Revised August 11, 2008

Subtask 2.3. Track, Signal and Grade Crossing

Requirement

The contractor shall review the railroad corridor's safety and ability to reliably convey passengers. The contractor shall review the MDOT estimate for the track, signal and grade crossing infrastructure capital improvement program. The contractor shall make a determination of the adequacy of coordination with adjoining railroad operators: the CSX railroad and the Ann Arbor Railroad. The contractor shall also provide examples of safety and security plans needed to assure public and passenger safety and make a recommendation for the Wally safety plan.

Discussion

Materials Reviewed

Regarding track, signal and grade crossing capital costs, RLBA initially reviewed the following WALLY Coalition reports and documents:

- Pertinent portions of the Wally North South Commuter Rail Service Business Plan dated February, 2008;
- Rail Infrastructure Improvement Preliminary Estimate, Ann Arbor to Howell dated February 21, 2008;
- Warning Device Upgrades spreadsheet detailing an at-grade, highway-rail crossing inventory and potential upgrade costs;
- Budgetary signal letter from GE Transportation Systems Global Signaling, LLC to Michigan Department of Transportation (MDOT) dated February 28, 2008 and
- Other background documents including a brief synopsis of the proposed commuter rail service.

Terri Blackmore requested an early estimate of costs; this estimate was provided by RLBA in an interim report, "Preliminary Review of Proposed Operating and Capital Costs", submitted on April 30, 2008.

Assumptions were made by RLBA in developing preliminary review figures. Some of these assumptions were later changed.

Later, following the May 1 and 2, 2008, on-site inspection, described below, additional background materials and information sources were provided by either the WALLY Coalition, MDOT or Great Lakes Central Railroad (GLC) including:

- Great Lakes Central Railroad Time Table Number 1, effective date April 1, 2008;
- MDOT Plans of Proposed Railroad Rehabilitation, dated January 1996;
- Track Geometry Inspection Report, Durand to Osmer, Michigan, dated October 10, 2007, and

- Miscellaneous cost figures and breakdowns of actual track work performed by contractors for MDOT.

Site Visits

On May 1 and 2, 2008, RLBA's Ken Withers participated in initial meetings with the WALLY Coalition. On May 1, RLBA's Walt Schuchmann and Gene Davis, P.E., spot checked track infrastructure at various locations along the corridor. On May 2, Messrs. Schuchmann and Davis participated in a hyrail inspection of the corridor, with GLC representatives Mike Bagwell (President) and Tom Springsdorf (Vice President-Transportation), between milepost (MP) 74.44 near Howell and MP 47.50 near Plymouth Road in Ann Arbor. Messrs. Withers, Schuchmann and Davis all participated in the May 2 kickoff meeting with the Technical Steering Committee.

Following are comments relating to infrastructure, based on those meetings and the hyrail inspection:

Meetings

The initial meeting brought out some important points concerning the existing track infrastructure and train operations:

- GLC currently operates a daily train in each direction over the corridor.
- GLC interchanges with CSX just south of Howell at Anne Pere.
- GLC believes that its customers could be served at night to facilitate commuter rail operations.
- MDOT owns the line while GLC is responsible for train operation and maintenance-of-way (MOW) activities.
- GLC is the operator in perpetuity with no defined time limits.
- Most switches are #10 hand throw.
- CSX crossing at Anne Pere is an automatic interlocking (first come, first served) which experiences between six and ten CSX trains in a 24 hour period.
- No bridge work is required on the line.
- Four culverts need repair on the south end of the corridor.
- GLC averages about five to ten broken rails per year.
- GLC currently uses a twenty year timber and surfacing (T&S) cycle.
- At-grade highway-rail crossing work is averaging about $700 per track foot (installed).
- Stations likely will consist of a modest platform, small canopy, parking and some lighting.

Hyrail Inspection Trip

The MDOT-furnished track plans and GLC-furnished timetable were checked against physical characteristics found in the field during the hyrail inspection trip. As previously

stated, the inspection started at West Street (MP 74.1), just north of the old train depot in Howell, and proceeded southward toward Ann Arbor. Some pertinent track information and characteristics are included below under “Current Field Conditions”.

