TASK 10

CAPITAL COSTS TECHNICAL MEMO

PREPARED BY: QUANDEL CONSULTANTS, LLC

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SMITHGROUPJJR AECOM . BERGMANN ASSOCIATES . QUANDEL CONSULTANTS



North-South Commuter Rail Feasibility Study

Task 10: Capital Costs 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 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 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 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 (SGJJR), the project prime consultant to implement the following workscope as defined in the contract documents:

Task 10-Estimate/Refine Capital Costs

Review and refine project capital costs by and between proposed station locations. Cost worksheets, originally prepared by R.L. Banks, have been maintained and updated by TheRide staff, with help from MDOT. The consultant shall review the cost estimates for accuracy and completeness and make any changes that are necessary. Cost estimates have been developed for the following categories (details attached in Appendices)

- a) Stations and station sites
- b) Track work and grade crossings
- c) Signals / Positive Train Control (if required)
- d) Grade crossing signals / protection
- e) Interlockers / Connections

As part of this task, the consultant shall develop preliminary cost estimates for other specific infrastructure elements, including:

• Ann Pere – this is where the MDOT tracks cross over CSX tracks, just south of Howell. The consultant shall evaluate the potential for conflicts at this crossing, and devise procedures for minimizing delay of commuter rail traffic, in consultation with the railroads. Costs associated with needed upgrades should be estimated. The consultant shall draft an agreement between the two railroads that governs the use of the crossing.

• Layover facilities – proposed locations for layover facilities have been identified. Concept plans for the layover facilities have been developed and cost-estimated. The consultant will review the proposed layover locations and will verify that they will support the proposed operating plan. The consultant will confirm existing concepts and cost estimates or create new concepts and cost estimates for layover facilities.

• Daytime

• Overnight / weekend

• Bridges – no assessments of existing bridge conditions have been conducted by TheRide/MDOT nor have any cost estimates have been made for any deficiencies associated with bridges. The consultant shall examine existing bridge assessments and develop costs to perform any upgrades needed to ensure safe reliable passenger service (see detail below).

• Property acquisition – the consultant shall describe all property that would need to be acquired for the project, either by purchase or by lease, and provide estimates of the costs of such property

Rolling stock acquisition

• Railcars – a fleet of railcars, suitable for passenger service, is available from the Michigan Department of Transportation. The feasibility study should assume that these railcars will be made available at no cost to the service operator for the first three years of service (Note: This assumption was later revised to include costs for leasing the passenger rolling stock. A line item is included in Task 11: Operating Costs.)

• Locomotives – locomotives will need to be leased for this service and those costs should be estimated.

• Buses for connecting service – TheRide has devised routes to serve the Plymouth Road station, and has estimated the capital and operating expense for those routes. The consultant shall evaluate and confirm those requirements and costs

• Maintenance and inspection fleet – Any requirements to purchase right-of-way maintenance equipment should be spelled out and estimated. However, if it is assumed that maintenance will be purchased as a service, then those costs should be included in the operating cost estimates

A construction timeline shall be developed as part of this task, indicating major project milestones and indicating the cumulative construction costs at each milestone.

Bergmann Associates is serving as sub-consultant to SmithGroupJJR (SGJJR), the project prime consultant to implement the following work scope as defined in the contract documents:

The project team will develop capital costs and a construction timeline as described above. An important element of this effort is the assessment of existing bridges to identify deficiencies and potential costs associated with upgrades.

This scope is based on the understanding that the structures along the Great Lakes Central RR line (approximately 19) and the structures along the Watco RR line (5) have already been inspected and load rated.

Bergmann will review the existing bridge inspection reports information and provide a brief summary of each structure including any repair needs and associated costs. This task includes:

- Review of existing inspection reports for each bridge on the line.

- Bridge inspection is NOT included as part of this task. It is assumed that inspection reports will be provided for each bridge by MDOT and Watco.

- Develop a brief report outlining the location, condition, repair needs, and load rating for each structure.

- A bridge management program is NOT included as part of this task. It assumed that MDOT and Watco have prepared bridge management programs to meet the requirements of the FRA.

In order to show that these bridges have the safe load carrying capacity for the passenger service proposed along the line, Bergmann Associates will assess the existing load ratings on file for each bridge. An equivalent Cooper Train loading chart will be developed for the anticipated car/engine proposed for the project and compared to the existing ratings to determine if the bridges can safely carry the proposed passenger service equipment at the desired speed.

- Equivalent Cooper Train Loading charts will be provided for the anticipated car/engine proposed for the project.

- Bridge load rating is NOT included as part of this task. It is assumed that all bridge load ratings will be provided by MDOT and Watco.

- Existing load ratings on file will be reviewed, summarized, and compared with the equivalent load charts for the anticipated car/engine proposed for the Wally project.

- If the existing bridge ratings are not sufficient and repairs are necessary, repair recommendations and modifications to the ratings for the proposed repair can be performed as an amendment to this proposal.

We understand that one structure over the Huron River located southeast of Lakeland, MI has a slow order on certain train movements due to the load carrying capacity of the structure. We have included time in our proposal for a high level study to assess options for improving this bridge which include:

- Visit site (1) to evaluate site conditions and constraints for preparing the high level cost estimate.

- Review existing inspection and load rating information to be provided by MDOT.
- Estimate total replacement costs for the bridge.
- *Estimate rehabilitation costs to bring the bridge up to required loading with no slow orders.*
- No drawings or in-depth analysis will be performed as part of this work at this time.
- No geotechnical or survey information will be performed as part of the high level study.
- Prepare a brief memorandum with the summary of these high level findings.

No inspection time is assumed as part of this task but it can be performed with additional hours and expenses if desired.

Deliverable(s): 1. Submit draft estimate of Capital Costs

2. Review meeting and submit final estimate of Capital 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 Capital Cost Estimate. Update Technical Memo for Task 10: Capital Cost Estimate. Note: Following review of existing reports, all bridges appear to be adequate for carrying passenger trains without strengthening repairs. Consequently, development of Cooper Train loading charts is not required.

