

TASK 11

DETAILED LONG TERM OPERATING COSTS TECHNICAL MEMO

PREPARED BY: QUANDEL CONSULTANTS, LLC

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SMITHGROUP JJR . AECOM . BERGMANN ASSOCIATES . QUANDEL CONSULTANTS



North-South Commuter Rail Feasibility Study

Task 11: Detailed Long Term Operating Costs Technical Memo

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APPENDIX I: ANNUAL OPERATING AND MAINTENANCE COST ESTIMATES

APPENDIX II: OPERATING EXPENSE ASSUMPTIONS-OPTIONS 5A-5B

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 local 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 US23 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 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 11 – Estimate/Refine Detailed Long-Term Operating Costs

Costs to operate various levels of N-S Rail service have been estimated by AAATA and MDOT. These estimates include:

- a. Train operations based on an assumed operating plan and timetable*
- b. Passenger fare collection*
- c. Insurance requirements*
- d. Trackage rights payments (if required)*
- e. Station operations*
- f. Facility maintenance*
- g. Connecting bus services*

The consultant shall evaluate all existing cost estimates, refining, correcting and detailing as necessary. In particular need of work are the costs for insurance and trackage rights. Cost estimates for operations shall be produced for five and twenty year time frames.

The project team will evaluate existing cost estimates and develop detailed long-term operating costs as described above for up to 2 service plans. Particular emphasis will focus on costs for insurance and trackage rights.

Deliverable(s):

1. *Submit draft estimate of Long-Term Operating Costs*
2. *Review meeting, refine and resubmit final estimate of Long-Term Operating Costs*

Amendment 1 adds the following scope:

Additional Rail Option for Analysis: Whitmore Lake/Barton Drive/Ann Arbor

- *Diesel-electric locomotives with coaches*
- *One to two train sets operating with a reverse commute to provide four trips to Ann Arbor in the AM/four trips to Whitmore Lake in the PM*
- *Prepare Operating and Maintenance Cost Estimate. Update Technical Memo for Task 11: Operating Cost Estimates.*

2. DESCRIPTION OF SERVICE PLAN OPTIONS

2.1 Service Limits and Railroad Ownership

The North-South commuter rail service is proposed to operate over an approximately 27-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 and operated by the Ann Arbor Railroad (AARR). Discussions are underway to lease the southern section of the route to GLC so that the proposed new service would be operated over a single carrier's track. Although the service is proposed to operate over a distance of approximately 27 miles, the actual amount of track and right-of-way needed for the project would be approximately 30.1 miles.

2.2 Service Plan Options

Five service options have been evaluated and are described briefly as follows:

Option 1: Full Service Option

- 6 stations: Howell, Genoa Township, Hamburg, Whitmore Lake, Barton Drive and Downtown Ann Arbor
- Four train sets to Ann Arbor in the AM; four train sets return to Howell in the PM
- Dedicated bus service at Barton Drive
- Mid-day layover facility in Ann Arbor area
- Overnight/maintenance facility in Howell area
- CSX coordination required at the Ann Arbor Interlocking
- New freight interchange at Ellsworth Rd
- 60 mph max speed
- Gates at all public crossings
- Positive Train Control

Option 2: Full Service without Barton Drive Station

- 5 stations: Howell, Genoa Township, Hamburg, Whitmore Lake and Downtown Ann Arbor
- Four train sets to Ann Arbor in the AM; four trains sets return to Howell in the PM
- Dedicated bus service in Ann Arbor
- Mid-day layover facility in Ann Arbor area
- Overnight/maintenance facility in Howell area
- CSX coordination required at the Annpere Interlocking
- New freight interchange at Ellsworth Rd
- 60 mph max speed
- Gates at all public crossings
- Positive Train Control

Option 3: Starter Service with Howell/Whitmore Lake/Ann Arbor Stations

- 3 stations: Howell, Whitmore Lake and Downtown Ann Arbor
- Four train sets to Ann Arbor in the AM; four trains sets return to Howell in the PM
- Dedicated bus service in Ann Arbor
- Mid-day layover facility in Ann Arbor area
- Overnight/maintenance facility in Howell area
- CSX coordination required at the Annpere Interlocking
- New freight interchange at Ellsworth Rd
- 60 mph max speed
- Gates at all public crossings
- Positive Train Control

Option 4A: Minimum Operable Configuration (MOC) with PTC

- 2 Stations: Whitmore Lake and Barton Drive
- Shuttle service with a single train set (and one spare set), 14 trains per day
- Dedicated bus service at Barton Drive
- Parking and layover/maintenance facility in Whitmore Lake
- 40 mph max speed
- As Warranted Grade Crossing Gates
- Positive Train Control (PTC)

Option 4B: Minimum Operable Configuration (MOC) without PTC

- 2 Stations: Whitmore Lake and Barton Drive
- Shuttle service with a single train set (and one spare set), 12 trains per day
- Dedicated bus service at Barton Drive
- Parking and layover/maintenance facility in Whitmore Lake
- 40 mph max speed
- As Warranted Grade Crossing Gates
- Centralized Traffic Control (CTC)

Option 5A: Shuttle Service (one train set) with Whitmore Lake/Barton Drive/Ann Arbor Stations

- 3 stations: Whitmore Lake, Barton Drive and Downtown Ann Arbor
- One train set, making four peak direction trips to Ann Arbor in the AM and four peak direction trips to Whitmore Lake in the PM. The accomplishment of this objective with a single train set requires three reverse commutes in the AM and three reverse commutes in the PM. Due to the round trip travel time, peak direction starts occur at roughly one hour intervals, which may not be optimal for capturing commuter market share.
- Weekday operation only
- Dedicated bus service at Barton Drive
- Mid-day layover track/minimal facility in Ann Arbor

- Overnight/layover track/minimal facility in Whitmore Lake
- Periodic offsite maintenance at Owosso or another existing facility
- New freight interchange at Ellsworth Rd
- 60 mph max speed
- Gates at all public crossings
- Positive Train Control with an option

Option 5B: Shuttle Service (two train sets) with Whitmore Lake/Barton Drive/Ann Arbor Stations

- 3 stations: Whitmore Lake, Barton Drive and Downtown Ann Arbor
- Two train sets, making four peak direction trips to Ann Arbor in the AM and four peak direction trips to Whitmore Lake in the PM. The accomplishment of this objective with two train sets requires two reverse commutes in the AM and two reverse commutes in the PM. Peak direction starts are implemented at roughly 35 minute intervals.
- Weekday operation only
- Dedicated bus service at Barton Drive
- Mid-day layover track/minimal facility in Ann Arbor
- Overnight/layover track/minimal facility in Whitmore Lake
- Periodic offsite maintenance at Owosso or another existing facility
- New freight interchange at Ellsworth Rd
- 60 mph max speed
- Gates at all public crossings
- Positive Train Control

The service plan options are defined more fully in Task 8: Service Plans for Evaluation.

3. OPERATING AND MAINTENANCE COST ESTIMATES

3.1 Initial Year Estimates

Based on the respective service plans, Quandel Consultants has developed estimates of the operating and maintenance costs for the initial year of operation for each option as follows:

- Option 1: Full Service Option: \$13.2 million
- Option 2: Full Service without Barton Drive Station: \$13.1 million
- Option 3: Starter Service: \$12.9 million
- Option 4A: Minimum Operable Configuration (MOC) with PTC: \$5.8 million
- Option 4B: Minimum Operable Configuration (MOC) without PTC: \$5.7 million
- Option 5A: Shuttle Service (one train set): \$6.6 million
- Option 5B: Shuttle Service (two train sets): \$7.0 million

3.2 Five Year Estimates

Over time the annual operating and maintenance cost is anticipated to increase with inflation. Under the New Starts Program, the Federal Transit Administration (FTA) requires that applicants consider the effects of inflation in their financial planning. While the FTA does not specifically define a required inflation factor, the FTA awards higher scores for conservative financial planning. Quandel Consultants has employed an annual inflation rate of 3.0% in calculating the projected future year costs.