Infrastructure Ability to Convey Passengers

In order for any potential commuter rail service to be successful, the individual automobile drivers must be induced to leave their cars and utilize transit services. One of the underlying principles of this assumption is that travel times must be competitive with or beat automobile trip times. To accomplish that goal, track speed is assumed to reach up to 60 miles per hour (mph). While a lower speed of between 40 and 45 mph could also be achieved, RLBA believes that to be time-competitive with the automobile, commuter trains should operate at speeds up to at least 60 mph. Discussed below is a review of current field conditions and proposed infrastructure improvements deemed necessary to support 60 mph operations.

Current Field Conditions

Based upon documentation and hyrail inspection, the following observations are stated:

- Right-of-Way (ROW) width ranges between 66 and 100 feet.
- Rail weights include 100, 110, 112 and 115 pounds per yard with the predominate weight being 112.
- Overall corridor tie conditions appear good. This is confirmed through review of the latest 2007 Geometry Inspection Report revealing only one short length of wide gage (eleven feet) in the corridor.
- No significant bridge work is required on the seven bridges (according to both MDOT and GLC).
- Sidings include Howell, Anne Pere, Chilson, Whitmore Lake and Osmer; the last three sidings named are used for passing and running around the freight train.
- Maximum main track timetable speed is 40 mph with the following exceptions:
  1) Curve at MP 73.8 – ten (10) mph.
  2) CSX crossing between MP 72.2 and 71.8 – ten (10) mph.
  3) Curve between MP 62.5 and 62.2 – thirty (30) mph.
- Maximum curvature is at MP 73.8 (sixteen degrees and 35 minutes) and the next stiffest curve is at MP 62.3 (six degrees and zero minutes).
- Maximum gradient is 1.11 percent near Ann Arbor.
- Overall ride quality over the corridor was good (during the 2007 Geometry Inspection a total of eighteen ride quality defects were noted, all of which appeared to have since been corrected).
- There are 34 public (both passive and active protection) and thirteen private at-grade highway-rail crossings.

RLBA noted during the hyrail inspection that the GLC rail corridor is well maintained.

Proposed Infrastructure Improvements

Achieving a main track passenger speed of 60 mph is likely key to making WALLY service a successful operation. Therefore the following infrastructure improvements are deemed appropriate. During discussion with MDOT and GLC, it was stated that no bridge repairs are necessary.

New Track Construction

Overnight and mid-day layover facilities are proposed as the only new construction projects and are required to facilitate train storage, light servicing and cleaning of rail equipment. While initial service levels would likely require only about 600-foot-long tracks at an overnight layover yard to accommodate a single trainset consisting of one locomotive and five cars, RLBA increased track lengths to 1,000 feet to accommodate future expansion. The overnight layover yard and facility would be constructed near Oak Grove and consist of five 1,000-foot-long tracks along with a 1,000 foot long lead completely off of the main track. Four associated hand-throw turnouts connecting the tracks with the lead as well as one power main track turnout are proposed. In addition to sufficient track to accommodate five trainsets, support facilities would consist of:

- 480 volt standby power (required to maintain train heat and cooling and operate lights and doors without running the train's locomotive,
- A crew and maintenance building,
- Fencing and security,
- Lighting,
- Locomotive drip pans,
- The ability to change around equipment without entering main track, and
- Roadway vehicle access to all tracks.

Additionally, a mid-day layover track is proposed to be constructed at the east end of Osmer Siding (see photo at top of next page) consisting of a hand-throw switch (off of the siding) providing access to a single 5,000 foot side track. Standby power would be supplied at this location as well. Access to this layover track would be by gravel road.

