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SEPTEMBER 9, 2016

TO: BOARD OF DIRECTORS

THROUGH: PHILLIP A. WASHINGTON *PAW*
CHIEF EXECUTIVE OFFICER

FROM: JAMES T. GALLAGHER *JTG.*
CHIEF OPERATIONS OFFICER

SUBJECT: OPERATIONS TRACTION POWER UPDATE

ISSUE

The following information is to update the Board regarding recent traction power events that took place during the weekend of August 27 - 28, 2016; to summarize the overall situation surrounding traction power matters systemwide; and to describe Operations efforts for current and planned activities to address these matters.

DISCUSSION

First, on Saturday, August 27, 2016 a traction power event occurred along the Blue Line. This event was a result of the failure of an Emergency Trip Station (ETS) printed circuit board. Our experience with this circuit board is that it is a reliable component of Blue Line ETS and was part of a planned replacement project to be initiated in FY18. To address any immediate issues, I have directed Traction Power staff to actively monitor and accelerate ETS system replacement activities. A schedule and budget for these immediate activities is in development.

Second, on Sunday, August 28, 2016, a second traction power event occurred along the Blue Line. This event was a result of a power surge that took two substations off-line. One of the stations was reset from the Rail Operations Control Center (ROC), while the other had a control system failure that prevented the remote reset. This was a result of failed batteries. A battery replacement program was initiated in May 2016 with board approval of a contract to supply and install new control system batteries at twenty-two substations along the Blue Line. Installation began in August 2016 and will conclude in November 2016. The contractor is proceeding at a rate of two substations per week.

Third, Operations Maintenance and Engineering staff continues to engage the Gold and Expo Line substation supplier to accelerate and refine current activities to make all substations more reliable. Contractors were at Metro from Monday, August 22, 2016 through Monday, August 29, 2016 and will continue to be onsite until all findings and corrective actions are completed, and issues are resolved. The main issues are:

- Factory workmanship deficiencies
- Factory settings for ground fault detection systems are too sensitive
- Faulty control software and/or electrical breakers set at an overly sensitive position, resulting in disruptive breaker function; and prevention of immediate restoration of power from the ROC
- Provisions relating to the timely receipt of major capital spare parts

NEXT STEPS

Operations staff has identified all issues relating to traction power matters, and the contractor and staff are in the process of addressing them. Attachment A, entitled Systemwide Summary of Traction Events, provides details for major issues that Operations is addressing across the rail system. This document also outlines multiple targeted completion dates which I am closely monitoring. Operations will continue to apprise the Board as this process proceeds and as project updates become available.

ATTACHMENTS

Attachment A - Systemwide Summary of Traction Power Events

METRO BLUE LINE TRACTION POWER ISSUES				
#	Problem Description	Root Cause	Repair	Status
1	Unexpected breakers tripping cause by Ground Fault Detection System	Initial Ground Fault Detection relay settings were too sensitive	Manufacturer's technician adjusted ground fault relays for correct setting. Problem was resolved.	Closed
2	Emergency Trip System (ETS) problems	Printed Circuit Board card failure caused by defective electronic component	Circuit Board replaced. Monitor Printed Circuit Board performance for reliability.	Projected date to close: End of September 2016
3	ETS problems	Control power battery failure	Battery replacement in progress as of May 2016	Projected date to close: End of November 2016
4	OCS contact wire arcing	Section Insulator Runner misaligned with contact wire, Maintenance Issue	Performed adjustment on section insulator runners between Washington and Willow Stations. Providing additional equipment to aid inspectors to check proper alignment. Revising maintenance schedule to provide more frequent checking of section insulators.	Projected date to close: End of December 2016
5	OCS bridle wire sagging	Loose bridle cable attachment to OCS pole. Maintenance Issue.	Performed adjustment on bridle cable attachment to poles in Long Beach Loop.	Closed
6	OCS hanger wire broke loose	Loose hardware attachment to contact wire, Maintenance Issue.	Performed inspection of hanger wires & replaced hanger wires in incident area.	Closed

