

TASK 15

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# PERFORMANCE MONITORING SYSTEM TECHNICAL MEMO

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# North-South Commuter Rail Task 15: Performance Monitoring System Technical Memo

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# 1. INTRODUCTION AND SCOPE OF WORK

## 1.1 Introduction

The North-South Commuter Rail Project, (WALLY), is a proposed 27-mile long commuter rail operation on existing tracks that would provide service between Ann Arbor and Howell, with intermediate stops along the way. It has been embraced by a number of public and private organizations in Washtenaw and Livingston counties as a way to expand commuting options in a rapidly growing part of southeast Michigan along the US 23 corridor. The Ann Arbor Area Transportation Authority (AAATA) has taken on the role as the “designated authority” for studying and developing the concept.

This report is one of the deliverables in a feasibility study, now underway, which will determine in detail the costs of the project and the estimated number of future riders. It will also define the organization needed to build and operate the service, and the prospects for establishing a funding source for the service. It will help drive the community’s decision about moving forward with the project.

## 1.2 Scope of Work

Quandel Consultants is serving as sub-consultant to SmithGroupJJR, the project prime consultant to implement the following workscope as defined in the contract documents:

### *Task 15 – Performance Monitoring System*

*Create a system for measuring the operating and financial performance of the N-S Rail service. List important measures and the efforts needed to collect data. For each measure, create a goal or standard indicating the desired performance thresholds.*

#### *15.1 Performance Monitoring System*

*The Project Team will meet with regional commuter rail providers, such as NICTD and Metra, to obtain performance measuring metrics and strategies. Based on proven data and systems, the Project Team will develop a performance monitoring system as described above.*

#### *Deliverable(s):*

- 1. Submit draft approach for a performance monitoring system*
- 2. Review meeting, refine, and submit final approach for a performance monitoring system.*

## **2. DESCRIPTION OF MONITORING SYSTEM OPTIONS**

### **2.1 Service Limits and Railroad Ownership**

The North-South commuter rail service is proposed to operate over a 28.4-mile route between Howell and Ann Arbor, Michigan. Most of the route is owned by the Michigan Department of Transportation (MDOT) which contracts with Great Lakes Central Railroad (GLC) for operations and maintenance. The southern section of the route, beginning near Barton Road north of Ann Arbor, is owned by Watco Companies, LLC and is operated as the Ann Arbor Railroad (AARR). Preliminary and conceptual discussions have been held to lease the southern section of the route from Watco, so that the proposed new service could be operated over a single carrier's track. Although the service is proposed to operate over a distance of 28.4 miles, the actual amount of track and right-of-way needed for the project would be approximately 30.1 miles.

Several commuter rail service options are currently under consideration. Under any of these options, train dispatching and train crew operations, equipment maintenance and infrastructure maintenance functions could each potentially be performed by separate entities. It is anticipated that a new regional transit agency would perform the administrative functions internally and exercise oversight and control over each of the operating and maintenance contractors. Efficient, cost-effective and timely reporting of all of these functions is essential to the Agency's successful management of the service.

### **2.2 Monitoring System Options**

Existing commuter rail service providers, most with larger networks, have elaborate monitoring systems commensurate with the size of their operations. These systems are intended to monitor and control large asset and employee bases, often including hundreds or thousands of employees working on several lines in complex service areas. They require substantial data input and systems maintenance. They can produce large volumes of information, in many types of reports, and in both written and electronic formats. Reports typically include data on all four of the principal areas of railroad activities: operations, equipment maintenance, infrastructure maintenance and administration.

It is anticipated that since the N-S commuter rail service is a "new start," it may begin with the implementation of limited service in a Minimum Operating Segment (MOS). The objective of the MOS is to begin basic peak hour commuter rail service as soon as possible and with minimum operating and maintenance expense and minimum overhead and administrative support. Once the service has begun operating and ridership levels indicate strengthening demand, the service can be expanded as needed.

