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RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT DIVISION

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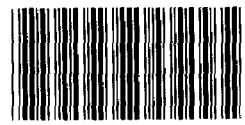

Mr. Robert H. McManus
Associate Administrator for Grants
Management
Urban Mass Transportation Administration
Department of Transportation

Dear Mr. McManus:

Subject: UMTA could take steps to reduce costs in the development of light rail projects.

Large amounts of Federal dollars are being spent towards the development of light rail systems in Buffalo, NY; Portland, OR; and Pittsburgh, PA; and a number of other cities are considering similar systems.

Pittsburgh's $480 million light rail project consists of reconstructing 12.5 miles of an existing streetcar line, constructing a subway for the 1.1 miles of the system in the downtown area, developing a new vehicle maintenance and storage facility, purchasing 55 new light rail vehicles, and rehabilitating 45 existing streetcars. The system, being constructed by the Port Authority of Allegheny County (PAT), will run from downtown Pittsburgh to South Hills Village and serve 16 stops and 13 stations, four of which will be in the downtown segment. A stop is usually just a location on a street where the vehicle stops to pick up passengers, while a station has platforms, passenger waiting areas, parking facilities, and in some cases connections with feeder bus lines.

We made a review of the development of the Pittsburgh light rail system to identify what actions were taken to hold down the costs of the system and to ensure that the most effective use is being made of the Federal funds.

We found that the decision to upgrade the existing streetcar system and other actions held down the costs of the Pittsburgh system. However, several additional steps could be taken to further reduce costs and could also be applicable to other systems. The areas where we believe actions are needed are (1) the use of value engineering, (2) guidance on appropriate criteria to justify the need for high-level stations, and (3) development of realistic ridership projections.

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VALUE ENGINEERING OF THE LIGHT RAIL STATIONS COULD REDUCE COSTS

Since 1979, the Urban Mass Transportation Administration (UMTA) has been using a peer review technique on selected capital projects, primarily those for new heavy rail systems, that has been somewhat successful in reducing costs. In our recent report, "Value Engineering Has The Potential To Reduce Mass Transit Construction Costs" (GAO/RCED-83-34, Dec. 29, 1982), we pointed out that even when UMTA's peer review technique has been used, costs can be further reduced through the use of value engineering. The objective of value engineering is to satisfy the required function at the lowest cost consistent with the requirements of performability, reliability, and maintainability. The planned stations in the PAT light rail system have not been subjected to either peer review or value engineering.

In our December 1982 report, we recommended that UMTA implement a value engineering program for all construction projects exceeding $2 million. In response, UMTA indicated that it is developing a comprehensive project management guideline for cost control which will incorporate value engineering, peer reviews, and other processes. UMTA indicated that the guideline will encourage grantees to incorporate value engineering in their construction contracts.

In the PAT system, 13 stations are planned--10 above ground and 3 in the underground segment--at a total cost of more than $26 million, 80 percent of which is financed from Federal funds. The underground stations and four of the above ground stations are already under construction, but construction of the remaining six stations is not scheduled to begin until July and October 1983. The estimated cost of these stations not yet under construction is over $4 million. Because of our previous work on value engineering, we believe that there are opportunities for savings if the six stations were subjected to value engineering.

While value engineering can be applied during any phase of a project, the optimum time to use it is during the early design phase. The chances of implementing changes are greatest at early stages and the impact of changes on costs and construction schedules is less.

In discussing the feasibility of value engineering the remaining stations, officials of UMTA's Office of Grants Management indicated that the new cost control guideline that UMTA is developing would address these issues. We found, however, that the guideline has not yet been drafted and its development is being delayed by higher priority work. If no action is taken to value engineer the Pittsburgh stations before the

above mentioned guideline is issued, the opportunity to achieve savings will have passed.