The cost values for Year 5 are as follows:

- Option 1: Full Service Option: \$15.2 million
- Option 2: Full Service without Barton Drive Station: \$15.2 million
- Option 3: Starter Service: \$14.9 million
- Option 4A: Minimum Operable Configuration (MOC) with PTC: \$6.7 million
- Option 4B: Minimum Operable Configuration (MOC) without PTC: \$6.6 million
- Option 5A: Shuttle Service (one train set): \$7.7 million
- Option 5B: Shuttle Service (two train sets): \$8.1 million
-

3.3 Twenty year Estimates

Employing the same 3.0% annual inflation rate, the cost values for Year 20 are as follows:

- Option 1: Full Service Option: \$23.8 million
- Option 2: Full Service without Barton Drive Station: \$23.6 million
- Option 3: Starter Service: \$23.3 million
- Option 4A: Minimum Operable Configuration (MOC) with PTC: \$10.4 million
- Option 4B: Minimum Operable Configuration (MOC) without PTC: \$10.2 million
- Option 5A: Shuttle Service (one train set): \$12.0 million
- Option 5B: Shuttle Service (two train sets): \$12.7 million

Annual operating and maintenance cost estimate spreadsheets are provided as Appendix I to this document. The spreadsheets employ a tabular format that provides detailed quantities and unit costs and summarizes the costs by categories normally employed by railroads in developing their annual budgets. The cost elements include descriptive titles that are intended to clearly define the cost activity. Details are provided for the costs of bus operations, commuter rail coach lease, locomotive lease and insurance. Costs have been developed in year 2015 dollars.

A set of detailed operating expense assumptions has been prepared for Options 5A and 5B to document the differences in operating cost elements compared to Option 4A. This analysis is presented in Appendix II.

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We would like to hear from you. Stay up-to-date on the latest news and developments, and engage with us through the website.

www.NSRAILSTUDY.com

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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APPENDIX I: ANNUAL OPERATING AND MAINTENANCE COST ESTIMATES

APPENDIX I: ANNUAL OPERATING AND MAINTENANCE COSTS				
North-South Commuter Rail	Initial Year		Year 5	Year 20
Annual Operating and Maintenance Cost Estimate			Escalation Factor at 3% annual inflation 1.16	1.81
Option 1: Full Service			Comment	
Stations: AA/Washington-AA/Barton Rd-Whitmore Lake-Hamburg-Genoa-Howell				
Train Consist: Loco-Coach-Coach-Cab, four in service, one spare				
Fleet: 5 locomotives, 11 coaches, 5 cabs				
Project Limits: Ellsworth Rd MP 41.75 to CP Howell MP 74.0				
Revenue Service: Weekday Operation-4 Inbound-4 Outbound TPD				
Annual Operating Cost excluding the cost of connecting bus service	\$12,348,488			
Annual Revenue Train Miles	59589			
Annual Operating Cost per Revenue Train Mile	\$207	Excludes the cost of connecting bus service		
9/28/2016				
Cost Element	Value			
Transportation:				
Management, train dispatching, train crews-labor & overhead	\$1,586,798		\$1,839,534	\$2,865,934
Locomotive fuel	\$205,293		\$237,991	\$370,782
Crew service support (training, radios, gear, supplies)	\$115,000		\$133,317	\$207,703
Joint Facilities (CSX-Ann Pere Interlocking)	\$250,000		\$289,819	\$451,528
Locomotive Lease: 5 units: F-40PH or equivalent	\$502,000		\$581,956	\$906,668
Passenger Car Lease: 11 coaches and 5 cabs	\$746,000		\$864,818	\$1,347,359
Barton Rd Connecting Bus Operating Expense: 5 buses	\$803,000	Barton Bus Distribution Service	\$930,897	\$1,450,307
Total Transportation	\$4,208,091		\$4,878,331	\$7,600,280
Equipment Maintenance:				
Management & supervision, shop forces-labor & overhead	\$1,071,136		\$1,241,740	\$1,934,591
Parts & materials including freight	\$385,000		\$446,321	\$695,353
Utilities including 480-volt standby power	\$480,000		\$556,452	\$866,933
Facilities maintenance including snow clearing	\$176,000		\$204,032	\$317,876
Vehicle & equipment operation & maintenance	\$35,000		\$40,575	\$63,214
Contracted services	\$97,000		\$112,450	\$175,193
Medium & heavy repairs-locomotives and commuter cars	\$114,000		\$132,157	\$205,897
Total Equipment Maintenance	\$2,358,136		\$2,733,726	\$4,259,056
Maintenance of Infrastructure:				
AARR Property Lease	\$1	Annual Lease cost linked to Ellsworth Interchange	\$1	\$2
Management, supervision, crews-labor & overhead	\$1,672,837		\$1,939,277	\$3,021,330
Track materials	\$215,000		\$249,244	\$388,314
Structures materials	\$58,000		\$67,238	\$104,754
Signal & Communications materials	\$185,000		\$214,466	\$334,131
Vehicle & equipment operation & maintenance	\$350,000		\$405,746	\$632,139
Utilities including switch heater fuel, crossings, signal system	\$400,000		\$463,710	\$722,444
Contracted services	\$350,000		\$405,746	\$632,139
Snow clearing	\$220,000		\$255,040	\$397,344
Commuter stations	\$112,000		\$129,839	\$202,284
Total Maintenance of Infrastructure	\$3,562,837		\$4,130,305	\$6,434,880
Administration:				
Management & staffing-labor & overhead	\$1,056,924		\$1,225,265	\$1,908,922
Contracted professional services	\$280,000		\$324,597	\$505,711
Marketing, advertising, ticketing	\$185,000		\$214,466	\$334,131
Systems maintenance	\$84,000		\$97,379	\$151,713
Office expense	\$113,000		\$130,998	\$204,091
Casualties and Insurance	\$1,303,500	Requires that the Agency fund a \$1 million SIR	\$1,511,114	\$2,354,266
Total Administration	\$3,022,424		\$3,503,818	\$5,458,834
Total First Year Operating & Maintenance Expense	\$13,151,488		\$15,246,179	\$23,753,050

