

# MEMORANDUM

**To:** Javier Betancourt, CITT Executive Director  
**From:** IMG Rebel Team  
**Date:** July 19<sup>th</sup>, 2019  
**Subject:** Summary Findings and Recommendations from Assessments of the Department of Transportation and Public Works (DTPW) Metromover and Metrorail

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On February 6, 2018, IMG Rebel (hereafter referred to as “the Team”) was engaged by the Citizens’ Independent Transportation Trust (CITT) to review and analyze the Department of Transportation and Public Works (DTPW) Metromover maintenance and cleaning practices. On December 27, 2018, IMG was again engaged by CITT to review and analyze DTPW’s Metrorail preventive maintenance and cleaning practices.

The Team requested, received, and conducted a review of internal DTPW data, including, but not limited to, budgets, performance metrics, labor practices, and maintenance records. The Team performed analysis of external cost and performance benchmarks from peer systems; conducted extensive interviews over the phone and in person as well as on-site visits to observe maintenance facilities, stations, and vehicles in service across the entire length of each network. As a result of this analysis, the Team came to certain shared conclusions across both assessments as well as certain unique findings to each system that inform our ultimate recommendations to CITT.

The Team found that DTPW is not able to hire qualified technicians into Metrorail and Metromover maintenance roles. This is largely due to restrictions placed on DTPW’s hiring practices by the agreement entered into with Transport Workers Union (TWU) by the County as a result of Section 13(c) of the Federal Transit Act. While the shortage of qualified maintenance technicians is more acutely felt by Rail Maintenance (Division 82), it was also an issue highlighted by DTPW during the Team’s review in 2018 of Metromover (maintenance conducted by Division 86).

The outcome of the above-mentioned labor restrictions is that a limited number of maintenance supervisors must perform a large proportion of Metrorail and Metromover maintenance work. This limits the ability of DTPW to adequately maintain complex systems such as train control, traction power, and vehicle electronics, especially on Metrorail. As a result, labor practices may contribute to a higher rate of service failures, as evidenced by a high rate of corrective maintenance on Metrorail, and this may ultimately compromise safety.

## **Findings**

The Team made findings that were similar between the two systems, as detailed below:

1. Preventive maintenance: In general, DTPW adheres to its preventive maintenance schedules and practices as laid out in maintenance checklists for both Metromover and Metrorail. This is evidenced by high rates of preventive maintenance adherence, typically above the 90% goal for both systems. However, for Metrorail, it is unclear whether preventive maintenance activities are effective in preventing failures, as roughly 50% of all maintenance work orders are unscheduled or corrective in nature, higher than the 30% internal goal that DTPW sets for itself. The opposite is true for Metromover, where unscheduled maintenance typically only composes less than 10% of work orders.
2. Asset management system: DTPW's Enterprise Asset Management System (EAMS) is currently used for Metromover largely as a document management system instead of as a robust and modern asset management system. Maintenance work orders are recorded on paper forms, which are then scanned and stored in PDF format with no ability to quantitatively analyze the data entered into the forms. Metrorail currently does not use EAMS at all, though implementation is planned. Nevertheless, the Team's concern relates to the nature of future implementation, as EAMS should enable DTPW supervisors to view rich data in chart format related to trends in parts failure, maintenance history of specific vehicles to check for recurrent issues, historic diagnostic measurements, labor hours spent on specific work orders, etc. to better inform future preventive maintenance practices. Such analysis is not currently possible in the implementation of EAMS used for Metromover, and the Team has not seen an EAMS implementation plan for Metrorail that would enable this type of analysis there.
3. Performance metrics: The performance metrics reported upon regularly to CITT are not closely tied to customer/passenger outcomes, which leads to reported performance appearing better than what passengers may experience. As an example, Metrorail's on-time performance is currently reported at an aggregate level across an entire month, whereas most passengers will more closely perceive on-time performance specifically during weekday peaks (AM and PM).
4. Budgets: Maintenance budgets are typically unrealistic when compared with the historic actual spending at both Metromover and Metrorail, indicating a mismatch between the needs of the departments and what they receive in approved budget. At the same time, cost benchmarks are in line with peers; Operating and Maintenance (O&M) cost per vehicle revenue mile (for Metrorail) and per passenger mile (for Metromover) is roughly at the median of peer systems, indicating cost overruns versus budgets are not unduly causing Metromover or Metrorail's costs to rise above the costs of comparable peers.

The Team made certain findings that were specific to each individual system:

***Metromover***

5. Cleanliness: Elevator and escalator cleanliness is less than satisfactory, likely exacerbated by the fact that restrooms are not available at most Metromover stations and that the service is free to use. This may dissuade passenger ridership, given undesirable odor and appearance at Metromover stations.
6. Spare parts: Metromover maintains a high spare parts inventory due to the use of a “min-max” inventory management technique, leading to overstocking even though the vast majority of spare parts are used for scheduled maintenance activity, for which demand can be predicted in advance and stocked for at an appropriate level.