Accordingly, two monitoring system options, both using modern information technology at differing levels, are presented for consideration:

## Option 1: Minimum Reporting System

The Minimum Reporting System Option is designed for the start-up level of commuter rail train operations where only a relatively few personnel are involved in providing the service and where there is a high degree of hands-on knowledge of daily operations and occurrences by management. It is the recommended option for the start-up and early years of the N-S commuter rail service.

- A relatively few managers, supervisors and employees are utilized to provide the initial level of commuter rail service. Management is closely involved with all activities each day.
- Daily reports containing specific key information fields are designed in electronic format and accessed through computer terminals to be installed at the following locations:
  - Contract Operator's office
  - Train dispatcher's office
  - Train crew on/off duty station(s)
  - Equipment Maintenance shop and layover offices
  - Maintenance of Way office(s)
  - Agency headquarters (which is also the location of the reporting website)
- Training is required for all users in all departments to enable them to generate and submit reports, and, for those authorized to do so, to query the system to obtain the periodic management reports used for performance monitoring.
- Managers, train dispatchers, supervisors and employees prepare their daily reports in the formats provided during their respective tours of duty and submit them directly to the website.
- Once reports are submitted, the website:
  - Directs the original reports to the contractor and Agency addressees designated to receive each type of report.
  - Electronically compiles data from each report field into the periodic (daily, weekly, monthly, annual) reports which have been established.
  - Requires no clerical position to generate the daily or periodic reports.
  - Builds and maintains a permanent data base which serves as the historical data base for the N-S system going forward.

- Backs up the information on a real-time basis, provides essential security architecture and performs the functions for which it is programmed.
- The website is established and maintained by the Agency or its Information Technology contractor. The Contract Operator as well as the Equipment Maintenance and Infrastructure Maintenance contractors are also connected to the system.
- Individual employees may maintain their own pocket notebooks during the work day and use the information they have recorded to populate the data entry forms at the end of each tour of duty. The Minimum Reporting System does not anticipate a large number of handwritten reports to be completed and submitted by employees each day. It does, however, require management attention to ensure that the required electronic forms are being submitted each day by the employees and supervisors as required and that the website is providing the reporting as designed. Where written reports are required by the Federal Railroad Administration (FRA), they may be incorporated into the system provided that all FRA's access requirements are met.

With the Minimum Reporting System Option, the reports can be tailored to the situation. The Agency's System Administrator would manage the format and access functions. Not all managers would need all reports. Some might need a report type not shown here. However, the following types of reports could be formatted for the departments and used in a "new start" situation to provide the most basic information for the management team during the early years of operation:

- Operations
  - Conductor's Work Report (Trains operated, locomotive and car numbers, trip miles, departure and arrival times, numbers of passengers carried, gallons fuel consumed, delays, accidents, mechanical or maintenance of way exceptions, as well as payroll on/off duty time information for both conductor and for engineer.) Submitted once per tour of duty by Conductor for both the Conductor and Engineer. Includes all trains operated by that crew in that tour of duty. [Performance metrics: Compare reports to actual operations for late trains, accidents, exceptions, indications of developing problems, overtime where none is expected, etc. Also used as the official Hours of Service Records as required by FRA. FRA requirements for such records would have to be met by the system.]
  - Dispatcher's Daily Report (Provides the On-Time Performance Report for the previous calendar day. For each train number scheduled to be operated and extra trains that were operated, the locomotive number and number of cars, the scheduled and actual departure and arrival times, number of minutes late for each with cause(s) of delays. Also includes data entries for accidents, exceptions, weather conditions on each shift, and dispatcher on/off duty payroll information for each shift.) [Many of the same

metrics as shown in Conductor's Work Report-compare information reported in Conductor's Work Report to Train Dispatcher's Report. This report also will indicate details of interface with freight trains and operational issues that affect service reliability.] Note that the Dispatcher's Daily Report (probably issued about 0530 daily is not the same as the FRA-mandated Dispatcher's Record of Train Movements (Train Sheet).