North-South Commuter Rail				Initial Year	Year 5	Year 20		
Annual Operating and Maintenance Cost Estimate					Escalation Factor at 3% annual inflation 1.16	1.81		
Option 2: Full Service w/o Barton Rd					Comment			
Stations: AA/Washington-Whitmore Lake-Hamburg-Genoa-Howell								
Train Consist: Loco-Coach-Coach-Cab, four in service, one spare								
Fleet: 5 locomotives, 11 coaches, 5 cabs								
Project Limits: Ellsworth Rd MP 41.75 to CP Howell MP 74.0								
Revenue Service: Weekday Operation-4 Inbound-4 Outbound TPD								
Annual Operating Cost excluding the cost of connecting bus service				\$12,272,489				
Annual Revenue Train Miles				59589				
Annual Operating Cost per Revenue Train Mile				\$206	Excludes the cost of connecting bus service			
9/28/2016								
Cost Element				Option 1 Value	Variation (+/-)	Option 2 Value		
Transportation:								
Management, train dispatching, train crews-labor & overhead				\$1,586,798		\$1,586,798	\$1,839,534	\$2,865,934
Locomotive fuel				\$205,293	(\$21,000)	\$184,293	\$213,646	\$332,854
Crew service support (training, radios, gear, supplies)				\$115,000		\$115,000	\$133,317	\$207,703
Joint Facilities (CSX-Ann Pere Interlocking)				\$250,000		\$250,000	\$289,819	\$451,528
Locomotive Lease: 5 units: F-40PH or equivalent				\$502,000		\$502,000	\$581,956	\$906,668
Passenger Car Lease: 11 coaches and 5 cabs				\$746,000		\$746,000	\$864,818	\$1,347,359
Barton Rd Connecting Bus Operating Expense: 5 buses				\$803,000		\$803,000	\$930,897	\$1,450,307
Total Transportation				\$4,208,091		\$4,187,091	\$4,853,986	\$7,562,352
Equipment Maintenance:								
Management & supervision, shop forces-labor & overhead				\$1,071,136		\$1,071,136	\$1,241,740	\$1,934,591
Parts & materials including freight				\$385,000	(\$20,000)	\$365,000	\$423,135	\$659,231
Utilities including 480-volt standby power				\$480,000		\$480,000	\$556,452	\$866,933
Facilities maintenance including snow clearing				\$176,000		\$176,000	\$204,032	\$317,876
Vehicle & equipment operation & maintenance				\$35,000		\$35,000	\$40,575	\$63,214
Contracted services				\$97,000		\$97,000	\$112,450	\$175,193
Medium & heavy repairs-locomotives and commuter cars				\$114,000		\$114,000	\$132,157	\$205,897
Total Equipment Maintenance				\$2,358,136		\$2,338,136	\$2,710,540	\$4,222,934
Maintenance of Infrastructure:								
AARR Property Lease				\$1		\$1	Annual Lease cost linked to Ellsworth Interchange \$1	\$2
Management, supervision, crews-labor & overhead				\$1,672,837		\$1,672,837	\$1,939,277	\$3,021,330
Track materials				\$215,000		\$215,000	\$249,244	\$388,314
Structures materials				\$58,000		\$58,000	\$67,238	\$104,754
Signal & Communications materials				\$185,000		\$185,000	\$214,466	\$334,131
Vehicle & equipment operation & maintenance				\$350,000		\$350,000	\$405,746	\$632,139
Utilities including switch heater fuel, crossings, signal system				\$400,000		\$400,000	\$463,710	\$722,444
Contracted services				\$350,000		\$350,000	\$405,746	\$632,139
Snow clearing				\$220,000		\$220,000	\$255,040	\$397,344
Commuter stations				\$112,000	(\$30,000)	\$82,000	\$95,060	\$148,101
Total Maintenance of Infrastructure				\$3,562,838		\$3,532,838	\$4,095,528	\$6,380,698
Administration:								
Management & staffing-labor & overhead				\$1,056,924	(\$5,000)	\$1,051,924	\$1,219,468	\$1,899,892
Contracted professional services				\$280,000		\$280,000	\$324,597	\$505,711
Marketing, advertising, ticketing				\$185,000		\$185,000	\$214,466	\$334,131
Systems maintenance				\$84,000		\$84,000	\$97,379	\$151,713
Office expense				\$113,000		\$113,000	\$130,998	\$204,091
Casualties and Insurance				\$1,303,500		\$1,303,500	\$1,511,114	\$2,354,266
Total Administration				\$3,022,424		\$3,017,424	\$3,498,021	\$5,449,803
Total First Year Operating & Maintenance Expense				\$13,151,489	(\$76,000)	\$13,075,489	\$15,158,075	\$23,615,788

North-South Commuter Rail				Initial Year		Year 5	Year 20
Annual Operating and Maintenance Cost Estimate					Escalation Factor at 3% annual inflation	1.16	1.81
Option 3: Starter Service					Comment		
Stations: AA/Washington-Whitmore Lake-Howell							
Train Consist: Loco-Coach-Coach-Cab, four in service, one spare							
Fleet: 5 locomotives, 11 coaches, 5 cabs							
Project Limits: Ellsworth Rd MP 41.75 to CP Howell MP 74.0							
Revenue Service: Weekday Operation-4 Inbound-4 Outbound TPD							
Annual Operating Cost excluding the cost of connecting bus service				\$12,080,489			
Annual Revenue Train Miles				59589			
Annual Operating Cost per Revenue Train Mile				\$203	Excludes the cost of connecting bus service		
9/28/2016							
Cost Element	Option 1 Value	Variation (+/-)	Option 3 Value				
Transportation:							
Management, train dispatching, train crews-labor & overhead	\$1,586,798	(\$20,000)	\$1,566,798			\$1,816,348	\$2,829,811
Locomotive fuel	\$205,293	(\$63,000)	\$142,293			\$164,957	\$256,997
Crew service support (training, radios, gear, supplies)	\$115,000		\$115,000			\$133,317	\$207,703
Joint Facilities (CSX-Ann Pere Interlocking)	\$250,000		\$250,000			\$289,819	\$451,528
Locomotive Lease: 5 units: F-40PH or equivalent	\$502,000		\$502,000			\$581,956	\$906,668
Passenger Car Lease: 11 coaches and 5 cabs	\$746,000		\$746,000			\$864,818	\$1,347,359
Barton Rd Connecting Bus Operating Expense: 5 buses	\$803,000		\$803,000		Downtown Bus Distribution Service	\$930,897	\$1,450,307
Total Transportation	\$4,208,091		\$4,125,091			\$4,782,111	\$7,450,373
Equipment Maintenance:							
Management & supervision, shop forces-labor & overhead	\$1,071,136		\$1,071,136			\$1,241,740	\$1,934,591
Parts & materials including freight	\$385,000	(\$60,000)	\$325,000			\$376,764	\$586,986
Utilities including 480-volt standby power	\$480,000		\$480,000			\$556,452	\$866,933
Facilities maintenance including snow clearing	\$176,000		\$176,000			\$204,032	\$317,876
Vehicle & equipment operation & maintenance	\$35,000		\$35,000			\$40,575	\$63,214
Contracted services	\$97,000		\$97,000			\$112,450	\$175,193
Medium & heavy repairs-locomotives and commuter cars	\$114,000		\$114,000			\$132,157	\$205,897
Total Equipment Maintenance	\$2,358,136		\$2,298,136			\$2,664,169	\$4,150,689
Maintenance of Infrastructure:							
AARR Property Lease	\$1		\$1		Annual Lease cost linked to Ellsworth Interchange	\$1	\$2
Management, supervision, crews-labor & overhead	\$1,672,837		\$1,672,837			\$1,939,277	\$3,021,330
Track materials	\$215,000		\$215,000			\$249,244	\$388,314
Structures materials	\$58,000		\$58,000			\$67,238	\$104,754
Signal & Communications materials	\$185,000		\$185,000			\$214,466	\$334,131
Vehicle & equipment operation & maintenance	\$350,000		\$350,000			\$405,746	\$632,139
Utilities including switch heater fuel, crossings, signal system	\$400,000		\$400,000			\$463,710	\$722,444
Contracted services	\$350,000		\$350,000			\$405,746	\$632,139
Snow clearing	\$220,000		\$220,000			\$255,040	\$397,344
Commuter stations	\$112,000	(\$90,000)	\$22,000			\$25,504	\$39,734
Total Maintenance of Infrastructure	\$3,562,838		\$3,472,838			\$4,025,971	\$6,272,332
Administration:							
Management & staffing-labor & overhead	\$1,056,924	(\$35,000)	\$1,021,924			\$1,184,690	\$1,845,708
Contracted professional services	\$280,000		\$280,000			\$324,597	\$505,711
Marketing, advertising, ticketing	\$185,000		\$185,000			\$214,466	\$334,131
Systems maintenance	\$84,000		\$84,000			\$97,379	\$151,713
Office expense	\$113,000		\$113,000			\$130,998	\$204,091
Casualties and Insurance	\$1,303,500		\$1,303,500		No significant change from Full Service	\$1,511,114	\$2,354,266
Total Administration	\$3,022,424		\$2,987,424			\$3,463,243	\$5,395,620
Total First Year Operating & Maintenance Expense	\$13,151,489	(\$268,000)	\$12,883,489			\$14,935,495	\$23,269,014