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 30.1miles.

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 trains 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 Annpere 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

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

There has been interest expressed in a new passenger station at the location where the Ann Arbor Railroad crosses over the Michigan Central Line adjacent to North Main Street. The complications associated with a station in this location are noted in Task 7: Prospective Station Locations. The service plan options are defined more fully in Task 8: Service Plans for Evaluation.

3. CAPITAL COST ESTIMATES

3.1 Infrastructure Requirements and Capital Cost Estimates

Based on the requirements of the respective service plans, Quandel Consultants has identified the necessary infrastructure improvements and prepared an estimate of the capital costs for the development and construction of each option. The capital cost estimates for each option are as follows:

- Option 1: Full Service Option: \$122.3 million
- Option 2: Full Service without Barton Drive Station: \$121.0 million
- Option 3: Starter Service: \$118.4 million
- Option 4A: Minimum Operable Configuration (MOC) with PTC: \$28.9 million
- Option 4B: Minimum Operable Configuration (MOC) without PTC: \$21.9 million
- Option 5A: Shuttle Service (one train set): \$61.3 million
- Option 5B: Shuttle Service (two train sets): \$65.2 million

3.2 High and Low Cost Estimates

The capital cost estimate values presented above are based on a set of infrastructure improvements that Quandel Consultants has defined as necessary to provide reliable commuter service, recognizing the condition of the existing track and signal infrastructure, the age and condition of the proposed commuter rail coaches and locomotives, weather conditions in central Michigan, the present regulatory environment and the public's expectations. These values are defined in our spreadsheets as the "High Estimate."

It may prove possible to minimize the initial capital cost by reducing the scope and extent of the infrastructure improvements. We have identified three elements where such reductions may be possible, depending upon decisions made by the owner, State of Michigan and Federal Railroad Administration. Specifically:

- The owner may elect to reduce the functionality of the proposed maintenance facility, performing certain functions at an off-site facility owned by others.
- The owner and the State may petition the Federal Railroad Administration (FRA) for a waiver or exemption from regulations requiring the implementation of Positive Train Control. The FRA is solely responsible for determining whether or not to grant an exemption or waiver.
- In compliance with Michigan's Railroad Code of 1993, the selection of devices to be installed at a highway-railroad grade crossing will be evaluated by a diagnostic study team comprised of knowledgeable individuals representing the MDOT, the roadway authorities with jurisdiction, the operating railroads, and other relevant affected parties. Diagnostic study teams perform a review of conditions at existing or proposed highway-railroad crossings and provide input to assist the

Department with its determination concerning safety needs at each crossing. The team may determine that a lesser degree of grade crossing warning system improvements is warranted.

Quandel Consultants has quantified possible reductions to the recommended infrastructure improvements to develop a "Low Cost estimate" for each of the options. The low cost values are as follows:

- Option 1: Full Service Option: \$85.5 million
- Option 2: Full Service without Barton Drive Station: \$84.3 million
- Option 3: Starter Service: \$81.6 million
- Option 4A: Minimum Operable Configuration (MOC) with PTC: \$28.0 million
- Option 4B: Minimum Operable Configuration (MOC) without PTC: \$21.0 million

Low cost estimates have not been developed for the Shuttle Service options, (5A and 5B) as there the opportunity for large reductions in cost is anticipated to be quite limited, as is demonstrated in the Option 4A and 4B analyses.

3.3 Capital Cost Spreadsheets

Capital cost 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 of improvements by categories that enable the utilization of (Federal Transit Administration (FTA) Standard Cost Category worksheets. The cost elements include descriptive titles that are intended to clearly define the scope of the proposed improvement to the stakeholders.

Some general notes are as follows:

- Unit prices are in 2015 dollars.
- Trackwork for the corridor segments subject to commuter service is based on an inspection of the track with the objective of raising conditions to a state of good repair suitable for passenger service. In addition, elements such as bridge deck replacement are included in the scope, as such activities are likely to result in track outages lasting multiple days.
- Positive Train Control (PTC) pricing strategy. Costs for all options are based on the construction of a Centralized Traffic Control (CTC) system with a PTC overlay. The overlay including back office server, wayside interface unit functionality and vitality is priced at 82% of the signal system hardware based on our analysis of the costs provided by GE Transportation for Michigan DOT's high speed rail program on the former Michigan Central line. GE is providing a new PTC signal system to enable Amtrak to operate passenger service under the federal mandate defined in 49CFR236. The contract provides detailed unit prices, which have been employed to develop the unit prices employed in our North-South estimates.
- All options are configured to protect commuter service territory from freight operations with remotely controlled split point derails, as this functionality will be required by the FRA for any operation without PTC and will be required by the Ann Arbor Railroad for any option which seeks to use property owned by AARR.

- Options which employ PTC must equip all passenger equipment locomotives and cab cars with On Board PTC equipment. Any freight locomotives which operate in the territory must be similarly equipped. The cost estimates provide funding to equip 2 GLC freight locomotives for the Full Service, Starter Service and Shuttle Service options, as only GLC will operate freight trains in passenger service territory when the interchange point is moved to Ellsworth. The MOC PTC Option provides funds to equip 2 GLC locomotives and 2 AARR locomotives, as both freight railroads will operate through passenger service territory to interchange at Osmer.
- The costs for stations and parking in the Full Service and Starter Service options are simple allocations as concept plans have not been developed. The AA-Washington St estimate is based on the previous report prepared by SGJJR.
- Right of Way costs are based on Zillow values for local undeveloped property, except in the case of the Whitmore Lake site, which is based on the per acre asking price of the specific property.
- Commuter rail locomotives and passenger coaches will be leased. The lease costs are addressed in the annual operating costs.
- All options include a connecting bus service with a fleet of 6 new buses. The options with a Barton Rd Station have bus service from Barton Rd. Those without have service from Washington St. The capital costs include the procurement of new equipment.
- Allocations for Special Elements are identical for each option, although it is reasonable to anticipate that the costs for implementing special elements for the Full Service and Starter Service territory may be greater than that of the MOC and Shuttle service territories, simply due to length and complexity of the system.
- Professional Services and Environmental use identical percentages, although some elements of the MOC implementation could proceed with a lesser, expedited design effort.
- Columns are provided to identify the possible cost reductions for the Low Estimate.