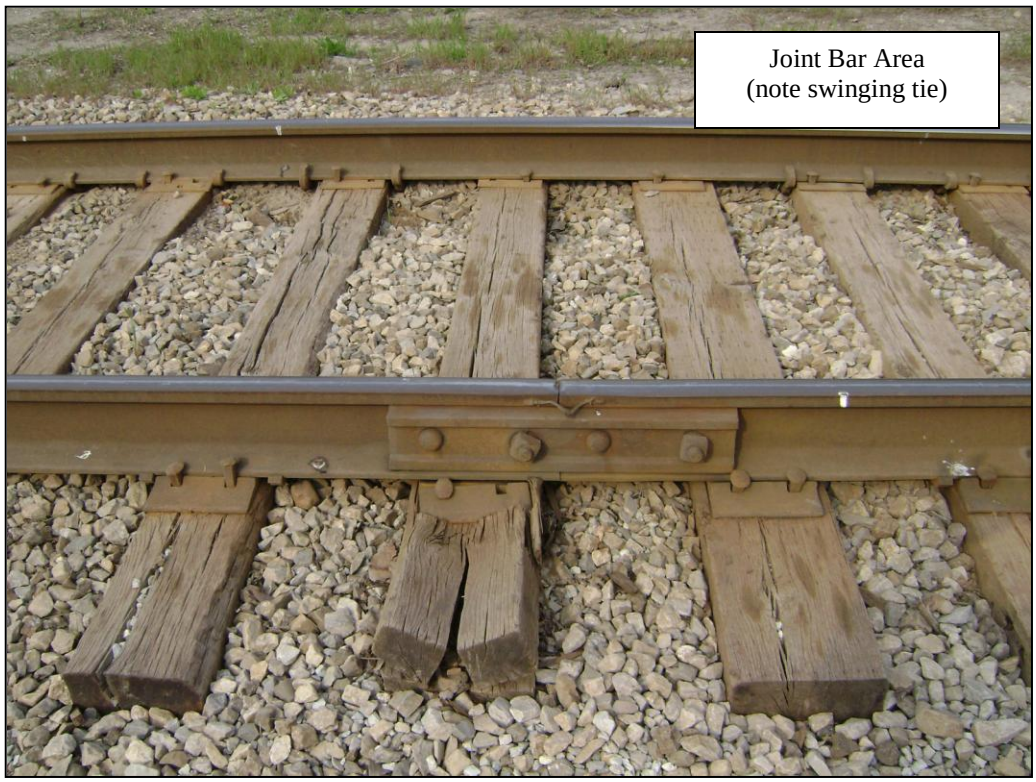
For a complete breakdown of associated capital costs, see the next section which is detailed even further in Appendix A.

Rail

As previously stated, four rail weights currently exist in the corridor with the predominant weight being 112 pounds per yard. Conversations with MDOT and GLC confirmed RLBA belief that new replacement rail would likely be 115 pounds per yard or greater. GLC confirmed that it had not performed an internal rail flaw detection test within recent history and agrees with the RLBA assertion that a thorough test must be performed to determine how much rail needs to be replaced (if any) before passenger operations begin. RLBA estimates a lump sum line item for rail defect detection testing and based upon discussion with GLC regarding annual broken rail counts, estimates the amount of replacement rail at ten percent of main track and five percent of side track.

Additionally, RLBA assumes replacing all 0.3 miles of 100 pounds per yard rail located west of Whitmore Lake Siding.

Lastly, after rail testing and initial rail replacement, RLBA assumes flash-butt welding the entire corridor to enhance ride quality and reduce joint problems, such as that seen in the photo to the right. While portions of the rail are quite old, without initial wholesale rail replacement (and significantly higher initial capital costs) with continuous welded rail (CWR), the best method to improve ride quality is through elimination of joints. Costs are estimated in the next section and detailed in Appendix A.



Track Rehabilitation (T&S)

While RLBA was impressed with overall track condition, conversation with GLC representatives confirmed RLBA's initial assumption that some level of initial timber and surfacing (T&S) work will be required. That proposed T&S cycle would take care of situations such as those seen in the photo above. After all rail work is completed, RLBA assumes about 25 percent of the entire corridor or just under seven miles would receive a T&S cycle consisting of at least 600 ties per mile (out of about 3,200 ties in each mile) along with 1,000 tons of ballast per mile, for surfacing the track.