- On-Time Performance Report (This is a cumulative report driven by the Train Dispatcher's Daily Report. It provides Daily, Week to Date, Month-to-Date and Year-to-Date "On-Time Performance" statistics. This is one of the most-watched non-financial performance metrics for commuter service.) [Achieving or exceeding a 95% On-Time Performance Ratio is a common goal or standard within the commuter rail industry. The most common standard defines a train that is more than 5 minutes behind schedule as late and it is counted as a reportable delay. 95 of 100 trains operated would have to arrive on time (or no more than 5 minutes late) at the final station to achieve a 95% On-Time Performance rating. Metric would match the OTP requirements in the Contract Operator's service contract.]

- Equipment Maintenance

These reports may be entered electronically or hand written (where required by FRA) and then scanned into the system for document retention purposes by the mechanical department employee performing the work:

- Daily Locomotive / Cab Car Inspection Report (One for each locomotive and cab control car each calendar day). [Performance metric: Defects occurring between scheduled maintenance require follow-up.]
- Daily Passenger Car Interior Report (One for each passenger car each calendar day). [Performance metric: Defects occurring between scheduled maintenance require follow-up.]
- Daily Passenger Car Exterior Report (One for each passenger car each calendar day). [Performance metric: Defects occurring between schedule maintenance require follow-up.]
- Supervisor's Report of Mechanical Failure (Locomotive or Passenger Car) including last date this vehicle was inspected and/or released from inspection and maintenance. [Performance metric: Mechanical failure between scheduled inspections requires investigation to determine root and contributing causes for failure as well as corrective and preventive actions.]



- Locomotives and Passenger Car Inspection Date Report (Matrix showing the due dates for all federally-mandated inspections for each locomotive, cab control car and passenger car.) [Monitor matrix to ensure that scheduled dates are met, inspections are spread out and not bunched in any category or any time period. Also verify that shop force and inventory levels are adequate to support inspection schedule.] Note that no locomotive, cab control car or passenger car may continue in service if it has passed any of its periodic FRA-mandated inspection dates.
- Daily Locomotive Fuel Delivery Report (Record of all fuel delivered including Locomotive number, Number of gallons delivered, Company, Driver, Truck Number, Date, Time. The numbered and metered fuel delivery ticket for each fuel delivery is scanned and entered into the system. The original is submitted to accounting. Each locomotive fueled requires a separate fuel delivery ticket.)[Performance metric: 100% sampling of records to ensure that the fuel quantities on the stamped and metered fuel delivery tickets match exactly the quantities shown on the Delivery Report and the quantities invoiced by the locomotive fuel vendor.]
- Daily Bad Order Report (For locomotives , cab control cars and passenger cars; Shows date Bad Order, Reason, Status, Date Due Out of Shop, Date Released from Shop.)[Performance metric: Identify any vehicle bad ordered or in shop for repair between scheduled inspections and reason why. Follow-up where appropriate for corrective/preventive action.]
- Daily Maintenance Shop Production Report (Prepared by the Equipment Maintenance Supervisor describing all work performed on the commuter locomotive and car fleet for the previous calendar day. Also includes payroll information for all shop/mechanical employees.) [Performance metric: Identify locomotives/cars with excessive labor spent on maintenance compared to others. Identify premature failure of workmanship or specific parts/components for corrective/preventive action. Compare shop overtime to budget and shop workload for unexplained variances.]
- Infrastructure Maintenance
  - Track Inspector's Daily Work Report (Includes results of track inspection, segments of track requiring slow orders or other attention, as well as other exceptions taken during the daily inspection. Also includes payroll information and vehicle usage activity.) [Performance metric: Monitor frequency/location/weight of rail for broken rails that may indicate deteriorated tie conditions or the need for capital rail replacement. Monitor track defects identified, follow-up on train crew reports of track defects. Observe trends for high maintenance /breakage activity requiring future production gang budgeting and scheduling.]