4. EQUIPMENT MAINTENANCE AND LAYOVER FACILITIES

Under the Full Service and Starter Service options, the locomotives, gallery coaches and gallery cab control cars will be maintained at the Howell Maintenance Facility, which is also the overnight layover facility for the service. The Howell facility is proposed to be located on a site west of the GLC main track between the East Grand River Road grade separation (highway under) at MP 72.79 and the CSXT crossing at the Ann Pere Interlocking at MP 72.10. The Midday Layover Facility will be located on the site of the Ann Arbor Railroad's Ferry Yard, south of the Hoover Street grade crossing at MP 44.64, and north of State Street grade crossing at MP 43.96 on the west side of the AA main track (in the segment now under discussion and proposed to be leased to MDOT). Design criteria for the maintenance and layover facilities are provided as Appendix II. Concept design plans are provided as Appendix III.

Under the Minimum Operable Configuration and Shuttle Service options, overnight storage, minor maintenance and daily inspections will be performed at the Whitmore Lake site adjacent to the passenger station. Under the Minimum Operable Configuration Options the Whitmore Lake facility will also provide midday storage, while under the Shuttle Service Options trains will be stored at an abbreviated Ann Arbor layover facility during the midday. Periodic inspections and other maintenance activities will be performed at an off-site location. For the purposes of estimating operating costs, the site is presumed to be GLC's Owosso facility.

5. ELLSWORTH INTERCHANGE

Two of the most important actions being taken to optimize the corridor's characteristics are discussions about the possibility of a lease arrangement for the southern end of the N-S commuter rail corridor and the potential for relocation of the freight interchange between GLC and AARR to Ellsworth, south of State Street crossing in Ann Arbor. These two critical changes will have important positive effects for the project:

- One railroad (GLC) would have complete operational control of the entire N-S commuter rail corridor. This is a critical element in train operations efficiency, signals, communications and the installation of Positive Train Control which is mandated for the new service.
- AARR freight trains would no longer enter the N-S commuter rail corridor. This eliminates the risk factors associated with commuter territory for AARR. It also relocates the point where freight trains will interchange traffic, occupying the main track and sidings to do so, with the resultant potential for delay to commuter trains. The new interchange point would be south of the south end of the N-S commuter rail territory on AARR trackage at Ellsworth instead of on GLC trackage at Osmer siding where it is today.

Quandel Consultants has developed a concept plan for the new interchange, which is presented as Appendix IV.

6. BRIDGE ASSESSMENT

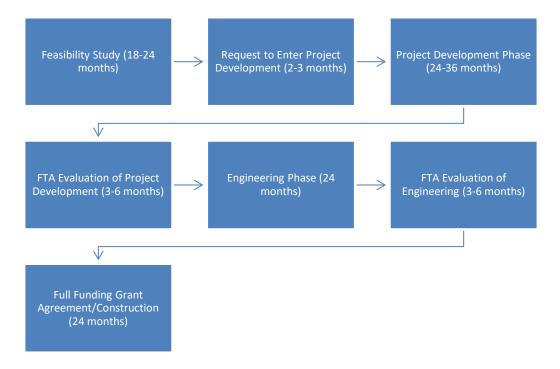
Bergmann Associates reviewed available bridge data and proposed passenger train speeds to report that based the info we have received, we do not anticipate any speed restrictions for the passenger trains due to the load carrying capacity of the existing bridges. All the bridges appear to be adequate for carrying passenger trains without any strengthening repairs. This assumes the recommended repairs noted in the 2008 load rating report of the Ann Arbor Railroad line were made. As of 2015, we believe there were still some repairs that needed to be made.

That said, it may be worth considering a contingency budget to account for any deterioration that may occur between now and the time when the commuter trains are in operation. Assuming \$25,000 per bridge, times 12 bridges on the line would give a contingency budget of \$300,000, which seems reasonable. Since the need for future repairs is an unknown, the contingency budget could be adjusted up or down as desired.

Quandel Consultants note: The capital cost estimates for each option contain a contingency line item calculated at 20% of the value of the defined construction cost elements. The value ranges from a high of \$10.7 million for Option 1 to a low of \$2.7 million for Option 4B. These values are sufficient to address the possible bridge work identified in the Bergmann analysis.

7. CONSTRUCTION TIMELINE

Since it is expected that the N-S project will seek funding under the Federal Transit Administration's New Starts program, the construction timeline of the project depends almost entirely on the amount of time it will take for work to be completed on the project to meet FTA requirements for Project Development, Engineering and Full Funding Grant Agreement phases. The process and general timeline are defined as follows:



The project stakeholders have been studying the feasibility of North-South commuter rail service for a number of years. Anticipating that the feasibility study phase will conclude with the current study in Spring 2017, and assuming that the identified project sponsors can advance the program rapidly with the minimum durations shown above, we can develop a construction timeline with major project milestones and cumulative construction costs. An example is provided for Option 1: Full Service in Appendix V.

STAY INFORMED AND GET INVOLVED!

