Metro Tunnel Rail Installation Process

Management Audit

Report No. 98-04

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INTRODUCTION

The management audit of the Metro Tunnel Rail Installation Process was initiated at the request of the Metropolitan King County Council, and included in the Council-adopted 1998 Auditor s Office work program. The Council s interest was prompted by reports alleging that the existing tunnel rails might need to be replaced by RTA Sound Transit before implementation of light rail operations.

The Metro tunnel was initially designed as an electric-only bus facility with potential conversion for future light rail use, which was projected to be implemented after the year 2000 according to the Puget Sound Council of Government's Multi-Corridor Project Summary Report prepared in the mid-1980s. The Metro Council previously considered installing rail in the tunnel in 1985, but decided to postpone the installation until rail planning in the Puget Sound region was more defined. When the rail installation proposal resurfaced in 1988, 46% of the $431 million tunnel capital project budget had

been spent and all the major construction contracts were awarded to contractors.

STUDY OBJECTIVE

The primary audit objective was to determine whether the rail installed in the tunnel between 1988 and 1990 may need to be replaced by RTA Sound Transit prior to implementing a light rail system. In addition, the decision-making process for the early rail installation was reviewed to assess whether Metro management was aware of and fully informed the Metro Council about the possible future replacement of existing rails or other necessary modifications, when the rail installation was proposed in 1988.

GENERAL CONCLUSIONS

The general audit conclusion was that Metro installed functional girder rail in the tunnel; however, some technical requirements important to light rail operations were relaxed or not addressed during the design process such as stray current corrosion protection, noise and vibration damping, and special trackwork. Thus, RTA Sound Transit will recommend replacing the existing tunnel rails to meet the technical requirements for light rail due to significant stray current leakage.

The report also concluded that the Metro Council, Transit Committee and DSTP Subcommittee were not fully informed about the significant rail modifications required to implement light rail, and were advised that technological obsolescence was not a major concern. In addition, different and often conflicting information was presented by Metro to the three Council bodies, which were finally advised that there were no clear financial or technological benefits from the early rail installation. However, the available Metro meeting minutes indicated that the early rail installation was a Council-initiated and driven process.

MAJOR FINDINGS AND RECOMMENDATIONS

FINDING 2-1 ***Although Metro installed functional girder rail in the tunnel, some technical requirements important to light rail operations were relaxed or not addressed during the design process.***

Stray current corrosion protection is essential to embedded rail systems installed for dual-mode transportation operations. Stray current may, over time, corrode the rails as well as other utilities and structures located in the ground and tunnel structure (e.g., conduits for electric street lights, water pipes, etc.). Noise and wheel-rail vibrations are also important factors in light rail operations. Noise impacts passengers, and low-frequency vibrations can be transmitted through dense soils, which may cause movement in adjacent buildings or damage sensitive equipment.

Although functional girder rail was installed in the tunnel, Metro modified its design criteria following the completion of the initial, complex rail design because the engineer s estimate was $1.7 million above the $5 million rail project budget. However, the new design criteria, which emphasized economy and ease of installation, eliminated or decreased the stray current protective measures as well as the noise and vibration reduction measures.

Other rail components specific to a selected light rail system were also deferred by Metro until the implementation of light rail operations, including the location of the axle of the rails cars and crossover tracks, traction power, signalization, and rail routes outside the tunnel. These technical requirements for effective light rail operations, which are generally defined in a comprehensive rail system, could ultimately have led to the replacement of the existing tunnel rail. Metro s design consultant noted that the tunnel was state-of-the-art in terms of dual mode buses rather than rail, so many technical features essential to rail operations were not considered in either design.

Please see recommendations at the end of Findings 2-2 and 2-3 below.

Finding 2-2. ***Although the existing tunnel rails are usable, RTA Sound Transit will recommend replacing the rails to meet the technical requirements for a light rail system. Metro staff was aware of the need for substantial future modifications of the rail, including potential rail replacement, when the installation was proposed in 1988 .***

Although the existing tunnel rails are usable, RTA Sound Transit and its design engineering consultant had two significant concerns about the as-built rail design: stray current corrosion protection and the wheel-rail vibrations. In fact, significant leakage of stray current in the as-built rail design was detected during recent tests conducted by the consultant. RTA Sound Transit indicated that engineering studies on the rail issues will be available in the Fall and will include a recommendation to replace the rail. In addition, newer technological enhancements will be recommended as the new rail system is designed.

The audit recommended that the Metropolitan King County Council consider requesting a full report from RTA Sound Transit on rail modifications required for light rail operations. Detailed explanations of operational and cost factors should be included in the justification presented to the Council for rail replacement.

Finding 2-3 ***The Metro Council was not fully informed about the significant rail modifications that were required to implement a light rail system, and was advised that technological obsolescence was not a concern.***

Based upon the meeting minutes and staff reports, the early rail installation was a Council-initiated and driven process. However, even though the Metro Council was also informed that rail obsolescence was not considered an issue at the time, the review of the meeting minutes and staff reports from the Metro Council, Transit Committee and DSTP Subcommittee meetings indicated that the Metro Council was not fully informed of the future modifications required for light rail operations.

In addition, different and often conflicting information was presented by Metro at numerous meetings of the three Council bodies. For example, during the April 21, 1988 Metro Council meeting, the Council was only told that there would be a 10-15% increase in rail installation cost if the rails were installed after the tunnel opened. However, on the same day, during a Transit Committee Meeting, a detailed financial analysis of the rail installation was presented, and the Committee was informed that the decision of whether or not to place rail in the tunnel could not be based on clear financial benefits.

Ultimately, the early rail installation was inconsistent with Transit Committee minutes and staff reports in which the financial analysis was described, because the analysis suggested that it would be financially advantageous to postpone the rail installation if light rail operations were implemented after 1995. The Puget Sound Council of Governments' Multi-Corridor Project Summary Report, developed in the mid-1980s, indicated that light rail operations would be implemented after the year 2000 and as late as the year 2020.

The audit recommended that the Metropolitan King County Council, Regional Transit Committee, and its staff, in cooperation with the RTA Sound Transit Board, consider defining the reporting structure as well as the type and frequency of information to be routinely provided for decision-making purposes, to ensure that the Councilmembers can provide appropriate policy direction and oversight on the tunnel conversion to light rail. The audit also recommended that the Metro Transit Division management and staff provide timely and relevant reports to the Metropolitan King County Council, as defined in the above recommendation, regarding the conversion of the transit tunnel for light rail operations.

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