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## **ADJOURNED REGULAR MEETING**

August 6, 2012

**SUBJECT:** UPDATE ON OFFICE OF INSPECTOR GENERAL REVIEW OF THE EXPO/BLEUE LINE JUNCTION

**ACTION:** RECEIVE AND FILE

### **RECOMMENDATION**

Receive and file this Office of the Inspector General (OIG) Report.

### **ISSUE**

The OIG initiated an investigation of certain Expo construction matters. Subsequently, on July 26, 2012, the Metro CEO and Board asked the Inspector General to investigate an alignment issue on the junction at Washington Boulevard and Flower Street, where the Blue and Expo Lines merge. On August 2, 2012, the Inspector General was asked to present an update of the results of its review thus far.

### **DISCUSSION**

#### **Work to Date**

Immediately following the receipt of Expo Line concerns, the OIG has obtained and reviewed numerous documents; interviewed numerous rail experts at Metro and Expo; analyzed technical documents; visited the special track work area; monitored the activities of Metro, Expo, California Public Utilities Commission (CPUC), contractors, and others; and reviewed maintenance records and cost of repairs to date.

#### **Special Track Work at Washington/Flower Junction**

The junction at Washington Boulevard and Flower Street contains special track work that contains a crossing called a "diamond." Within the diamond, there is a component known as a "frog," of which there are four. This special track work allows Metro's Light Rail Vehicles (LRV's) traveling southbound to diverge at the Washington/Flower junction and travel either towards Long Beach (Blue Line) or Culver City (Expo Line).

After the special track work was installed, Metro and CPUC personnel observed metal flakes near one of the frogs at the Washington/Flower junction, which indicated that the

wheels of the LRVs were not travelling as smoothly as desired through the diamond area.

Further inspections determined that the wheels were making hard contact with one of the frogs, which was causing the flaking. Representatives from Metro, CPUC, and Nortrak (manufacturer of the diamond) believe that the problem is due to a combination of several contributing factors including:

- Gauge (width of track) of the diamond. The gauge of the track in the special track work is 4 feet 9 inches while the gauge in many other portions of the track is 4 feet 8½ inches. This could create more “play” in the special track area.
- Radius of the track (curvature of the diamond and other components of the special track work). The curvature of the special track area could be creating a high stress point.
- Overall alignment of the diamond and special track work.
- Other specific issues within the above-mentioned items.

Expo representatives believe that the special track work was designed and installed to American Railway Engineering and Maintenance-of-Way Association (AREMA) standards and Metro design criteria, and it was installed properly. Expo’s representatives also believe that the geometry of the junction was dictated by the pre-existing design of the area beginning with the location of the Blue Line Grand Station, which affects the special track work’s layout at the junction. Expo considered other options, but determined that the special track work was the only design that would work within the parameters of the junction.

### **Modifications to Junction**

After a high maintenance area was identified at the junction, Expo made modifications to the diamond in an attempt to reduce any damage to the LRVs by directing FFP (prime contractor) and the track work contractor to hard-face weld (“bulb”) the side of the frog D2 point to provide an improved guide for wheels at frog D4. During the period September 2010 through June 2012, this bulb was re-welded or worked on five times. In addition to the welding, the existing guardrail on the right rail approach of Track #2 curve to the diamond was extended so the lead wheels were further guided into and through the frog.

Metro personnel considered the modifications to be a temporary mitigation to avoid further damage while a permanent solution is being considered and implemented. Metro personnel also had concerns about the longevity of the modifications.

### **California Public Utilities Commission**

Beginning in May 2011, CPUC staff conducted multiple inspections at the Washington and Flower junction and found this section of track to be an operational and

maintenance concern. The CPUC determined that the wheel is damaging the frog point because the frog is misaligned.

CPUC staff also found an unusual amount of wheel shavings in the narrowed flange way that would indicate that the wheel is impacting the side of the flange in such a way to cause the wheel to be shaved every time it enters this flange way. CPUC staff also noted unusual damage to the underbody of the vehicles.