North-South Commuter Rail	Initial Year		Year 5	Year 20
Annual Operating and Maintenance Cost Estimate			Escalation Factor at 3% annual inflation 1.16	1.81
Option 4A: Minimum Operating Configuration with PTC			Comment	
Stations: AA/Barton Rd-Whitmore Lake				
Train Consist: Loco-Coach-Cab, one in service, one spare				
Fleet: 2 locomotives, 2 coaches, 2 cabs				
Project Limits: Barton Rd MP 47.19 to 8 Mile Rd MP 57.56				
Revenue Service: Weekday Operation-7 Inbound-7 Outbound TPD				
Annual Operating Cost excluding the cost of connecting bus service	\$4,981,801			
Annual Revenue Train Miles	37340			
Annual Operating Cost per Revenue Train Mile	\$133	Excludes the cost of connecting bus service		
9/28/2016				
Cost Element	Option 4A Value			
Transportation:				
Management, train dispatching, train crews-labor & overhead	\$300,000		\$347,782	\$541,833
Locomotive fuel	\$60,000		\$69,556	\$108,367
Crew service support (training, radios, gear, supplies)	\$25,000		\$28,982	\$45,153
Joint Facilities (CSX-Ann Pere Interlocking)	\$0	Not required	\$0	\$0
Locomotive Lease: 2 units: F-40PH or equivalent	\$201,000		\$233,014	\$363,028
Passenger Car Lease: 2 coaches and 2 cabs	\$191,000		\$221,421	\$344,967
Barton Rd Connecting Bus Operating Expense: 5 buses	\$803,000	Barton Bus Distribution Service	\$930,897	\$1,450,307
Total Transportation	\$1,580,000		\$1,831,653	\$2,853,656
Equipment Maintenance:				
Management & supervision, shop forces-labor & overhead	\$750,000		\$869,456	\$1,354,583
Parts & materials including freight	\$40,000		\$46,371	\$72,244
Utilities including 480-volt standby power	\$95,000		\$110,131	\$171,581
Facilities maintenance including snow clearing	\$30,000		\$34,778	\$54,183
Vehicle & equipment operation & maintenance	\$15,000		\$17,389	\$27,092
Contracted services	\$25,000		\$28,982	\$45,153
Medium & heavy repairs-locomotives and commuter cars	\$40,000		\$46,371	\$72,244
Total Equipment Maintenance	\$995,000		\$1,153,478	\$1,797,081
Maintenance of Infrastructure:				
AARR Property Lease	\$1	Short segment of property north of Barton	\$1	\$2
Management, supervision, crews-labor & overhead	\$514,000		\$595,867	\$928,341
Track materials	\$185,000		\$214,466	\$334,131
Structures materials	\$20,000		\$23,185	\$36,122
Signal & Communications materials	\$85,000		\$98,538	\$153,519
Vehicle & equipment operation & maintenance	\$120,000		\$139,113	\$216,733
Utilities including switch heater fuel, crossings, signal system	\$200,000		\$231,855	\$361,222
Contracted services	\$80,000		\$92,742	\$144,489
Snow clearing	\$140,000		\$162,298	\$252,856
Commuter stations	\$60,000		\$69,556	\$108,367
Total Maintenance of Infrastructure	\$1,404,001		\$1,627,622	\$2,535,782
Administration:				
Management & staffing-labor & overhead	\$212,000		\$245,766	\$382,896
Contracted professional services	\$130,000		\$150,706	\$234,794
Marketing, advertising, ticketing	\$130,000		\$150,706	\$234,794
Systems maintenance	\$50,000		\$57,964	\$90,306
Office expense	\$40,000		\$46,371	\$72,244
Casualties and Insurance	\$1,243,800		\$1,441,905	\$2,246,441
Total Administration	\$1,805,800		\$2,093,417	\$3,261,476
Total First Year Operating & Maintenance Expense	\$5,784,801		\$6,706,170	\$10,447,994

North-South Commuter Rail				Initial Year		Year 5	Year 20
Annual Operating and Maintenance Cost Estimate					Escalation Factor at 3% annual inflation	1.16	1.81
Option 4B: Minimum Operating Configuration without PTC					Comment		
Stations: AA/Barton Rd-Whitmore Lake							
Train Consist: Loco-Coach-Cab, one in service, one spare							
Fleet: 2 locomotives, 2 coaches, 2 cabs							
Project Limits: Barton Rd MP 47.19 to 8 Mile Rd MP 57.56							
Revenue Service: Weekday Operation-6 Inbound-6 Outbound TPD							
Annual Operating Cost excluding the cost of connecting bus service				\$4,866,801			
Annual Revenue Train Miles				32006			
Annual Operating Cost per Revenue Train Mile				\$152	Excludes the cost of connecting bus service		
9/28/2016							
Cost Element	Option 4A Value	Variation (+/-)	Option 4B Value				
Transportation:							
Management, train dispatching, train crews-labor & overhead	\$300,000		\$300,000			\$347,782	\$541,833
Locomotive fuel	\$60,000		\$60,000			\$69,556	\$108,367
Crew service support (training, radios, gear, supplies)	\$25,000		\$25,000			\$28,982	\$45,153
Joint Facilities (CSX-Ann Pere Interlocking)	\$0		\$0	Not required		\$0	\$0
Locomotive Lease: 2 units: F-40PH or equivalent	\$201,000		\$201,000			\$233,014	\$363,028
Passenger Car Lease: 2 coaches and 2 cabs	\$191,000		\$191,000			\$221,421	\$344,967
Barton Rd Connecting Bus Operating Expense: 5 buses	\$803,000		\$803,000	Barton Bus Distribution Service		\$930,897	\$1,450,307
Total Transportation	\$1,580,000	(\$15,000)	\$1,565,000			\$1,814,264	\$2,826,564
						\$0	\$0
Equipment Maintenance:						\$0	\$0
Management & supervision, shop forces-labor & overhead	\$750,000		\$750,000			\$869,456	\$1,354,583
Parts & materials including freight	\$40,000		\$40,000			\$46,371	\$72,244
Utilities including 480-volt standby power	\$95,000		\$95,000			\$110,131	\$171,581
Facilities maintenance including snow clearing	\$30,000		\$30,000			\$34,778	\$54,183
Vehicle & equipment operation & maintenance	\$15,000		\$15,000			\$17,389	\$27,092
Contracted services	\$25,000		\$25,000			\$28,982	\$45,153
Medium & heavy repairs-locomotives and commuter cars	\$40,000		\$40,000			\$46,371	\$72,244
Total Equipment Maintenance	\$995,000	(\$40,000)	\$955,000			\$1,107,107	\$1,724,836
						\$0	\$0
Maintenance of Infrastructure:						\$0	\$0
AARR Property Lease	\$1		\$1	Short segment of property north of Barton		\$1	\$2
Management, supervision, crews-labor & overhead	\$514,000		\$514,000			\$595,867	\$928,341
Track materials	\$185,000		\$185,000			\$214,466	\$334,131
Structures materials	\$20,000		\$20,000			\$23,185	\$36,122
Signal & Communications materials	\$85,000		\$85,000			\$98,538	\$153,519
Vehicle & equipment operation & maintenance	\$120,000		\$120,000			\$139,113	\$216,733
Utilities including switch heater fuel, crossings, signal system	\$200,000		\$200,000			\$231,855	\$361,222
Contracted services	\$80,000		\$80,000			\$92,742	\$144,489
Snow clearing	\$140,000		\$140,000			\$162,298	\$252,856
Commuter stations	\$60,000		\$60,000			\$69,556	\$108,367
Total Maintenance of Infrastructure	\$1,404,001	(\$50,000)	\$1,354,001			\$1,569,658	\$2,445,476
						\$0	\$0
Administration:						\$0	\$0
Management & staffing-labor & overhead	\$212,000		\$212,000			\$245,766	\$382,896
Contracted professional services	\$130,000		\$130,000			\$150,706	\$234,794
Marketing, advertising, ticketing	\$130,000		\$130,000			\$150,706	\$234,794
Systems maintenance	\$50,000		\$50,000			\$57,964	\$90,306
Office expense	\$40,000		\$40,000			\$46,371	\$72,244
Casualties including SIR & insurance	\$1,243,800		\$1,243,800			\$1,441,905	\$2,246,441
Total Administration	\$1,805,800	(\$10,000)	\$1,795,800			\$2,081,824	\$3,243,415
						\$0	\$0
Total First Year Operating & Maintenance Expense	\$5,784,801	(\$115,000)	\$5,669,801			\$6,572,853	\$10,240,291