Additionally, a similar T&S cycle is assume to be completed on each of three passing sidings (Chilson, Whitmore Lake and Osmer) to support safe freight and passenger meets if any were to occur. Given that none are foreseen during the initial service, this line item could be adjusted or postponed to a later date when service frequencies change.

The remaining approximately 20.2 miles of main track would receive a surfacing only maintenance cycle, which in conjunction with the joint elimination, should provide good ride quality.

Turnouts

RLBA believes there are sixteen existing main track turnouts, such as the north end of Whitmore Lake Siding (see photo). RLBA estimates about 25 percent of the existing main track turnouts would warrant replacement or renewal in conjunction with rail replacement and T&S work. Additionally, one new hand-thrown side track turnout would be constructed, providing access to the proposed mid-day layover track just off of the east end of Osmer Siding. Estimated capital costs are shown in the next section and expanded in Appendix A.

North End Whitmore Lake Siding (looking North)

Culverts

GLC representatives informed RLBA that, at the time of the hyrail inspection trip, four culverts needed repair or replacement. To account for other potential repairs before startup of passenger rail service, RLBA estimates that about one culvert every five miles would be replaced. Cost estimates in the next section reflect these assumptions.

Cost estimates reflect replacement of existing culverts (whatever the type) with a bituminous-coated corrugated metal pipe (CMP).

At-Grade, Highway-Rail Crossings

Each of the 34 public and thirteen private at-grade highway-rail crossing surfaces are assumed to be renewed in conjunction with either rail, T&S or surfacing program work. During discussions with GLC representatives, it was stated that GLC prefers asphalt filled, rail-guarded crossings such as that seen in the photo at top of next page. Cost estimates in the next section reflect unit costs provided to RLBA by MDOT and reviewed by GLC.

Signals

Currently the only signaled portion of the GLC corridor is the CSX crossing at Ann Pere, on which CSX provides the maintenance both of the diamond and the signal system allowing access to the interlocking. RLBA reviewed and utilized the initial GE Transportation Systems Global Signaling, LLC budgetary proposal dated February 28, 2008, in its preliminary capital cost estimate. After further discussion, RLBA believes that in order to provide an automobile competitive service, a complete Centralized Traffic Control (CTC) system is warranted, and estimates capital costs associated with that system.

Typical Preferred Crossing Surface
(Brighton Road)

RLBA recommends that a traffic control signal system be installed on the trackage to be used by the WALLY service. RLBA has made the same recommendation to its prior commuter rail clients, and almost all new services have been implemented on signaled trackage. Signal systems -- whether Incremental Train Control Systems (ITCS) as proposed by GE Transportation Systems Global Signaling, LLC (GE) or conventional CTC -- increase the level of safety of train operations.

RLBA reviewed the February 28, 2008, ITCS Proposal submitted by GE. For comparison purposes, RLBA developed a preliminary cost estimate of a conventional CTC system with associated communications equipment. RLBA's estimate of the CTC system cost is $4.4 million for signal equipment and $1.4 million for communications equipment, a total of $5.8 million. The quoted budgetary price of the ITCS system is $4.9 million based upon the assumption of using existing communications towers, which in fact do not exist on the GLC. Adding the same $1.4 million communications estimate would bring the ITCS total cost to $6.3 million. The two alternatives are quite close in cost; clearly the technology which best suits WALLY service should be the one selected.

RLBA uses conventional CTC system cost in developing the capital budget. More information should be developed on both alternatives. The brief GE proposal does not make a case that ITCS is the appropriate technology over a short segment of presently unsignalled railroad with light density passenger and freight operations. RLBA does not rule out the ITCS alternative; it simply notes that a sufficient argument has not yet been made to depart from standard and proven practice.

Stations

Based upon the discussion in Subtask 2.2., Station Development, platforms only (Howell, Chilson, Whitmore Lake and Plymouth Road only) would cost approximately $1.4 million. Station parking -- considering the deficit at Chilson only (Howell and Whitmore Lake are developer-provided parking, Plymouth Road has no parking) -- require another estimated $0.875 million. Additional station improvements approaching an estimated $2.0 million include:

- access roads;
- bus lanes;
- “kiss and ride” lanes;
- non-motorized paths (pedestrian and bicycle) providing access between city streets and/or parking areas to loading platforms and
- platform amenities such as shelters, windscreens, communications system, ticket vending machines and security lighting.