### **Plan to Monitor Potential Damage**

On or about March 3, 2012, Metro notified the CPUC of a detailed and comprehensive plan for monitoring any potential damage to the LRVs and junction special track work at various time intervals ranging from twice per week to once per month.

On March 14, 2012, the CPUC notified Metro and Expo to conduct at least one ultrasonic test of the diamond modification and frog point per month along with a detailed maintenance procedure.

### **Documentation of Vehicle Damage**

The CPUC has also required Metro to document all vehicle damage and repairs related to vehicle inspection. Further, any discovery or suspicions of a derailment or hazardous condition that is suspected to be related to unusual wear or deterioration shall be immediately reported to the CPUC.

During the period of March 27, 2012 to June 13, 2012, Metro inspected 21 LRVs that traveled through the area in question and found that damage to 10 of the 21 cars had a type of damage that could be “possibly related” to the junction. The estimated cost to repair the 10 LRVs totaled \$11,664.

### **CPUC Direction to Replace Frog at Junction**

The most recent CPUC inspection, dated July 6, 2012, found that the weld modification/bulbs on the flange way of the frog for southbound trains was defective, the surface weld was damaged and appeared to be separating, the modification was done in layers, and the top layer is compromised. CPUC staff also found excessive wear throughout the turnout, and raised concern given the short period of time that the junction has been in operation.

The CPUC subsequently sent a letter dated July 13, 2012, to Metro CEO and Expo CEO advising them that the current frog is unacceptable and that the weld on the frog has repeatedly failed. The CPUC also directed Metro and Expo to replace the frog at the Washington/Flower Junction with a new and properly designed frog and requested a written timetable for the expedited replacement of the frog by August 20, 2012.

In response to the CPUC letter, Metro, Expo, and CPUC personnel met during the week of July 16, 2012, in Sacramento, CA. All parties agreed to obtain an expert to review the special track work (diamond/frog) at the junction.

## **Summary**

The special track work of the Expo Line/Blue Line junction is experiencing high maintenance as a stress point possibly due to the curvature, track gauge, and other factors. It is requiring frequent inspection and repairs and may have an impact over time on the LRV wheels and underbody, even if the bulb weld is stabilized. Whether or not the level of maintenance remains within industry standards, it appears to be unacceptable to Metro and the CUPC, and therefore requires further review and consideration of options to improve performance.

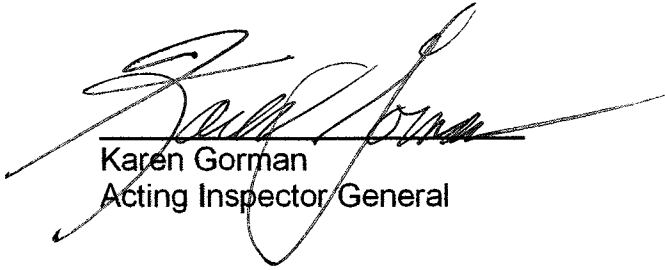
## **Current OIG Activities:**

We developed information during the week of July 30, 2012, that may further explain the circumstances, which lead to the problems associated with the diamond/frog. The information was corroborated verbally by two different sources, but due to the complexity of the matter, additional corroboration is needed through document reviews and interviews.

## **NEXT STEPS**

The OIG will continue to monitor the hiring of an expert and the report of the hired expert, Metro inspection activities, any repairs made by Metro or Expo, cost of any repairs, and any other incidents or significant developments. We will further describe the origin, implementation, support impacts, and status of resolution of the special track work issue after obtaining and reviewing additional specifications and technical documents. Provided that documentation is promptly forthcoming, the report might be ready for distribution to the Board by the September Board meeting. We are promised assistance as necessary to obtain these documents by the Expo CEO and will rely on that assistance to complete this report expeditiously.

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