North-South Commuter Rail				Initial Year		Year 5	Year 20
Annual Operating and Maintenance Cost Estimate					Escalation Factor at 3% annual inflation	1.16	1.81
Option 5A: Ann Arbor-Barton Drive-Whitmore Lake (one train set)					Comment		
Stations: Ann Arbor/Washington-Barton Dr-Whitmore Lake							
Train Consist: Loco-Coach-Cab, one in service, one spare							
Fleet: 2 locomotives, 2 coaches, 2 cabs							
Project Limits: Ellsworth Rd MP 41.75 to 8 Mile Rd MP 57.56							
Revenue Service: Weekday Operation-7 Inbound-7 Outbound TPD							
Annual Operating Cost excluding the cost of connecting bus service				\$5,821,151			
Annual Revenue Train Miles				43906			
Annual Operating Cost per Revenue Train Mile				\$133	Excludes the cost of connecting bus service		
9/28/2016							
Cost Element	Option 4A Value	Variation (+/-)	Option 5A Value				
Transportation:							
Management, train dispatching, train crews-labor & overhead	\$300,000	\$135,000	\$435,000			\$504,284	\$785,658
Locomotive fuel	\$60,000	\$10,550	\$70,550			\$81,787	\$127,421
Crew service support (training, radios, gear, supplies)	\$25,000	\$12,500	\$37,500			\$43,473	\$67,729
Joint Facilities (CSX-Ann Pere Interlocking)	\$0		\$0	Not required		\$0	\$0
Locomotive Lease: 2 units: F-40PH or equivalent	\$201,000		\$201,000			\$233,014	\$363,028
Passenger Car Lease: 2 coaches and 2 cabs	\$191,000		\$191,000			\$221,421	\$344,967
Barton Rd Connecting Bus Operating Expense: 5 buses	\$803,000		\$803,000	Barton Bus Distribution Service		\$930,897	\$1,450,307
Total Transportation	\$1,580,000	\$158,050	\$1,738,050			\$2,014,876	\$3,139,112
						\$0	\$0
						\$0	\$0
Equipment Maintenance:							
Management & supervision, shop forces-labor & overhead	\$750,000		\$750,000			\$869,456	\$1,354,583
Parts & materials including freight	\$40,000		\$40,000			\$46,371	\$72,244
Utilities including 480-volt standby power	\$95,000	\$20,000	\$115,000			\$133,317	\$207,703
Facilities maintenance including snow clearing	\$30,000	\$15,000	\$45,000			\$52,167	\$81,275
Vehicle & equipment operation & maintenance	\$15,000		\$15,000			\$17,389	\$27,092
Contracted services	\$25,000	\$12,500	\$37,500			\$43,473	\$67,729
Medium & heavy repairs-locomotives and commuter cars	\$40,000		\$40,000			\$46,371	\$72,244
Total Equipment Maintenance	\$995,000	\$47,500	\$1,042,500			\$1,208,543	\$1,882,871
						\$0	\$0
						\$0	\$0
Maintenance of Infrastructure:							
AARR Property Lease	\$1		\$1	Annual Lease cost linked to Ellsworth Interchange		\$1	\$2
Management, supervision, crews-labor & overhead	\$514,000	\$239,200	\$753,200			\$873,165	\$1,360,363
Track materials	\$185,000	\$29,600	\$214,600			\$248,780	\$387,591
Structures materials	\$20,000	\$30,000	\$50,000			\$57,964	\$90,306
Signal & Communications materials	\$85,000	\$85,000	\$170,000			\$197,077	\$307,039
Vehicle & equipment operation & maintenance	\$120,000	\$55,000	\$175,000			\$202,873	\$316,069
Utilities including switch heater fuel, crossings, signal system	\$200,000	\$75,000	\$275,000			\$318,800	\$496,681
Contracted services	\$80,000	\$40,000	\$120,000			\$139,113	\$216,733
Snow clearing	\$140,000	\$40,000	\$180,000			\$208,669	\$325,100
Commuter stations	\$60,000	\$30,000	\$90,000			\$104,335	\$162,550
Total Maintenance of Infrastructure	\$1,404,001	\$623,800	\$2,027,801			\$2,350,777	\$3,662,434
						\$0	\$0
						\$0	\$0
Administration:							
Management & staffing-labor & overhead	\$212,000		\$212,000			\$245,766	\$382,896
Contracted professional services	\$130,000		\$130,000			\$150,706	\$234,794
Marketing, advertising, ticketing	\$130,000		\$130,000			\$150,706	\$234,794
Systems maintenance	\$50,000	\$5,000	\$55,000			\$63,760	\$99,336
Office expense	\$40,000	\$5,000	\$45,000			\$52,167	\$81,275
Casualties including SIR & insurance	\$1,243,800		\$1,243,800	No significant change from MOC		\$1,441,905	\$2,246,441
Total Administration	\$1,805,800	\$10,000	\$1,815,800			\$2,105,010	\$3,279,537
						\$0	\$0
Total First Year Operating & Maintenance Expense	\$5,784,801	\$839,350	\$6,624,151			\$7,679,207	\$11,963,954