- Signal Maintainer’s Daily Work Report (Includes inspections, maintenance, repairs, block and interlocking signal and grade crossing system malfunction reports. Also includes payroll information and vehicle usage activity.) [Performance metric: Monitor for false activations/activation failures, trains delayed by red signals, insulated joint failures/other frequent defects that may indicate procedural or system faults.]
  - Track Crew’s Daily Work Report (Includes description of all work performed by the crew, materials used, time spent, vehicles and machines used. Also includes payroll information and vehicle usage activity.) [Performance metric: Monitor production time vs. “windshield time” for productivity. Also monitor for high activity/overtime as indicator of deteriorating track conditions and the potential future need for production gang budget/schedule.]
  - Bridge Crew’s Daily Work Report (Includes description of all work performed by the crew, materials used, time spent, vehicles and machines used. Also includes payroll information and vehicle usage activity.) [Performance metric: Monitor repair work for indications of stability issues (ballast, ties and surfacing) affecting bridge conditions. Monitor high maintenance hours as indicator of possible future bridge replacement needs or productivity issues.]
  - Welder’s Daily Work Report (Includes description of all work performed by the welder and helper, materials used, time spent, vehicles and machines used. Also includes payroll information and vehicle usage activity.) [Performance metric: Monitor work performed for indications of broken rails, failed insulated joints, track turnouts that may require component change-out or complete replacement. Compare welder’s work reports with those of signal maintainer and track crew.]
- Administration

In most cases, original reporting as described above is generated in the field and monitored by the management personnel of the Agency. However, the Agency may generate certain original reports itself including:

- Daily Passenger Revenue Report (No fares are collected on trains. All passenger revenues are collected at other locations and reported by the Agency.) [Performance metric: Is 100% of revenue and cash generated properly accounted for? Compare to revenue forecast, passenger counts from conductors’ work reports and field observations.]
- Non-Passenger Revenue (This is revenue received by the Agency other than fare box revenue.) [Performance metric: To be determined by Agency.]
- Payroll, Budget & Accounting Reports (To be determined by Agency.)

The Minimum Reporting System is designed to provide timely and accurate monitoring information to the Agency management team. It also provides historical documentation of certain critical activities. In a smaller start-up system, a careful review of the reports described above, plus daily communications at all levels, is expected to be sufficient to manage the service. The Agency may amend its reporting system as necessary to achieve the desired balance of access to information against the cost of obtaining it.

There are many other types of information and many other specific reports, some of which may be sensitive or confidential, and some of which may be required by state and/or federal agencies, which would need to be gathered, stored, prepared and /or submitted as required.

### **Option 2: Full Management System**

If the N-S commuter rail service expanded to a much larger size than presently being planned in any of its current service options, then a Full Management System option might be required.

However, if the N-S commuter rail service were eventually integrated into other systems now being planned in Michigan, then it is possible that the performance monitoring system(s) used by those services might be used instead.

A Full Management System option would employ all or most of the reports described above in the Minimum Reporting System. It might also include the following types of reports by department:

- Operations
  - Train and route statistics by corridor or line (train miles and hours, locomotive fuel consumption, delays by line, train and category, crew miles and hours, passenger counts, etc.
  - Automated train dispatching stringline graphs depicting the movements of all train movements by line or route including maintenance of way crew occupancy.
  - Details of all certifications and qualifications for all employees including the tracking of training, examinations and other operationally critical information.
- Equipment Maintenance
  - Utilization (miles and hours) and failure statistics for each locomotive, cab control car and passenger coach used in the service.
  - Computerized inspection and maintenance records for each locomotive, cab control car and passenger coach.

- Component performance tracking for locomotives and passenger cars indicating the service lives and failure trends for key parts and assemblies. Enables timely inspection and change-outs thereby avoiding in-service failures which result in train delays or annulments. Also helps to optimize maintenance planning with savings in materials inventory levels as well as purchasing quantities and frequencies.
- Infrastructure Maintenance
  - Because the maintenance of the N-S rail service corridor is expected to be the responsibility of the Great Lakes Central Railroad, or a successor contractor named by MDOT, it is expected that the infrastructure maintenance system records of GLC or the successor carrier would be utilized in lieu of an N-S reporting system.
- Administration
  - To be determined by Agency. If the Operations, Equipment Maintenance and Infrastructure Maintenance activities continue to be conducted by contractors, with revenue and ridership statistics maintained by the Agency, there may not be a need for expanded performance monitoring system for Administration.

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If your community or business group would like to learn more, a representative from the project team can present to your organization.

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