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. email:

TellUs@TheRide.org

Phone: 734.973.6500

APPENDIX I: CAPITAL COST SPREADSHEETS

Prepared by Quandel Consultants, LLC and Bergmann Associates for SmithGroupJJR, Inc. April 6, 2016

		APPENDIX I: C		CT CODEA								
	North-South Commuter Rail	AFFENDIA I. C	AFITAL CO	Ellsworth to State St		Service Limits						
				Freight Only		Great Lakes	Great Lakes	-				
	Option 1: Full Service High and Low Estimates	Host Carrier		Ann Arbor RR	Ann Arbor RR	Central RR	Central RR	-				
	1/13/2016	Mileposts From - To Route Miles		41.75-44.0 2.25 miles	44.0-47.5 3.5 miles	47.5-57.6 10.1 miles	57.6-74.0 16.4 miles	Systemwide	JJR/Quandel Cost Total- High Estimate	JJR/Quandel Cost Total- Low Estimate	Delta	Potential Cost Reduction
		Maximum Authorized			15 MPH (44.0-45.4)							
		Speed			30 MPH (45.4-47.19) 60MPH (47.19-47.5)	60 MPH	60 MPH					
Tracky	Cost Element	Unit	Unit Cost	Quantity	Quantity	Quantity	Quantity	-				
	Add Rail Spikes Eliminate Joint (Inspect, Crop, and Weld)	EA MI	\$ 2 \$ 118,519		7083 3.5	14297 10.1	27618 16.4		\$ 97,997 \$ 3,555,556	\$ 3,555,556		
	Replace Switch Timbers Replace Turnout Switch Point	EA EA	\$ 250 \$ 3,500			4			\$ 1,000 \$ 7,000	\$ 1,000 \$ 7,000		
	Install Heek Block Replace Frog Replace Rail with 115 CWR	EA EA LFT	\$ 1,000 \$ 15,000 \$ 70		18480	2 4	2 2000		\$ 2,000 \$ 90,000 \$ 1,433,600	\$ 90,000		
	Remove Turnouts (Pocket Track) Construct Track: Ballasted (at-grade)	EA TF	\$ 4,000 \$ 310	21,477	10400		1		\$ 4,000 \$ 6,657,827	\$ 4,000 \$ 6,657,827		
	Install #10 Turnout - Timber Install Split Point Derail	EA EA	\$ 93,302 \$ 60,000	4	1	6	2		\$ 559,812 \$ 780,000	\$ 559,812 \$ 780,000		
	Install S0% Te Replacement Surface Align and Ballast Install New Guardrail on Washington St. Bridge, MP. 45.48	MI MI FT	\$ 444,000 \$ 100,000 \$ 40		3.5 3.5 80				\$ 1,554,000 \$ 350,000 \$ 3,200	\$ 350,000		
	Install new Guardrail on Wasnington St. Bridge, WP. 45-48 Install New Guardrail and Redeck Timbers on Huron St. Bridge, MP 45.55 Install New Guardrail and Redeck Timbers on Miller Ave., MP 45.69	FT FT	\$ 40 \$ 100 \$ 100		95 75				\$ 3,200 \$ 9,500 \$ 7,500	\$ 9,500		
	Install New Guardrail and Redeck Timbers on Felch St. MP 45.89 Rebuild Ballast at Private Grade Crossing at MP 55.55	FT TFT	\$ 100 \$ 50		85	100			\$ 8,500 \$ 5,000	\$ 8,500 \$ 5,000		
	Rebuild and Improve Drainage at Crooked Lake Rd MP 69.40 Rebuild and Improve Drainage at Chilson Rd MP 65.99	TFT TFT	\$ 900 \$ 900				40 40		\$ 36,000 \$ 36,000	\$ 36,000		
Sub-to	Rebuild and Improve Drainage at Private Crossing MP 65.5	TFT	\$ 900				20		\$ 18,000 \$ 15,216,492			
Systen									3 13,10,431	7 13210,951		
	Install Electric Lock for Industry Turnout	EA	\$ 120,000		1	7	5		\$ 1,560,000			
	Install New Control Point (CP) for Temporal Separation with split point derail with bungalow, switch machine, home and remote signals Install Crossing Diamond	EA	\$ 700,000 \$ 1,280,000		1		2		\$ 2,100,000 \$ 1,280,000			
	Install Derail Control Point Install Intermediate Install Incondive On-Board Systems (Passenger and Freight)	EA EA EA	\$ 700,000 \$ 280,000 \$ 100,000		1	5	9	12	\$ 1,400,000 \$ 4,480,000 \$ 1,200,000			
Sub-to	Instant uccontoure Composito Systems (Farsbeinger and Prengin) Al Hardware Systems Integration: Communications, Back office, dispatch, PTCDP, PTCSP	EA	82%						\$ 12,020,000 \$ 12,020,000 \$ 9,834,545	\$ 10,820,000		
												Eliminate PTC
	al Systems +Hardware								\$ 21,854,545	\$ 10,820,000	\$ 11,034,545	components
Crossi	87 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Liberty Street, MP 45.4 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Summit Street, MP 46.09	EA EA	\$ 166,000 \$ 166,000		1				\$ 166,000 \$ 166,000			
	Replace Existing Warning System with New Gates, Flashers, and Bungal <i>o</i> w at Wright Street, MP 46.57 Replace Existing Warning System with New Gates, Flashers, and Bungal <i>o</i> w at Longshore Street, MP 46.6	EA EA	\$ 166,000 \$ 166,000		1				\$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Pontiac Trail, MP 46.64 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Bowen Street, MP 46.71	EA EA	\$ 166,000 \$ 166,000		1				\$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000		
	Replace Existing Warning System with New Gates, Flashert, and Bungalow at Traver Street, MP 46.74 Install Grade Crossing Start Modification at Barton Road, MP 47.19 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Barton Street, MP 47.19	EA EA EA	\$ 166,000 \$ 50,000 \$ 166,000		1				\$ 166,000 \$. \$ 166,000	\$ 83,000 \$ 83,000		
	xepiace Existing Warning System with New Gates, Flashers, and Bungalow at Sartion Street, MP 43.19 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Proteat. The 48.39 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Protiac Trail, MP 49.71	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000		1	1			\$ 166,000 \$ 166,000 \$ 166,000			
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Warren Road, MP 50.02 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Joy Road, MP 50.90	EA	\$ 166,000 \$ 166,000			1			\$ 166,000 \$ 166,000	\$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Northfield Church Road, MP 51.90 Replace Existing Warning System with New Gates, Flashers, and Bungalow at N. Territorial Road, MP 53.19	EA	\$ 166,000 \$ 166,000			1			\$ 166,000 \$ 166,000	\$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at 5 Mile Road, MP 53.91 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Main Street, MP 56.35 Install Grade Crissing Start Modification at 8 Mile, MP 57.56	EA EA EA	\$ 166,000 \$ 166,000 \$ 50,000			1			\$ 166,000 \$ 166,000			