Thus total station capital costs, at this point in conceptual design, is roughly estimated at about $4.3 million.

The above station cost estimate does not include potential environmental mitigations, or other things that may turn up when the Wally Coalition makes decisions which must be made prior to final design. Also, these estimates do not include the annual lease costs for parking where a church (at Chilson) and developers (at Howell and Whitmore Lake) are expected to provide the parking.

Other

RLBA recognizes there are missing from the WALLY Business Plan certain capital cost items such as ticket vending machines, and buses required to transport commuter rail customers between the Ann Arbor station location and downtown Ann Arbor. RLBA has estimated these costs.

Contingency

The largest unknowns are associated with the rail and signal categories since no internal rail flaw detection tests have been accomplished recently and all signal work needs to be site specific. Signal work generally constitutes a large portion of any

project when a new signal system is installed. Because of these unknowns and based upon discussion with GLC representatives, RLBA estimates a twenty percent contingency factor. As more detailed information becomes available, the contingency factor may be refined.

Capital Cost Estimate Review

Another portion of this task was to review the estimated capital costs associated with passenger rail service implementation both as originally submitted for review by the WALLY Coalition as well as those developed by RLBA. Table 1 below illustrates those estimated capital costs.

What is clear is the absence of certain cost items on the WALLY side. RLBA is confident regarding its recommendations regarding what should be included to implement a quality passenger rail service. RLBA has discussed its rationale for a 20 percent contingency.

Many of the unit prices that RLBA utilized in its estimates are those supplied by MDOT and agreed to by GLC.

Projected Capital Costs
Between Howell and Ann Arbor, MI
Original and Revised
(Thousands of Dollars)

Line Item	Wally Coalition	RLBA	Variance
New Construction (Layover Facilities)	-	$2,560	$2,560
Rail	-	3,111	3,111
Track Rehabilitation	$564	1,562	998
Turnouts	-	490	490
Culverts	-	45	45
At-grade, highway-rail crossings	-	1,595	1,595
Signals	4,891	9,025	4,134
Stations	1,685	4,300	2,615
Other	30	4,350	3,770
Subtotal	7,170	27,038	19,318
Contingency (20%)	-	5,408	4,775
Total Capital Expenses	**$7,170**	**$32,446**	**$24,093**

Source: RLBA Appendix X, WALLY Business Plan and GE Estimate.

Adjoining Railroad Coordination

It is important that freight railroads' interchange activities, and the infrastructure necessary to accomplish these activities, be considered. GLC stated that its customers

(most, if not all) could be switched at night. Thus there would be no conflict with commuter rail service.

No physical change is expected at Ann Pere, where GLC interchanges with CSX. The only infrastructure change at Osmer Siding, where GLC interchanges with the AARR, is new construction of a siding turnout, providing access to a single 5,000 foot long track for mid-day rail car storage.

If a new CTC system is installed, freight switching activities may have to be modified somewhat. This may require coordination with CSX and AARR.

Examples and Recommended Safety and Security Plans

Increased rail activity resulting from new commuter rail service will result in additional responsibilities for both GLC and MDOT. At present GLC, with MDOT assistance, is maintaining its track infrastructure to Federal Railroad Administration (FRA) Class 3 standards. Since Class 3 standards support passenger speeds up to 60 mph, little should change from a maintenance point of view. The track structure likely will be maintained to the upper end of FRA Class 3 standards, with some repairs performed to improve ride quality for passengers, such as flash-butt welding to eliminate joints.

Safety Plan

From a public safety perspective, informing the public of the startup of commuter service likely would include statements that trains will be traveling faster in the corridor as well as more frequently. Information booths at community events immediately before startup of service would be opportunities to educate the public regarding these increased frequencies and greater speed, in particular the increased risk at at-grade, highway-rail crossings, and dangers associated with trespassing on the railroad right-of-way. Scheduling some Operation Lifesaver presentations would be in order if qualified presenters were available.