***Metrorail***

7. Vehicle manuals: Manuals for the new Hitachi vehicles are still in draft form more than 18 months after the delivery of the first new vehicle, and multiple configurations are currently in use across the delivered vehicles, making it difficult for Rail Maintenance to determine proper maintenance procedures to adequately maintain each new vehicle.
8. Spare parts: There are spare parts shortages for both the legacy Budd and new Hitachi vehicles. Legacy Budd vehicles did not undergo a mid-life vehicle overhaul, recently leading to high rates of failures, and spare parts are no longer manufactured for these vehicles, leading to many legacy vehicles being cannibalized for parts. Secondly, Hitachi has failed to deliver adequate spare parts to fulfill its contract requirement of \$18 million in spare parts for Metrorail’s new vehicles. Certain parts have been wearing prematurely on Hitachi vehicles, such as wheels, possibly due to the suboptimal configuration of certain settings, and this has driven a need for additional spare parts to maintain vehicle availability for peak service.
9. Cleaning: Vehicles were found to be inadequately clean during service, driven by a variety of challenges that DTPW faces in this regard. Firstly, vehicle cleaners for Metrorail are subject to the same requirements of the 13(c) agreement as rail maintenance technicians. This has prevented outside staff from being hired as cleaners, and among the existing cleaners, only 10% of scheduled staff have shown up in recent months for the 8pm to 4am night shift, during which vehicles are cleaned for the following day’s service. Secondly, the Team observed vehicles becoming dirty throughout service hours, indicating a greater need for cleaning to be performed at terminal stations during the day.

As a result of the above findings, the Team made a variety of recommendations in both of its reports. Given the similarity of certain findings across both reports, the recommendations are

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grouped below into shared recommendations and those specific to Metromover or Metrorail. Certain recommendations specific to the individual systems could also be used across the two systems, and these are marked as such in parentheses.

### **Recommendations**

#### ***Shared***

1. Institute minimum qualifications for hiring maintenance technicians at both Metrorail and Metromover to enable better preventive maintenance and preserve passenger safety.
2. Rationalize spare parts inventory, meaning a reduction for Metromover to a level that is commensurate with upcoming scheduled maintenance needs and an immediate increase for Metrorail to a level that enables adequate maintenance today, especially for the new Hitachi vehicles.
3. Revamp performance metrics reported upon to CITT to more closely align with passenger and safety outcomes. The Team makes a variety of recommendations on revising performance metrics in its report on Metrorail.
4. Improve the use of DTPW's EAMS asset management system for both Metromover and Metrorail, moving away from paper-based forms and enabling quantitative analysis on parts failures, vehicle-specific history, diagnostic measurements and readings, and labor hours spent to improve future preventive maintenance practices.
5. Produce realistic annual budgets for Metrorail and Metromover that meet the needs of the respective maintenance divisions and, at minimum, account for past actual spending.

#### ***Metromover***

6. Study the use of tablets as a tool for technicians to directly enter data into digital format instead of on paper forms that are later scanned by clerks (likely applicable for Metrorail as well).
7. Introduce "lean" manufacturing/maintenance practices, which could reduce labor hours required for any given maintenance work order (likely applicable for Metrorail as well).

#### ***Metrorail***

8. Finalize Hitachi manuals and link them to preventive maintenance inspection forms to enable technicians to understand and execute proper maintenance procedures for the new vehicles.

## Summary Findings and Recommendations for Metromover and Metrorail

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9. Consider outsourcing or externally hiring for vehicle cleaning at Lehman Center and hire additional cleaning staff (either on staff or contracted out) at terminal stations to ensure vehicles remain clean throughout daily service.
10. Plan for a mid-life overhaul today for Metrorail's Hitachi vehicles to prevent them from eventually deteriorating to the condition that the legacy Budd vehicles are currently in. This is consistent with the Federal Transit Administration (FTA) recommendation in their Triennial Review of Metrorail, and this also applies to other critical support systems including, but not limited to, train control, to ensure continued safety and reliability of Metrorail service.

The Team's overall conclusion is that DTPW faces challenges in carrying out maintenance and cleaning for both Metromover and Metrorail, but that the challenges are greater for Metrorail given the complexity of the new Hitachi vehicles and because the shortage of qualified maintenance technicians is more acutely felt by Rail Maintenance. While some of these challenges must be addressed at the County level, DTPW must also act to improve systems and procedures that are within its control, including better deployment of EAMS for both Metromover and Metrorail and holding Hitachi accountable for contractual requirements. The Team makes more detailed conclusions and recommendations in each of its final reports on Metromover and Metrorail.

### **Conclusion**

The Team's assessments concluded that Metromover and Metrorail preventive maintenance practices were generally adhered to but have room for improvement. The Team recommended that performance metrics reported to CITT and the public are more closely aligned with passenger and safety outcomes. Team observed that Metrorail vehicles and Metromover elevator and escalator cleaning practices are less than satisfactory. The Team also recommended that DTPW improve systems and procedures that are within its control, including better deployment of EAMS for both Metromover and Metrorail.

The shortage of qualified staff for mission-critical systems (Train Control, Traction Power, and Vehicle Electronics) may compromise the safety of the Metromover and Metrorail systems. Additionally, current maintenance practices drive inefficiency in both long-term cost and system performance. The Team has offered several recommendations for both assessments to mitigate concerns raised.

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