	Instant or doe't citysing aart woonn atom at a mine, we 37:330 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Hall Road, MP 58.75 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Strawberry Lake Road, MP 59.02	EA EA	\$ 166,000 \$ 166,000				1		\$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Hamburg Road, MP 59.45 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Merrill Road, MP 60.53	EA EA	\$ 166,000 \$ 166,000				1		\$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Pettys Drive, MP 61.52 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Private-Trail Hamburg Township MP 61.7	EA EA	\$ 166,000 \$ 166,000				1		\$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Girard Road, MP 61.84 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Kress Road, MP 62.23 Replace Existing Variang System with New Gates, Flashers, and Rungalow at Kress Road, MP 62.23	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000				1 1 1		\$ 166,000 \$ 166,000 \$ 166,000	\$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at M-36, MP 62.52 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Swarthout Road, MP 64.3 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Bishop Lake Road, MP 65.36	EA	\$ 166,000 \$ 166,000				1		\$ 166,000 \$ 166,000			
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Chilson Road, MP 65.99 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Coon Lake Road, MP 67.73	EA EA	\$ 166,000 \$ 166,000				1		\$ 166,000 \$ 166,000	\$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Crooked Lake Road, MP 69.40 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Beck Road, MP 71.02	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000				1 1		\$ 166,000 \$ 166,000 \$ 166,000	\$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Barnard Street, MP 73.68	EA	\$ 166,000				1		\$ 166,000	\$ 83,000		Allowance for
												MDOT Diagnostic Review
	al Crossings (C)								\$ 5,312,000	\$ 2,656,000	\$ 2,656,000	Reductions
ROW	Procure Howell Overnight Maintenance and Layover Facility Site Procure Ann Arbor: Washington/Liberty Station Site	ACRE	\$ 20,000 \$ 100,000				12		\$ 240,000 \$ 100,000	\$ 240,000 \$ 100,000		
	Procure Ann Autor V Astrono Site Procure Ann Andro Barton Site Procure Stant Andro Barton Site	ACRE	\$ 20,000 \$ 145,000		1	4			\$ 20,000 \$ 580,000	\$ 20,000		
	Procure Hamburg Station Site Procure Genoa Township Station Site	ACRE ACRE	\$ 20,000 \$ 20,000				4		\$ 80,000 \$ 80,000	\$ 80,000 \$ 80,000		
	Procure Howell Station Site	ACRE	\$ 20,000				4		\$ 80,000 \$ 1,180,000	\$ 80,000		
	al ROW (D)								\$ 1,180,000	\$ 1,180,000		
	Construct Ann Arbor- Washington/Liberty Station Construct Ann Arbor-Barton Station	EA EA	\$ 1,000,000 \$ 750,000		1				\$ 1,000,000 \$ 750,000	\$ 750,000		
	Construct Whitmore Lake Station Construct Hamburg Station	EA EA EA	\$ 750,000 \$ 750,000 \$ 750,000			1	1		\$ 750,000 \$ 750,000 \$ 750,000	\$ 750,000		
	Construct Genoa Township Station Construct Howell Station	EA	\$ 750,000				1		\$ 750,000 \$ 750,000			
	al Stations/Parking (E)						_		\$ 4,750,000	\$ 4,750,000		
Vehick	s Procure Locanotives Procure Cars (Coaches and Cab Cars)	EA	s -						s -	\$ -		
	Procure Cars (Coaches and Cab Cars) Procure Hybrid Bus (new) Procure Aeproy Automobiles	EA EA EA	\$ 665,000 \$ 25,000					6 10	\$ 3,990,000 \$ 250,000	\$ - \$ 3,990,000 \$ 250,000		
Sub-to	al Vehicles		13,000						\$ 230,000 \$. \$ 4,240,000	\$.		
	nance Facilities											
	Construct Ann Arbor Bartion Station and Layover MOC Construct 8 Mile Station and Layover MOC Construct Ann Arbor Milday Layover Facility	EA EA EA	\$ 385,000 \$ 2,679,142 \$ 6,967,464		1				\$ 6,967,464	\$ 6,967,464		
	Construct Ann Arbor Milday Layover Facility Construct Howell Overnight Layover Facility	EA	\$ 6,967,464 \$ 16,596,324		1		1		\$ 16,596,324	\$ 7,258,478		
												Reduced Maintenance
Sub-to	al Maintenance Facilities (F)								\$ 23,563,788	\$ 14,225,942	\$ 9,337,846	Facility functionality
	ons for Special Elements Development of ADA Compliance Waiver Request 49 CFR 37.42	LS	\$ 13,600					1	\$ 13,600	\$ 13,600		
_	Development of Modifications to Operating Rules, Timetables, and Timetable Special Instructions 49 CFR 217.7(a) Development of Operational Tests and Inspection Program 49 CFR 217.7©	LS	\$ 28,400 \$ 14,200					1 1 1	\$ 28,400 \$ 14,200	\$ 28,400 \$ 14,200		
	Development of Training Program on Operating Rules 49 CFR 217.9 Develop Emergency Preparedness Plan and train employees 49 CFR 101 and 201	LS	\$ 14,200 \$ 14,200					1	\$ 14,200 \$ 14,200	\$ 14,200 \$ 14,200		
	Modify Conductor Certification Program 49 CFR 242.103 Prepare System Safety Program and Collision Hazard Analysis 49 CFR 270 (proposed rule)	LS LS	\$ 7,100 \$ 19,600 \$ 74,400					1	\$ 7,100 \$ 19,600 \$ 74,400	\$ 7,100 \$ 19,600		
	Develop and implement Training and Trial Running Program Advertising of Service in the Media and Development of Website Development and Priving of Schedules and User Information	LS	\$ 74,400 \$ 17,100 \$ 24,200					1 1 1	\$ 74,400 \$ 17,100 \$ 24,200	\$ 17,100		
	Procure and Train Fare Collection System including Hardware and Software Develop and Implement Local Grade Crossing Safety Advertising Program	LS LS	\$ 128,400 \$ 23,100					1 1	\$ 128,400 \$ 23,100	\$ 128,400 \$ 23,100		
	Prepare PTCIP al Allocations for Special Elements (E)	LS	\$ 102,000					1	\$ 102,000 \$ 480,500	\$ 102,000		
Sub-To									\$ 76,597,325		\$ 23,028,391	
	al Construction Elements (A+B+C+D+E+F)	1							\$ 15,319,465	\$ 10.713.787	\$ 4.605.678	
Sub-to	ency		20%									
Sub-to Contin Sub-to	enery Contingency al Construction Bennetis and Contingency		20%						\$ 91,916,790		\$ 27,634,069	
Sub-to Contin Sub-to	Entingency Contingency Contraction Elements and Contingency Construction Elements and Contingency Dead Services and Environmental Deages Engineering	15%	20%						\$ 91,916,790 \$ 13,787,518	\$ 64,282,720 \$ 9,642,408	\$ 27,634,069	
Sub-to Contin Sub-to	Contingency Conti	2% 4%	20%						\$ 91,916,790 \$ 13,787,518 \$ 1,838,336 \$ 3,676,672	\$ 64,282,720 \$ 9,642,408 \$ 1,285,654 \$ 2,571,309	\$ 27,634,069	
Sub-to Contin Sub-to Profes	Configency Configency Configency Contraction Rements and Contingency Configency Dead Services and Environmental Decign Engineering Insurances and Bonding Configency	2%	20%						\$ 91,916,790 \$ 13,787,518 \$ 1,838,336	\$ 64,282,720 \$ 9,642,408 \$ 1,285,654 \$ 2,571,309 \$ 6,428,272 \$ 1,285,654		