North-South Commuter Rail				Initial Year		Year 5	Year 20
Annual Operating and Maintenance Cost Estimate					Escalation Factor at 3% annual inflation	1.16	1.81
Option 5B: Ann Arbor-Barton Drive-Whitmore Lake (two train sets)					Comment		
Stations: Ann Arbor/Washington-Barton Dr-Whitmore Lake							
Train Consist: Loco-Coach-Cab, two in service, one spare							
Fleet: 3 locomotives, 3 coaches, 3 cabs							
Project Limits: Ellsworth Rd MP 41.75 to 8 Mile Rd MP 57.56							
Revenue Service: Weekday Operation-6 Inbound-6 Outbound TPD							
Annual Operating Cost excluding the cost of connecting bus service				\$6,223,001			
Annual Revenue Train Miles				37634			
Annual Operating Cost per Revenue Train Mile				\$165	Excludes the cost of connecting bus service		
9/28/2016							
Cost Element	Option 4A Value	Variation (+/-)	Option 5B Value				
Transportation:							
Management, train dispatching, train crews-labor & overhead	\$300,000	\$135,000	\$435,000			\$504,284	\$785,658
Locomotive fuel	\$60,000	\$15,000	\$75,000			\$86,946	\$135,458
Crew service support (training, radios, gear, supplies)	\$25,000	\$12,500	\$37,500			\$43,473	\$67,729
Joint Facilities (CSX-Ann Pere Interlocking)	\$0		\$0		Not required	\$0	\$0
Locomotive Lease: 3 units: F-40PH or equivalent	\$201,000	\$100,500	\$301,500			\$349,521	\$544,543
Passenger Car Lease: 3 coaches and 3 cabs	\$191,000	\$95,500	\$286,500			\$332,132	\$517,451
Barton Rd Connecting Bus Operating Expense: 5 buses	\$803,000		\$803,000		Barton Bus Distribution Service	\$930,897	\$1,450,307
Total Transportation	\$1,580,000	\$358,500	\$1,938,500			\$2,247,253	\$3,501,147
						\$0	\$0
						\$0	\$0
Equipment Maintenance:							
Management & supervision, shop forces-labor & overhead	\$750,000	\$104,000	\$854,000			\$990,020	\$1,542,419
Parts & materials including freight	\$40,000	\$40,000	\$80,000			\$92,742	\$144,489
Utilities including 480-volt standby power	\$95,000	\$20,000	\$115,000			\$133,317	\$207,703
Facilities maintenance including snow clearing	\$30,000	\$15,000	\$45,000			\$52,167	\$81,275
Vehicle & equipment operation & maintenance	\$15,000	\$15,000	\$30,000			\$34,778	\$54,183
Contracted services	\$25,000	\$12,500	\$37,500			\$43,473	\$67,729
Medium & heavy repairs-locomotives and commuter cars	\$40,000	\$20,000	\$60,000			\$69,556	\$108,367
Total Equipment Maintenance	\$995,000	\$226,500	\$1,221,500			\$1,416,053	\$2,206,165
						\$0	\$0
						\$0	\$0
Maintenance of Infrastructure:							
AARR Property Lease	\$1		\$1		Annual Lease cost linked to Ellsworth Interchange	\$1	\$2
Management, supervision, crews-labor & overhead	\$514,000	\$239,200	\$753,200			\$873,165	\$1,360,363
Track materials	\$185,000	\$37,000	\$222,000			\$257,359	\$400,957
Structures materials	\$20,000	\$30,000	\$50,000			\$57,964	\$90,306
Signal & Communications materials	\$85,000	\$85,000	\$170,000			\$197,077	\$307,039
Vehicle & equipment operation & maintenance	\$120,000	\$55,000	\$175,000			\$202,873	\$316,069
Utilities including switch heater fuel, crossings, signal system	\$200,000	\$90,000	\$290,000			\$336,189	\$523,772
Contracted services	\$80,000	\$40,000	\$120,000			\$139,113	\$216,733
Snow clearing	\$140,000	\$40,000	\$180,000			\$208,669	\$325,100
Commuter stations	\$60,000	\$30,000	\$90,000			\$104,335	\$162,550
Total Maintenance of Infrastructure	\$1,404,001	\$646,200	\$2,050,201			\$2,376,745	\$3,702,891
						\$0	\$0
						\$0	\$0
Administration:							
Management & staffing-labor & overhead	\$212,000		\$212,000			\$245,766	\$382,896
Contracted professional services	\$130,000		\$130,000			\$150,706	\$234,794
Marketing, advertising, ticketing	\$130,000		\$130,000			\$150,706	\$234,794
Systems maintenance	\$50,000	\$5,000	\$55,000			\$63,760	\$99,336
Office expense	\$40,000	\$5,000	\$45,000			\$52,167	\$81,275
Casualties including SIR & insurance	\$1,243,800		\$1,243,800		No significant change from MOC	\$1,441,905	\$2,246,441
Total Administration	\$1,805,800	\$10,000	\$1,815,800			\$2,105,010	\$3,279,537
						\$0	\$0
Total First Year Operating & Maintenance Expense	\$5,784,801	\$1,241,200	\$7,026,001			\$8,145,061	\$12,689,739

North-South Commuter Rail																
Annual Revenue Train Miles Computation																
	Option 1: Full Service		Option 2: Full Service w/o BR		Option 3: Starter Service: Howell/WL/AA Washington		Option 4A: MOC with PTC		Option 4B: MOC without PTC		Option 5A: Starter Service: WL/BR/AA Washington (one train)		Option 5B: Starter Service: WL/BR/AA Washington (two trains)		Banks/Wally Coalition	
North Terminal Station	Howell	73.91	Howell	73.91	Howell	73.91	Whitmore Lake	57.45	Whitmore Lake	57.45	Whitmore Lake	57.45	Whitmore Lake	57.45	Howell	73.91
South Terminal Station	AA-Washington	45.48	AA-Washington	45.48	AA-Washington	45.48	Barton Rd	47.27	Barton Rd	47.27	AA-Washington	45.48	AA-Washington	45.48	Barton Rd	47.27
Route Miles		28.43		28.43		28.43		10.18		10.18		11.97		11.97		26.64
Trains per Day		8		8		8		14		12		14		12		8
Operating Days per Year		262		262		262		262		262		262		262		262
Annual Revenue Train Miles		59589		59589		59589		37340		32006		43906		37634		55837

North-South Commuter Rail					
Rolling Stock and Bus Lease Expense					
Bus: AAATA Estimate					
	6375	hrs			
	\$126	per hr			
	\$803,250	Annual Operating Expense			
Bus routes, capital cost and operating cost were defined by AAATA on 3/16/2015 for Barton Drive service.					
On 8/31/15 similar routes were defined for downtown (Washington St) service without a Barton Rd stop. Costs are similar.					
Options employing both Barton Drive and Washington St stations will operate connecting bus service to Barton Drive only.					
Coach Lease: MDOT-GLC Contract					
	\$3,730	per month		\$3,730	per month
	12	months		12	months
	11	units		2	units
	\$492,360	Annual Lease Expense		\$89,520	Annual Lease Expense
Cab Lease: MDOT-GLC Contract					
	\$4,228	per month		\$4,228	per month
	12	months		12	months
	5	units		2	units
	\$253,680	Annual Lease Expense		\$101,472	Annual Lease Expense
	\$746,040	Cab and Coach Total		\$190,992	Cab and Coach Total
Locomotive Lease: MDOT RFP: F-59PH					
	\$ 100,375	Annual		\$ 100,375	Annual
	5	units		2	units
	\$ 501,875	Annual Lease Expense		\$ 200,750	Annual Lease Expense
Joint Facilities:					
	\$250,000	Annual			
Routes extending to Howell must cross the Ann Pere interlocking. It is anticipated that CSX will retain control of the interlocking and charge the commuter operator for a portion of the cost of operating and maintaining the interlocking. It is assumed that the commuter operator will not incur charges for operating on property owned by AARR or MDOT.					
Insurance Expense (Annual)					
based on Oct 22, 2015 guidance from Marsh				Full Service	
General Liability Coverage \$200 million with \$1 million Self Insurance Reserve				\$ 1,030,000	minimum value, applies to all options independent of signal technology not likely that the premium will reduce over time
Insured Losses taken from SIR				\$ 150,000	could be \$200,000
Property Insurance	\$0.10 per \$100	\$28.4	million	\$ 28,000	
Automobile Insurance	\$1200 per auto	10		\$ 12,000	
Rolling Stock Collision and Comp	\$0.30 per \$100	\$14.5	million	\$ 43,500	
Financial Management				\$ 40,000	
Total				\$ 1,303,500	
				MOC	
General Liability Coverage \$200 million with \$1 million Self Insurance Reserve				\$ 1,030,000	
Insured Losses taken from SIR				\$ 150,000	
Property Insurance	\$0.10 per \$100	\$4.0	million	\$ 4,000	
Automobile Insurance	\$1200 per auto	6		\$ 7,200	
Rolling Stock Collision and Comp	\$0.30 per \$100	\$14.5	million	\$ 12,600	
Financial Management				\$ 40,000	
Total				\$ 1,243,800	Applies to Options 4A, 4B, 5A and 5B

