tend to increase bus use and, potentially, transfers to the rail system.

7. Peak transit users dominate the ridership sample, partly because of the perceived dangers of riding during off-peak times. Improved security measures can be a tool for increasing off-peak ridership.

8. To be effective, new security measures must be made known to the public. Good public information is essential.

PERCEPTIONS OF PERSONAL SAFETY

Both male and female transit riders feel that the most dangerous portion of a rapid transit trip is entering the station and waiting for a train. An analysis of survey responses revealed that only 61 percent of the riders interviewed at the East 120th Street station felt safe all or most of the time when using the station whereas 95 percent felt safe in their own neighborhood and 85 percent felt safe while getting to the station. A summary of the responses is given in Table 1.

The rapid transit trains, on the other hand, are felt to be quite secure. At both stations surveyed, about 90 percent of the respondents felt safe on the trains all or most of the time. Buses, however, received mixed reviews. Only 76 percent of the respondents at East 120th Street felt secure on the bus all or most of the time compared with 89 percent at University Circle. Evidence indicates that there is a selective security problem on buses that depends largely on the neighborhoods through which a route operates.

There is also a time-of-day element in people's security perceptions that comes across clearly in talking with them but is not well reflected in the survey responses. When people say that they feel safe most of the time, that really means they feel safe at the times at which they currently travel. The hidden condition is that their travel times are carefully and consciously tailored to hours of peak activity. The adage that there is safety in numbers is particularly apt here. It is suggested, based on riders' comments, that the security problem at the East 120th Street station could largely be corrected by initiating marketing actions to improve the station's attractiveness to potential users in the neighborhood.

RIDER PERCEPTIONS OF ALTERNATIVE SECURITY IMPROVEMENTS

Manned Stations

The most favorably perceived actions to improve station security involve placing an attendant or security guard at the station full time. People were generally favorable to the idea of security guards assigned to each station, but they also recognized its limitations. It is clear that most criminal incidents happen very fast. If one guard has the platform plus several tunnel approaches to patrol, he or she is, at best, a deterrent only to the casual criminal. Several people expressed concern for the safety of the guard. Any isolated individual, even a security guard, is perceived as vulnerable in a rapid transit station.

Television Surveillance

Television surveillance was considered a reasonable action by 73 percent of the respondents at East 120th Street but by only 65 percent of University Circle respondents. The question that immediately arose was, Who is going to be watching the monitors and where will he or she be? If television surveillance is used, it must be coupled with very quick response. Monitoring at a central location will do little to improve people's sense of security. There was also great skepticism about how long the cameras would last; it was felt that they would quickly be vandalized or stolen.

Improved Visibility

Only 57-66 percent of the respondents felt that improved visibility from the street would improve platform security. Although the visibility issue is important (many respondents mentioned fear of the enclosed tunnels), there is also the feeling that people don't care, that the average person is not likely to respond to a cry for help or even to place a call for police assistance.

There are two sides to the visibility issue. On the one hand, future stations or station improvements should avoid enclosed tunnels with blind turns. This would improve the feeling of safety in the sense that a potentially dangerous individual could be spotted well in advance. On the other hand, people do not really expect help from passersby. Visibility is important, but improved visibility is probably not sufficient to turn around the negative perception of the East 120th Street station.

Station Relocation

Another measure under consideration for improving ridership at the East 120th Street station is moving

the station along the line from its present location to the next cross street, Mayfield Road. A station entrance at this point would provide direct access to the center of the white neighborhood. The responses to this idea point up the importance of neighborhood identification with a transit station.

Only white females favored moving the station as a security measure. Black females, black males, and white males were strongly of the opinion that moving the station was unimportant or would have no security impact. What this seems to be saying is that moving the station would not have much of a security impact compared with manning the existing station with a qualified guard or attendant. On a comparative basis, however, whites generally favor the new location whereas blacks are split between perceiving no security benefit and perceiving lessened security.

The ethnic differences in relative perceptions of personal safety at the present East 120th Street station and a relocated station point up the importance of neighborhood boundaries in the location of rapid transit station entrances. The East 120th Street station is located at the boundary of two markedly different residential areas. Residents of one neighborhood are reluctant to pass through the other to reach the rapid transit station. The platform area, however, is viewed as neutral ground.

The conclusion to be drawn from this observation is that each neighborhood should ideally have its own access to the transit station. It must be perceived as "our station". When neighborhoods of a distinctly different makeup share a station, a good planning principle is to provide access to each neighborhood.

ALTERNATIVE ACTIONS TO IMPLEMENT DESIGN PRINCIPLES

Based on the design principles mentioned earlier and an analysis of the survey findings, there are a number of actions that could be taken to improve use of the East 120th Street station:

1. Some buses could be rerouted so that bus-rail transfers occur at East 120th Street instead of University Circle. Some buses are currently diverted to University Circle because there are no transfer facilities at East 120th Street. This would infuse new ridership into the East 120th Street station, which would help to reduce security problems.

2. An experimental neighborhood feeder bus program serving both local neighborhoods and part of University Circle could complement the present University Circle, Inc., demand-activated bus service and improve the market penetration of the East 120th Street station.