From a railroad perspective, GLC likely would need to develop response action plans to commuter rail crisis situations such as a crossing collision, derailment or act of violence on the train while in service, as well as other possible scenarios. Before service initiation, GLC and MDOT should consider possible scenarios and utilize state and local policies and emergency response capabilities in order to plan responses.

Track infrastructure inspection would comply with FRA Track Safety Standards Part 213, Subpart F – Inspection for the appropriate track class. Subset 213.233 states that Class 3 track inspection frequency would be

> *"Weekly with at least 3 calendar days interval between inspections, or before use, if the track is used less than once a week, or twice weekly with at least 1 calendar day interval between inspections, if the track carries passenger trains or more than 10 million gross tons of traffic during the preceding calendar year."*

Along with regular inspections, a program maintenance cycle adjusted to the new level of service over the corridor (in addition to the normal routine maintenance required to maintain the track) is a necessity.

Regular FRA-required signal inspections and tests with regard to turnouts, at-grade highway-rail crossings, and signal components, would be complied with as well as any specific state-required inspections.

Security Plan
With the new construction of both the overnight and mid-day layover facilities, some additional security measures may be necessary for both the passenger rail cars and the employees servicing those engines and railcars. GLC (and MDOT) likely would need to contact the local police departments informing them of the locations of both facilities and that cars would be stored in those areas as well as the fact that employees would be servicing the engines and cars in those same areas. It may be appropriate to arrange for local law enforcement authorities to initiate routine patrols and develop response scenarios. The Wally Coalition and/or GLC should provide local law enforcement authorities with contact numbers in case of emergency, suspicious actions and/or reports of vandalism or trespassing.

Additional Work Areas

This section identifies additional work areas deemed necessary to complete or refine commuter rail planning.

As stated above, rail flaw detection test should be arranged, in order to determine replacement requirements and costs.

Time required to order necessary materials to accomplish the initial rail flaw detection test, and schedule the actual test, is estimated at 60 days, assuming that contractors such as Sperry or Holland could work GLC into their schedules. The actual test would require one or two days. A longer period would be required to make the necessary rail replacements.

Another critical next step is to work with CSX to determine how to integrate the proposed signal system with CSX's interlocking at Ann Pere. It is very important to automobile-competitive commuter rail service that there are not delays at this interlocking.

Working to integrate the proposed CTC system with the existing CSX system at Ann Pere will likely be more complicated and time-consuming than performing the initial rail flaw detection test. After initial discussions with CSX, the type of CTC system for WALLY will need to be decided, before going back to CSX to coordinate its installation. Considering the above, the critical path to initiation of service appears to lie through

developing the signal system. It is recommended that the Coalition contact CSX soon regarding signal changes associated with initiating commuter rail service.

Service Initiation Critical Path

To complete the implementation of commuter rail service on the corridor, certain track, and signal related items can be completed sequentially, while others must be accomplished in a progressive order. As one part of the total project critical path spelled out in the Final Report, following is a step-by-step sequence focusing strictly on track, signal and grade crossing infrastructure that is intended to accomplish implementation with minimal confusion, additional work and unnecessary delays.

1. Create authority.
2. Perform preliminary engineering (track – new construction and signal system).
3. Contact CSX about integrating service with Ann Pere crossing (simultaneous with 1).
4. Procure replacement rail for initial internal rail flaw detection test and schedule initial test (simultaneous with 1).
5. Apply for construction and environmental permits.
6. Complete engineering design.
7. Refine upgrade materials (track structure) and signal material quantities.
8. Order all necessary track and signal materials (includes grade crossings).
9. Procure ticket vending machines.
10. Put out request for services bid (contract work).
11. Award contract and begin construction.
12. Construct sidings and stations.
13. Complete construction contracts.

RLBA believes that all track and signal construction-related activities can easily be accomplished within the span of one calendar year if agreement can be reached with CSX over integration with the existing Ann Pere crossing. Total project timing could approach between eighteen months and two years for the entire project if not put on a fast track.

Conclusions

RLBA estimates capital expenses totaling about $32.4 million to implement automobile-competitive commuter rail service.