EXPO LINE TRACTION POWER ISSUES				
#	Problem Description	Root Cause	Repair	Status
1	Unexpected breakers tripping caused by Ground Fault Monitoring System	Software Problem related to programming errors resulted in DC breakers to open and de-energize OCS.	Install new software version	Projected date to close: Mid September 2016
2	Breakers tripped due to operation of ETS trip relays	Defective ETS trip relays	Replaced all ETS trip relays in entire Expo II Line	Closed
3	Intermittent Communication Failure in breaker control device caused DC breaker tripping.	Faulty Fiber optics transducer/Faulty Fiber Cable	Replace transducer and fiber cable under warranty	Projected date to close: Mid September 2016
4	Rail to Ground Voltage caused DC breaker tripping.	Combination of Ground Voltage Monitoring Software issue and return current leakage	Install new software version and perform negative return rail inspection	Projected date to close: End September 2016
5	Breakers tripping caused by Load Measure Resistor failure	Improper rating of control wiring on load measure resistor	Replace with proper insulation wire under warranty	Projected date to close: Mid October 2016
6	Breakers could not close at Expo Yard due protection relay failure. Resulted in loss of power to Yard Facility Buildings	Defective protection relay	Replace with new protection relay under warranty	Projected date to close: Mid September 2016
7	Intermittent breaker opening at Overland Substation	Moisture penetration into substation causing corrosion on breaker contacts & arcing of section insulators	Seal feeder cables holes, preventing moisture into substation and make adjustment on insulators	Projected date to close: Mid October 2016
8	Defective Mechanical flag & counter assembly	Breaker mechanical flag rod assembly disengagement with microswitch movement caused breaker status to be unknown	Redesign breaker mechanical flag assembly to not interfere with microswitch movement. Prototype has been completed and tested.	Projected date to close : End of September, 2016
9	Substation electronic event log software errors. This did not cause a substation failure, but it restricts the ability to perform fault diagnostics.	Lack of detail in manuals to specify method of downloading event file	Temporary work around process was implemented. BBRI will modify software to include download eventlog file to USB Drive.	Projected date to close : End of September 2016
10	Neutral current circulation on AC main breaker caused tripping of substation.	Wrong wire termination at current transformer	Corrected wire termination at current transformer	Closed
11	Delivery of contract spare parts. 72% received.	Resolving part numbers from contractor	Resolving parts number compliance between Contractor and Metro Logistic Department	Projected date to close : End of October 2016
12	Purchase additional spare parts	Resolving spare parts list	Proceed with requisition process	Projected date to close : Mid December 2016

GREEN LINE TRACTION POWER ISSUES				
#	Problem Description	Root Cause	Repair	Status
1	OCS wire broke at Yard Interface	Yard Controller sent train into de-energized OCS zone	OCS wire was repaired. Human error.	Closed
GOLD LINE TRACTION POWER ISSUES				
#	Problem Description	Root Cause	Repair	Status
1	Steel rope failure between weight stack and pulley	Steel rope was cut by pulley	Replaced steel rope at all locations. Follow-up campaign to replace with improved rope assembly.	Initial response closed. Projected date to complete follow-on campaign: End of August 2017.
2	Pantograph off-track from OCS contact wire	Improper Staggering of contact wire. Maintenance Issue.	Corrected contact wire for proper stagger	Closed
RED LINE TRACTION POWER ISSUES				
#	Problem Description	Root Cause	Repair	Status
1	UPS failure at Civic Center	UPS batteries failure	Replaced with new batteries	Closed
2	Premature failure of three station transformers along Segment 1.	Premature failure of transformer winding.	Re-wind failed transformers. Procure additional transformers and send all remaining Segment 1 transformers for re-winding.	Projected date to close: Early 2018.
GENERAL TRACTION POWER ISSUES				
#	Problem Description	Root Cause	Actions	Status
1	Past-Due maintenance	Workload conflict with Capital Projects/Reg-4 Inspections/Contractor Support	Improve planning & scheduling of maintenance work and contractor work	Open
2	Training	Lack of formal Syllabus and Materials	Plan to be developed to improve training programs	Projected date to develop training plan: End of December 2016.
3	M-3 issues	Preventative Work Order procedures and schedule not efficient.	Move to inspection module regime, as successfully implemented for MOW Signals	Projected date to close: December 2016.