APPENDIX II OPERATING EXPENSE ASSUMPTIONS: OPTIONS 5A AND 5B

**Appendix II: 1404 North-South Commuter
Operating Expense Assumptions-Options 5A-5B
28Sep2016**

Part 1-Operating & Maintenance Assumptions

Option 5A ----Whitmore Lake-Barton Drive-Ann Arbor Downtown (one train set)

Operating & Maintenance Assumptions:

- 1 set of one locomotive, one trailer, one cab car in service 5 days/week
- Crew: one conductor and one engineer
- No cash fares sold on train or by crew
- Locomotives face west-cab cars face east
- Second train set as a spare/maintenance-stored at Owosso
- Maintenance site Owosso or other reasonably close alternative
- Working train set-overnight 5 nights/week or more at Whitmore Lake
- Working train set-stored during the day at Ann Arbor layover facility (Mon-Fri)
- Round trip deadhead Owosso-Whitmore Lake & return twice/week equipment relay is included in Maintenance of Equipment expense
- Running time with no meet-21 minutes
- Train dispatching to be done by GLC at Owosso (CTC and possibly PTC)
- Freight locked out at both ends during commuter operations-verified by CTC
- Crew base assumed to be in Owosso or at base established by contract operator but no further away than Owosso (which is over an hour's drive with good weather/no traffic)
- Assumes train crew picks up paper and cleans train interior as part of each crew day
- Assumes train crew assists Mechanic-in-Charge at Ann Arbor and/or Whitmore Lake
- Assumes fueling by tank truck twice/week at Ann Arbor during daytime layover

Option 5B----Whitmore Lake-Barton Drive-Ann Arbor Downtown (two train sets)

Operating & Maintenance Assumptions:

- 2 sets of: one locomotive, one trailer, one cab car in service 5 days/week
- Crew: one conductor and one engineer x 2 trains
- No cash fares sold on train or by crew
- Locomotives face west-cab cars face east
- Third train set as a spare/maintenance-stored at Owosso
- Maintenance site Owosso or other reasonably close alternative
- Working train sets-two overnight 5 nights/week or more at Whitmore Lake
- Working train sets-two stored during the day at Ann Arbor layover facility (Mon-Fri)
- Round trip deadhead Owosso-Whitmore Lake & return twice/week equipment relay is included in Maintenance of Equipment expense
- Running time with no meet (for the superior train)-21 minutes
- Running time with a meet (for the "inferior train")-26 minutes
- Train dispatching to be done by GLC at Owosso (CTC and possibly PTC)

- Freight locked out at both ends during commuter operations-verified by CTC
- Crew base assumed to be in Owosso or at base established by contract operator but no further away than Owosso (which is over an hour's drive with good weather/no traffic)
- Assumes train crew picks up paper and cleans train interior as part of each crew day
- Assumes train crew assists Mechanic-in-Charge at Ann Arbor and/or Whitmore Lake
- Assumes fueling by tank truck twice/week at Ann Arbor during daytime layover

Part 2- Transportation Train Crews

Option 5A-Crew Assignments

Crew 1: (Monday-Friday) ---Version 1

Whitmore Lake

On duty/Orders/Briefing	04:27	
Train Inspection/Test	04:42	
Move train to station	05:07	
1001 Lv. Whitmore Lake	05:22	
1002 Lv. Ann Arbor	05:52	
1003 Lv. Whitmore Lake	06:23	
1004 Lv. Ann Arbor	06:53	
1005 Lv. Whitmore Lake	07:29	
1006 Lv. Ann Arbor	07:59	
1007 Lv. Whitmore Lake	08:30	
1007 Ar. Ann Arbor	08:50	
1007 Ar. Ann Arbor Layover	09:00	
Secure train	09:15	
Off duty	09:30	5'03"
Released from duty (min 4 hrs)	09:30	5'20"
On duty/Orders/Briefing	14:50	
Train Inspection/Test	15:05	
Move train to station	15:30	
1010 Lv. Ann Arbor	15:45	
1011 Lv. Whitmore Lake	16:16	
1012 Lv. Ann Arbor	16:46	
1013 Lv. Whitmore Lake	17:17	
1014 Lv. Ann Arbor	17:52	
1015 Lv. Whitmore Lake	18:23	
1016 Lv. Ann Arbor	18:53	
1016 Ar. Ann Arbor	19:14	
1016 Ar. Whitmore Lake L/O	19:24	
Secure train	19:39	
Off duty	19:54	5'04"

Total On Duty Time 10'07" + 5'20" release = 17'22"/day

Rest period before next on duty = 8'33" Very tight!

Version 1 rejected. See Version 2.

Crew 2 (Monday-Friday) ---Version 1
Extra board relief crew: 8 hours/day x 5 days=40 hours/week

Crew 1: (Monday-Friday) ---Version 2

Whitmore Lake

On duty/Orders/Briefing	04:27	
Train Inspection/Test	04:42	
Move train to station	05:07	
1001 Lv. Whitmore Lake	05:22	
1002 Lv. Ann Arbor	05:52	
1003 Lv. Whitmore Lake	06:23	
1004 Lv. Ann Arbor	06:53	
1005 Lv. Whitmore Lake	07:29	
1006 Lv. Ann Arbor	07:59	
1007 Lv. Whitmore Lake	08:30	
1007 Ar. Ann Arbor	08:50	
1007 Ar. Ann Arbor Layover	09:00	
Secure train	09:15	
Clean train/assist MIC	11:22	
Drive car to Whitmore Lake Ar.	12:07	Company vehicle for one way trip to Whitmore Lake*
Submit reports/Off duty	12:27	On Duty 8'00"/day x 5 days=40 hours/week Rest period before next on duty=16 hours

Crew 2 (Monday-Friday) ---Version 2

Whitmore Lake

On duty/Orders/Briefing	13:50	
Drive car to Ann Arbor	14:05	*Company vehicle for return trip to Ann Arbor Layover
Arrive Ann Arbor Layover	14:50	
Train Inspection/Test	15:05	
Move train to station	15:30	
1010 Lv. Ann Arbor	15:45	
1011 Lv. Whitmore Lake	16:16	
1012 Lv. Ann Arbor	16:46	
1013 Lv. Whitmore Lake	17:17	
1014 Lv. Ann Arbor	17:52	
1015 Lv. Whitmore Lake	18:23	
1016 Lv. Ann Arbor	18:53	
1016 Ar. Ann Arbor	19:14	
1016 Ar. Whitmore Lake L/O	19:24	
Secure train	19:39	
Clean train/assist MIC	21:35	
Submit reports/Off duty	21:50	On Duty 8'00"/day x 5 days=40 hours/week Rest period before next on duty=16 hours

Crew 3 (Monday-Friday) ---Version 2

Extra board relief crew: 8 hours/day x 5 days=40 hours/week

Option 5A Hours Summary

Crew 1 40 hours (day commuter)
 Crew 2 40 hours (afternoon commuter)
Crew 3 40 hours (extra/relief crew)
 Total 120 hours/week

Annual Totals

6,240 Crew hours
 12,480 Man hours

Option 5B Crew Assignments

Crew 1: (Monday-Friday)