Quandel Consultants, LLC

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N	lorth-South Commuter Rail			Ells worth to State St Freight Only	Passenge	r Service Limits						
	ption 2: Full Service without Barton High and Low Estimates	Host Carrier		Ann Arbor RR		Great Lakes Central RR	Great Lakes Central RR	ļ				
1/1	13/2016	Mileposts From - To Route Miles		41.75-44.0 2.25 miles	44.0-47.5 3.5 miles	47.5-57.6 10.1 miles	57.6-74.0 16.4 miles	Systemwide	JJR/Quandel Cost Total-High Estimate	JJR/Quandel Cost Total- Low Estimate	Delta	Potential Cost Reduction
		Maximum Authorized			15 MPH (44.0-45.4)			Ī				
		Speed			30 MPH (45.4-47.19) 60MPH (47.19-47.5)	60 MPH	60 MPH					
ackwork	Cost Element Id Rail Spikes	Unit	Unit Cost	Quantity	Quantity 7083	Quantity 14297	Quantity 27618	1	\$ 97,997	\$ 97,997		
Elii Rej	iminate Joint (Inspect, Crop, and Weld) splace Switch Timbers	EA MI EA	\$ 118,519 \$ 250		3.5	1429/ 10.1 4	16.4		\$ 3,555,556 \$ 1,000	\$ 3,555,556 \$ 1,000		
Ins	pplace Trog place Frog	EA EA EA	\$ 3,500 \$ 1,000 \$ 15,000			2 2 4	1		\$ 7,000 \$ 2,000 \$ 90,000	\$ 7,000 \$ 2,000 \$ 90,000		
Rej	place Rail with 115 CWR prove Turnouts (Pocket Track)	LFT EA	\$ 70 \$ 4,000		18480		2000		\$ 1,433,600 \$ 4,000	\$ 1,433,600 \$ 4,000		
Ins	nstruct Track: Ballasted (aterade) stall #10 Turnout - Timber stall Split Point Derail	EA EA	\$ 310 \$ 93,302 \$ 60,000	21,477	1	6	2		\$ 6,657,827 \$ 559,812 \$ 780,000	\$ 6,657,827 \$ 559,812 \$ 780,000		
l ns Sur	stall 50% Tie Replacement Irface Align and Ballast	M	\$ 444,000 \$ 100,000		3.5	Ū	0		\$ 1,554,000 \$ 350,000	\$ 1,554,000 \$ 350,000		
Ins	stall New Guardrail on Washington St. Bridge, MP. 45.48 stall New Guardrail and Redeck Timbers on Huron St. Bridge, MP 45.55 stall New Guardrail and Redeck Timbers on Miller Ave., MP 45.69	FT FT FT	\$ 40 \$ 100 \$ 100		80 95 75				\$ 3,200 \$ 9,500 \$ 7,500	\$ 3,200 \$ 9,500 \$ 7,500		
ins Rel	stall New Guardrail and Redeck Timbers on Felch St. MP 45.89 Ibuild Ballast at Private Grade Crossing at MP 55.55	FT TFT	\$ 100 \$ 50		85	100			\$ 8,500 \$ 5,000	\$ 8,500 \$ 5,000		
Rel	build and Improve Drainage at Crooked Lake Rd MP 69.40 sbuild and Improve Drainage at Chilson Rd MP 65.99 build and Improve Drainage at Private Crossing MP 65.5	TFT TFT TFT	\$ 900 \$ 900 \$ 900				40 40 20		\$ 36,000 \$ 36,000 \$ 18,000	\$ 36,000 \$ 36,000 \$ 18,000		
total Trackwork												
ems									\$ 15,216,492	\$ 15,216,492		
ins	stall Electric Lock for Industry Turnout stall New Control Point (CP) for Temporal Separation with split point derail with bungalow, switch machine, me and remote signals	EA	\$ 120,000 \$ 700.000		1	7	5		\$ 1,560,000 \$ 2,100,000	\$ 1,560,000 \$ 2,100,000		
Ins	stall Crossing Diamond stall Control Point		\$ 1,280,000 \$ 700,000		1		1		\$ 2,100,000 \$ 1,280,000 \$ 1,400,000	\$ 2,100,000 \$ 1,280,000 \$ 1,400,000		
Ins	stall intermediate stall Locomotive On-Board Systems (Passenger and Freight)	EA EA	\$ 280,000 \$ 100,000		2	5	9	12	\$ 4,480,000 \$ 1,200,000	\$ 4,480,000		
	stems Integration: Communications, Back office, dispatch, PTCDP, PTCSP	EA	82%						\$ 12,020,000 \$ 9,834,545	\$ 10,820,000		
otal Systems dware									\$ 21,854,545	\$ 10,820,000	\$ 11,034,545	Eliminate PTC components
sings Rej	place Existing Warning System with New Gates, Flashers, and Bungalow at Liberty Street, MP 45.4	EA	\$ 166,000		1				\$ 166,000	\$ 83,000		
Rej	pplace Existing Warning System with New Gates, Flashers, and Bungalow at Summit Street, MP 46.09 pplace Existing Warning System with New Gates, Flashers, and Bungalow at Wright Street, MP 46.57	EA EA	\$ 166,000 \$ 166,000		1 1 1				\$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000		
Rej	pplace Existing Warning System with New Gates, Flashers, and Bungalow at Longshore Street, MP 46.6 pplace Existing Warning System with New Gates, Flashers, and Bungalow at Pontia CTail, MP 46.64 pplace Existing Warning System with New Gates, Flashers, and Bungalow at Bowen Street, MP 46.71	EA EA FA	\$ 166,000 \$ 166,000 \$ 166,000		1				\$ 166,000 \$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000 \$ 83,000		