3. Construction of bus-transfer bays and a park-and-ride lot at East 120th Street would facilitate bus transfers and also provide an expanded market area for the station through improved automobile access. A number of riders currently park on the street at East 120th Street, which indicates a latent park-and-ride market.

4. Lighting and station signing should be improved. This should largely be accomplished through the programmed station improvement project that is soon to begin. Whenever it is reasonable, tunnel access should be replaced with open stairways.

5. The present entrance to the East 120th Street station should be closed. This entrance tunnel is universally perceived as dangerous because of the blind turns and steep stairs. In addition, its proximity to the overpass at Euclid Avenue is disadvantageous because walking under the overpass

itself constitutes a security problem.

6. Two new entrances should be opened at the south end of the East 120th Street station platform, nearer Mayfield Road. One entrance should serve the Wade Park area and the other the Murray Hill area. Bus-transfer and park-and-ride facilities could potentially be developed on the east side of the rail right-of-way. Tunnels should be avoided in constructing the new entrances.

7. A restructuring of the fare-collection system should be considered so that the entire platform and the tunnel approaches are accessible only to those who have paid the fare.

8. A station security program should be considered, at least during off-peak periods, including midday and early morning. Depending on budget limitations, a full-time attendant would be beneficial.

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Discussion

Larry G. Richards

Andrle, Barker, and Golenberg have discussed a problem of critical importance for designers and operators of transit systems. Security, both actual and perceived, is a major factor in travel mode choice and patterns of transit use in large cities. The design and renovation of transit facilities to enhance both security and perceived security should be a central concern for operating agencies. This discussion has three purposes: (a) to highlight certain results reported by the authors and to emphasize some of their design recommendations, (b) to relate their findings to other research in this area, and (c) to provide references to the relevant literature on security planning and design.

PERCEIVED SECURITY

This paper demonstrates a concern about security among users of rapid transit at two stations in Cleveland. A perception of poor security is said to explain the low passenger volume at the East 120th Street station. A platform survey of users at two stations yielded information on user evaluation of possible security improvements and their perceptions of the relative risk of various segments of a transit trip.

Previous research has demonstrated the importance of perceived security to travel mode choice and patterns of transit use, and a systematic study of a major transit system found that how security was perceived was the major factor that differentiated frequent users, infrequent users, and nonusers of transit (1).

RELATIVE RISK OF VARIOUS TRIP SEGMENTS

The authors' finding that more survey respondents at the East 120th Street station were satisfied with the safety of rail rapid transit than with the safety of the bus is the opposite of results obtained in Chicago. Ferrari and Trentacoste (2) reported that safety was one of the major reasons patrons in Chicago chose the bus over the elevated

train for their trips. The el in Chicago was rated much less safe than the bus system.

In the Carnegie-Mellon University study of the Chicago transit system (3), respondents also rated their perceived security during various segments of a transit trip. Riding the bus was perceived as the safest activity, followed in rank order by waiting for the bus, walking to the rapid transit station, riding the train, waiting at the station, and entering and leaving the station.

Thus, the ordering of the safety of trip segments found by Andrie, Barker, and Golenberg generally agrees with that found in the Chicago study except for the relative safety of the bus versus the train for the East 120th Street respondents. The conclusion that the security of the bus is a function of the route traveled is probably correct. Thus, bus access routes to the East 120th Street station should be selected for their safe image.

USER PREFERENCES FOR SECURITY IMPROVEMENTS

The authors' results agree with those of several previous studies on user preferences for various security measures (1,3,4). People generally prefer security measures that involve manpower (e.g., security guards and attendants) to electronic surveillance, communications and alarm systems, or design features. However, passenger discomfort in the station environment is often related to design features (1), and various low-manpower countermeasures may effectively reduce station crime (5).

TERRITORIALITY AND DEFENSIBLE SPACE

The description of the East 120th Street station and the surrounding neighborhood situation is especially important. It relates this study directly to Newman's concept of defensible space (6), which includes the notion of territoriality discussed by the authors. The East 120th Street station violates all four of Newman's criteria for defensible space: (a) It lacks adequate territorial definition, (b) it is not subject to easy surveillance, (c) it does not interface with safe and/or busy public areas, and (d) it is isolated and set apart from community activity patterns. The suggestion that separate entrances from the two neighborhoods would facilitate use of the station is very important and should be more completely examined, both in this case and in others. A survey of nonusers is needed to determine how many people do not use the East 120th Street station because they are reluctant to cross territorial boundaries.

NEED FOR NONUSER SURVEY

Although this study does demonstrate that security is a concern among the users of the Cleveland

transit system, it does not demonstrate that poor security is driving away users or is the reason that nonusers are avoiding the system. To show that, a survey of nonusers and former users would be necessary. If peak-hour users are concerned about their personal security, less frequent users and nonusers may be even more so.

CONCLUSIONS

Andrie, Barker, and Golenberg were interested in the redesign and renovation of a particular transit station. Their recommendations are generally sound and conform to design principles suggested elsewhere (7,8). The survey results replicate previous findings, except for the relative safety of the bus as perceived by respondents at the East 120th Street station. The actions suggested to implement the design principles are all good, and the authors' conclusions are well taken. It is hoped that there will be a follow-up report to indicate how these changes have in fact influenced perceived security and station use.

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