LACK OF CRITERIA FOR DETERMINING WHEN HIGH-LEVEL PLATFORMS ARE JUSTIFIED

High-level platforms, where the platform is level with the floor of the vehicle, are desirable for rail systems with a high volume of passengers because they improve the speed and safety of passenger loading and unloading and the trains do not have to spend as much time at each station. Ridership, however, is not the only factor to be considered when deciding whether to build high-level platforms. Some systems, for example, use high-level platforms to make the system more accessible to the elderly and handicapped. In some locations, conditions such as the lack of space preclude the construction of high-level platforms. In most cases high-level platforms are more costly to build than street level platforms. UMTA, however, has not developed any guidance as to when the additional expense of constructing high-level platforms is justified.

PAT intends to construct high-level platforms at 13 of the 29 stops in the system based on projected ridership and accessibility for the elderly and handicapped. The new PAT light rail vehicles will have four double doors on each side of the car which can be used at the high-level platforms and one door with steps beside the operator's compartment at each end of the vehicle which can be used at low-level stops. In addition, PAT will also be using rehabilitated streetcars which can only be used at low-level stops. As a result, each of the 13 stations will also have a low-level segment at each end of the high platform for the rehabilitated cars.

While three of the 13 stations are in the subway segment, where it apparently makes little difference in cost whether high- or low-level platforms are built, the remaining 10 high-level stations, which will cost about $6 million, are at above ground stops. The number of passengers that are projected to use these stops during the heaviest peak hour range from a low of 18 at the Gravey-Welton stop to a high of 1,254 at the McFarland stop. While PAT has chosen to build the high-level platforms at the stops with the highest projected usage, the selection of these stops seems somewhat arbitrary. For example, Washington Junction, with 280 passengers during the peak hour, will have a high-level platform, while the Shiras stop, with 257 passengers, will not. When high-level platforms are selected solely because of ridership, we believe UMTA should have some criteria to judge what level of ridership justifies the expense of constructing high-level platforms.

Furthermore, in 1976 when the PAT system was approved, PAT intended to use the traditional form of fare collection where passengers must file past the vehicle operator to deposit their fares. Since fares are collected when passengers board on the inbound trip and when they leave the vehicle on the outbound trip, high-level platforms and multiple doors would not have speeded up the system's operations because of the method of fare collection. While PAT officials informed us that they were studying various methods of self-service fare collection that could eliminate these drawbacks, the higher cost high-level platforms were selected when the system was designed without any firm plans on how they could be effectively utilized.

Officials of UMTA's Office of Grants Management told us it would be difficult for UMTA to develop national criteria because of the different factors that must be taken into consideration in selecting high-level platforms and that to do so would constitute unwarranted Federal intrusion into what should be a local decision. While we agree that it would be difficult to develop criteria to cover all of the different factors, we still believe that if ridership is the only basis used in selecting this option, some guidance is needed to ensure that Federal funds are used effectively.

RIDERSHIP PROJECTIONS ARE QUESTIONABLE

Many of the basic decisions about the structure of any transit system are affected by ridership projections. For example, projected usage of the system affects the decision on whether heavy rail, light rail, or express bus service will be the most cost effective way of meeting the objectives of the service. Similarly, ridership also is used to determine the number of vehicles and the number and type of stations or stops that are needed. Making ridership projections is a very imprecise process because of the many factors, such as the cost and availability of gasoline, the general economic condition, and the population increase or decrease, that affect the result. Most transit systems appear to pick optimistic projections for ridership growth in planning transit improvements, and there is no evidence that UMTA questions or reviews these projections.

PAT calculated the need to buy 55 new light rail vehicles (LRV's) and rehabilitate 45 of their existing streetcars based on a projected 1985 morning peak ridership of about 13,600 passengers. Peak ridership on the existing streetcar system is currently about 8,000; and Pittsburgh expects to gain about 5,600 more riders because of the upgraded service and the restructuring of some bus lines to feed into the light rail

system. This represents an increase in ridership for the light rail/streetcar system of about 70 percent.

To determine the accuracy of ridership projections, we contacted eight transit systems which had recently completed new rail systems or extensions of their existing rail systems. The following information was found:

--Cleveland had projected in 1976 that ridership on their modernized light rail system would be 22,000 per day, but actual ridership is only 17,000.