Rej	pplace Existing Warning System with New Gates, Flashers, and Bungalow at Traver Street, MP 46.74 stall Grade Crossing Start Modification at Barton Road, MP 47.19	EA EA EA	\$ 166,000 \$ 166,000 \$ 50,000		1				\$ 166,000 \$ 166,000 \$.	\$ 83,000 \$ 83,000		
Rej	pplace Existing Warning System with New Gates, Flashers, and Bungalow at Barton Street, MP 47.19 pplace Existing Warning System with New Gates, Flashers, and Bungalow at Traver Street, MP 48.39	EA EA	\$ 166,000 \$ 166,000		1	1			\$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000		
Rej	pplace Existing Warning System with New Gates, Flashers, and Bungalow at Pontiac Trail, MP 48.71 splace Existing Warning System with New Gates, Flashers, and Bungalow at Warren Roid, MP 50.02 splace Existing Warning System with New Gates, Flashers, and Bungalow at Joy Road, MP 50.90	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000			1 1 1			\$ 166,000 \$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000 \$ 83,000		
	spiace Existing Warning System with New Gates, Flashers, and Bungalow at Joy Koad, MP 50.90 splace Existing Warning System with New Gates, Flashers, and Bungalow at Northfield Church Road, MP 51.90.	EA	\$ 166,000 \$ 166,000			1			\$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000		
Rej	place Existing Warning System with New Gates, Flashers, and Bungalow at N. Territorial Road, MP 53.19	EA	\$ 166,000			1	-		\$ 166,000	\$ 83,000		
Rej	pplace Existing Warning System with New Gates, Flachers, and Bungalow at 5 Mile Road, MP 53.91 pplace Existing Warning System with New Gates, Flachers, and Bungalow at Main Street, MP 56.35 stall Grade Crossing Start Modification at 8 Mile, MP 57.56	EA EA EA	\$ 166,000 \$ 166,000 \$ 50,000			1			\$ 166,000 \$ 166,000 \$ -	\$ 83,000 \$ 83,000		
Rej	place Existing Warning System with New Gates, Flashers, and Bungalow at Hall Road, MP 58.75	EA	\$ 166,000				1		\$ 166,000	\$ 83,000		
Re	pplace Existing Warning System with New Gates, Flashers, and Bungalow at Strawberry Lake Road, MP 59.02 pplace Existing Warning System with New Gates, Flashers, and Bungalow at Hamburg Road, MP 59.45 Fplace Existing Warning System with New Gates, Flashers, and Bungalow at Merrill Road, MP 50.53	EA EA	\$ 166,000 \$ 166,000				1		\$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000		
Rej	prace Existing Warning System with New Gates, Flashers, and Bungalow at Petrys Drive, MP 6152 Pplace Existing Warning System with New Gates, Flashers, and Bungalow at Petrys Drive, MP 6152 Iplace Existing Warning System with New Gates, Flashers, and Bungalow at Private-Trail Hamburg Township	EA	\$ 166,000 \$ 166,000				1		\$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000		
MP	P 61.7 splace Existing Warning System with New Gates, Flashers, and Bungalow at Girard Road, MP 61.84	EA EA	\$ 166,000 \$ 166,000				1		\$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000		
Rei	place Existing Warning System with New Gates, Flashers, and Bungalow at Kress Road, MP 62.23 pplace Existing Warning System with New Gates, Flashers, and Bungalow at M-36, MP 62.52 pplace Existing Warning System with New Gates, Flashers, and Bungalow at Kwarthout Road, MP 64.3	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000				1 1		\$ 166,000 \$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000 \$ 83,000		
Rej	place Existing Warning System with New Gates, Flashers, and Bungalow at Bishop Lake Road, MP 65.36	EA	\$ 166,000				1		\$ 166,000	\$ 83,000		
	eplace Existing Warning System with New Gates, Flashers, and Bungalow at Chilson Road, MP 65.99	EA	\$ 166,000				1		\$ 166,000	\$ 83,000		
Re	pplace Existing Warning System with New Gates, Flashers, and Bungalow at Coon Lake Road, MP 67.73	EA	\$ 166,000 \$ 166,000				1		\$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000		