Whitmore Lake

On duty/Orders/Briefing	05:35	
Train Inspection/Test	05:50	
Move train to station	06:15	
1001 Lv. Whitmore Lake	06:30	
1002 Lv. Ann Arbor	07:00	
1003 Lv. Whitmore Lake	06:23	
1005 Lv. Ann Arbor	06:53	
1005 Ar. Ann Arbor	07:59	
1005 Ar. Ann Arbor Layover	08:09	
Secure train	08:24	
Submit reports/Off duty	08:39	3'04"
Released from duty (min 4 hrs)	08:39	6'51"
On duty/Orders/Briefing	15:30	
Train Inspection/Test	15:45	
Move train to station	16:15	
1010 Lv. Ann Arbor	16:30	
1011 Lv. Whitmore Lake	17:01	
1014 Lv. Ann Arbor	17:36	
1014 Ar. Whitmore Lake	17:57	
1014 Ar. Whitmore Lake L/O	18:07	
Secure train	18:22	
Submit reports/Off duty	18:37	3'07"

Total On duty Time 6'11" + 6'51" release = 13'02"/day

Assume paid 8 hours/day=40 hours per week

Rest period before next on duty=10'58"

Crew 2: (Monday-Friday)

Whitmore Lake

On duty/Orders/Briefing	06:05
Train Inspection/Test	06:20
Move train to station	06:50
1003 Lv. Whitmore Lake	07:05
1004 Lv. Ann Arbor	07:35
1007 Lv. Whitmore Lake	08:15

1007 Ar. Ann Arbor	08:35	
1005 Ar. Ann Arbor Layover	08:45	
Secure train	09:00	
Submit reports/Off duty	09:15	3'10"
Released from duty (min 4 hrs)	09:15	6'45"
On duty/Orders/Briefing	16:00	
Train Inspection/Test	16:15	
Move train to station	16:45	
1012 Lv. Ann Arbor	17:00	
1013 Lv. Whitmore Lake	17:36	
1016 Lv. Ann Arbor	18:11	
1016 Ar. Whitmore Lake	18:32	
1016 Ar. Whitmore Lake L/O	18:42	
Secure train	18:57	
Submit reports/Off duty	19:12	3'12"

Total On duty time: 6'22" + 6'45" release = 13'07"/day
Assume paid 8 hours/day = 40 hours/week
Rest period before next on duty=10'53"

Crew 3 (Monday-Friday)
Extra board relief crew: 8 hours/day x 5 days=40 hours/week

Option 5B Hours Summary
Crew 1 40 hours (commuter)
Crew 2 40 hours (commuter)
Crew 3 40 hours (extra/relief crew)
Total 120 hours/week

Annual Totals
6,240 Crew hours
12,480 Man hours

Part 3-Annual Train Operating Statistics

Description	Option 4A	Option 5A	Option 5B
North Terminal Station	Whitmore Lake MP 57.45	Whitmore Lake MP 57.45	Whitmore Lake MP 57.45
South Terminal Station	Barton Road MP 47.27	AA-Washington MP 45.48	AA- Washington MP 45.48
Route Miles	10.18	11.97	11.97
Trains per Day	14	14	12
Operating Days per Year	262	262	262
Annual Revenue Train Miles	37,340	43,906	37,634
Train Sets in Daily Service	1	1	2
Train Crews Required (including extra)	2	3	3

Part 4-Maintenance of Infrastructure

Assumptions used in calculation of Infrastructure Maintenance expenses:

Additional Infrastructure Maintenance Requirements vs. Option 4A	Option 5A	Option 5B
Main track and siding miles (Osmer Siding 0.8 miles only in Option 5B)	3.3	4.1
Yard track miles (Ann Arbor Layover Facility)	0.5	0.5
Passenger stations (AA-Washington/Liberty)	1	1
CTC control points: CP State, CP Hoover in both options plus CP South Osmer, CP North Osmer in Option 5B only	2	4
Power-operated turnouts	2	4
Hand-throw turnouts	5	5
Miles of CTC	3.3	4.1
Miles of PTC (based on FRA's current rule with 14 train exemption)	3.3	0
Highway grade crossings	13	13
Highway grade crossing warning systems	13	13
Bridges over water (Huron River)	1	1
Bridges over highways	5	5
Daytime Equipment Layover Facility Ann Arbor	1	1

The following changes in staffing would be required to accomplish the additional infrastructure maintenance requirements described above. The increases are out of proportion to the additional track distance involved due to the congested urban nature of the added miles.

1 Track Foreman @ \$52,000-Increase from 80% to 100% commuter share =	\$10,400
1 Truck Driver/Machine Operator @ \$50,000-Increase from 80% to 100% =	\$20,000
2 Track laborers @ \$40,000-Increase from 80% to 100% commuter share =	\$16,000
2 additional Signal Maintainers @ \$52,000-80% commuter share =	\$104,000
1 B&B Foreman @ \$56,000-Increase from 50% to 80% commuter share =	\$16,800
1 B&B Truck Driver/Machine Operator @ \$50,000-Increase from 50% to 80% =	\$15,000
2 B&B Carpenters @ \$50,000-Increase from 50% to 80% commuter share =	\$30,000
1 Track Welder @ \$50,000-Increase from 50% to 80% commuter share =	\$15,000
1 Welder Helper @ \$40,000-Increase from 50% to 80% commuter share =	<u>\$12,000</u>
Total additional infrastructure maintenance staffing requirements	\$239,200

Part 5-Operating Expense Comparison

(Note: Only the cost categories that have changed from Option 4A are listed)

Cost Element	Option 4A Value	Option 5A Value	Variation	Option 5B Value	Variation
Transportation:			+\$158,050		+\$358,500
Management, Crews	\$300,000	\$435,000	+\$135,000	\$435,000	+\$135,000
Locomotive Fuel	\$60,000	\$70,550	+\$10,550	\$75,000	+\$15,000
Crew service support	\$25,000	\$37,500	+\$12,500	\$37,500	+\$12,500
Locomotive Lease	\$201,000	\$201,000	---	\$301,500	+\$100,500
Passenger Car Lease	\$191,000	\$191,000	---	\$286,500	+95,500
Equipment Maintenance:			+\$47,500		+\$226,500
Management, Crews	\$750,000	\$750,000	---	\$854,000	+\$104,000
Parts & Materials	\$40,000	\$40,000	---	\$80,000	+\$40,000
Utilities	\$95,000	\$115,000	+\$20,000	\$115,000	+\$20,000
Facilities Maint	\$30,000	\$45,000	+\$15,000	\$45,000	+\$15,000
Veh & Eqpt Opn/Mtce	\$15,000	\$15,000	---	\$30,000	+\$15,000
Contracted Services	\$25,000	\$37,500	+\$12,500	\$37,500	+\$12,500
Med & Heavy Repairs	\$40,000	\$40,000	---	\$60,000	+\$20,000
Maintenance of Infrastructure			+\$623,800		+\$646,200
Management, Crews	\$514,000	\$753,200	+\$239,200	\$753,200	+\$239,200
Track Materials	\$185,000	\$214,600	+\$29,600	\$222,000	+\$37,000
Structures Materials	\$20,000	\$50,000	+\$30,000	\$50,000	+\$30,000
Sig & Comm Materials	\$85,000	\$170,000	+\$85,000	\$170,000	+\$85,000
Veh&Eqpt Opn&Mtce	\$120,000	\$175,500	+\$55,000	\$175,500	+\$55,000
Utilities	\$200,000	\$275,000	+\$75,000	\$290,000	+\$90,000
Contracted Services	\$80,000	\$120,000	+\$40,000	\$120,000	+\$40,000
Snow Clearing	\$140,000	\$180,000	+\$40,000	\$180,000	+\$40,000
Commuter Stations	\$60,000	\$90,000	+\$30,000	\$90,000	+\$30,000
Administration			+\$10,000		+\$10,000
Office Expense	\$40,000	\$45,000	+\$5,000	\$45,000	+\$5,000
Systems Maintenance	\$50,000	\$55,000	+\$5,000	\$55,000	+\$5,000
Total Increase			+\$839,350		+\$1,241,200