--In 1979 Atlanta projected that the 1982 ridership on the first 15 miles of their system would be 120,000 trips per day, but actual ridership is only about 99,000.

--While Buffalo's light rail line is not yet in operation, projected ridership using 1970 census data was expected to be 88,000 per day. In 1982, however, projections were adjusted to 44,000 to 46,000 per day based on the preliminary 1980 census data.

--In 1974, Washington, D.C., projected annual ridership for the subway system to be 314 million but in 1981, the projection for the entire system was dropped to 179 million. Ridership for the first phase of the system did exceed projections.

--San Diego and San Francisco reported that they had exceeded their projected ridership growth; while Philadelphia, who had projected that they would maintain their prior ridership levels, achieved a 10 percent growth in ridership after modernizing their light rail line.

--Boston does not maintain separate ridership figures for their light rail line, but indicated that they believed there had been some decline due to fare increases and service cutbacks.

We believe the above examples raise serious questions about the accuracy of ridership projections made by transit systems when they start projects. In addition, few other new systems have experienced such a large increase in ridership as that projected by Pittsburgh. UMTA, however, did not question the reasonableness of Pittsburgh's ridership figures.

The officials of UMTA's Office of Grant Management generally accepted our comments on ridership projections but pointed out that the studies and projections are generally done many years before a system is completed and that these studies are limited by the fact that census data is only available every 10 years.

CONCLUSIONS

Because value engineering has its greatest impact in the earliest stages of design, we believe UMTA should require that the unconstructed Pittsburgh stations be subjected to value engineering now, because waiting for the completion of UMTA's management guideline for cost control would mean that the Pittsburgh stations would be too far along to achieve any savings.

We also believe UMTA should provide guidance concerning the appropriate criteria that should be used in selecting higher cost options such as high-level platforms instead of permitting local preferences to determine the ultimate cost of the system and the resulting Federal investment.

While it is difficult to calculate accurate projections for ridership, we believe UMTA has an obligation to review and question ridership projections to make sure that the Federal moneys subsequently allocated to the projects are really needed. For example, if Pittsburgh does not realize its projected 70 percent increase in ridership, it will not be fully utilizing all of its 55 new LRV's. At nearly $900,000 per vehicle (or over $700,000 of Federal money) even small reductions in vehicle needs could have significant dollar savings.

RECOMMENDATIONS

We recommend that UMTA:

--have the Pittsburgh light rail stations not yet under construction value engineered as soon as possible so that any potential savings could still be realized.

--provide guidance on the level of usage needed to justify the selection of high-level platforms when ridership is the only criterion affecting the decision, and

--review and question ridership projections used by transit systems as the basis for selecting various options in designing new rail systems.

OBJECTIVES, SCOPE, AND METHODOLOGY

The objective of our review was to determine whether the funds provided by UMTA for light rail equipment acquisition, construction projects, and rehabilitation will result in efficient and economical use of the funds.

In carrying out this review, we examined documents concerning the design and construction of the Pittsburgh light rail system, and interviewed officials of the Port Authority of Pittsburgh, UMTA headquarters and the Philadelphia regional office. In addition, we visited transit officials in Buffalo, NY; Philadelphia, PA; San Diego, CA; and San Francisco, CA; to gather information about the design and operation of their light rail systems. We also contacted transit officials in Cleveland, OH; Atlanta, GA; Boston, MA; and Washington, D C.; to determine actual ridership for their systems as compared with projected usage at the time the systems were designed. Our review was performed in accordance with generally accepted government auditing standards.

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Please let us know what actions you take or plan to take on our report. If you have questions or wish to discuss these issues, please contact Mr. Stephen L. Keleti at 426-2125.

We are sending copies of this letter to the Administrator of UMTA as well as the Department of Transportation's Office of Inspector General and Assistant Secretary for Administration.

Sincerely yours,

Oliver W. Krueger
Associate Director