Rej	pplace Existing Warning System with New Gates, Flashers, and Bungalow at Beck Road, MP 71.02 splace Existing Warning System with New Gates, Flashers, and Bungalow at Barnard Street, MP 73.68	EA EA	\$ 166,000 \$ 166,000				1		\$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000		
tal Crossings (C)									6 6 242 000	\$ 2,656,000		Allowance for MDDT Diagnostic Review Reductions
									\$ 5,312,000		5 <u>1,030,000</u>	
Pro	ocure Howell Overnight Maintenance and Layover Facility Site ocure Ann Arbor- Washington/Uberty Station Site ocure Ann Arbor-Barton Station Site	ACRE ACRE ACRE	\$ 20,000 \$ 100,000 \$ 20,000		1		12		\$ 240,000 \$ 100,000	\$ 240,000 \$ 100,000		
Pro	ocure Whitmore Lake Station Site	ACRE	\$ 145,000 \$ 20,000			4	4		\$ 580,000 \$ 80,000	\$ 580,000 \$ 80,000		
Pro	ocure Genoa Township Station Site ocure Howell Station Site	ACRE	\$ 20,000 \$ 20,000				4		\$ 80,000 \$ 80,000	\$ 80,000 \$ 80,000		
otal ROW (D)									\$ 1,160,000	\$ 1,160,000		
	instruct Ann Arbor-Washington/Liberty Station Instruct Ann Arbor-Barton Station	EA EA	\$ 1,000,000 \$ 750,000		1				\$ 1,000,000	\$ 1,000,000		
Cor	instruct Whitmore Lake Station	EA EA	\$ 750,000 \$ 750,000 \$ 750,000			1	1		\$ 750,000 \$ 750,000	\$ 750,000 \$ 750,000		
Cor	instruct Genoa Township Station instruct Howell Station	EA EA	\$ 750,000 \$ 750,000				1		\$ 750,000 \$ 750,000	\$ 750,000 \$ 750,000		
otal Stations/ ng (E)									\$ 4,000,000	\$ 4,000,000		
les												
Pro	ocure Locomotives ocure Cars (Coaches and Cab Cars) ocure Hybrid Bus (new)	EA EA EA	> · \$. \$ 665.000					6	\$ - \$ - \$ 3,990.000	\$. \$ 3,990,000		
Pro	ocure Agency Automobiles	EA	\$ 665,000 \$ 25,000					10	\$ 3,990,000 \$ 250,000 \$.	\$ 250,000 \$.		
al Vehicles									\$ 4,240,000	\$ 4,240,000		
enance Facilities Cor	instruct Ann Arbor Barton Station and Layover MOC	EA	\$ 385,000									
Cor	instruct 8 Mile Station and Layover MOC Instruct Ann Arbor Midday Layover Facility Instruct Howelli Downight Layover Facility	EA	\$ 2,679,142 \$ 6,967,464 \$ 16,596,324		1		1		\$ 6,967,464 \$ 16,596,324	\$ 6,967,464 \$ 7,258,478		
		50			-				- 10,396,324	* <i>1,1</i> 38,478		
al Maintenance 25 (F)									\$ 23,563,788	\$ 14,225,942	\$ 9,337,846	Reduced Maintenance Facility functionality
ons for Special												
nts De	evelopment of ADA Compliance Walver Request 49 CFR 37.42	LS	\$ 13,600		<u> </u>			1	\$ 13,600	\$ 13,600		
De	evelopment of Modifications to Operating Rules, Timetables, and Timetable Special Instructions 49 CFR evelopment of Operational Tests and Inspection Program 49 CFR 217.70 evelopment of Training, Program on Operating Rules 49 CFR 217.90	15 15	\$ 28,400 \$ 14,200 \$ 14,200		<u> </u>			1	\$ 28,400 \$ 14,200 \$ 14,200	\$ 28,400 \$ 14,200 \$ 14,200		
De	evelop Emergency Preparedness Plan and train employees 49 CFR 101 and 201 odify Conductor Certification Program 49 CFR 242.103	2 2 2	\$ 14,200 \$ 7,100					1	\$ 14,200 \$ 7,100	\$ 14,200 \$ 7,100		
Pre	epare System Safety Program and Collision Hazard Analysis 49 CFR 270 (proposed rule) evelop and implement Training and Trial Running Program	LS LS LS	\$ 19,600 \$ 74,400 \$ 17,100	-			-	1	\$ 19,600 \$ 74,400 \$ 17,100	\$ 19,600 \$ 74,400 \$ 17,100		
De Pro	twertising of Service in the Media and Development of Website evelopment and Printing of Schedules and User Information ours and Train Fare Collection System including Hardware and Software	2 2 2	\$ 17,100 \$ 24,200 \$ 128,400					1	\$ 17,100 \$ 24,200 \$ 128,400	\$ 17,100 \$ 24,200 \$ 128,400		
De Pre	evelop and Implement Local Grade Crossing Safety Advertising Program epare PTCIP	کا کا	\$ 23,100 \$ 102,000					1	\$ 23,100 \$ 102,000	\$ 23,100 \$ 102,000		
al Allocations ial Elements]					6 Am	s		
					-				\$ 480,500	\$ 480,500		
I Construction												
+D+E+F) ency									\$ 75,827,325	\$ 52,798,934	\$ 23,028,391	
Cor	ntingency		20%		-				\$ 15,165,465	\$ 10,559,787	\$ 4,605,678	
otal Construction ents and												
ngency									\$ 90,992,790	\$ 63,358,720	\$ 27,634,069	
isional Services invironmental												
De	ssign Engineering surance and Bonding ogram Management	15% 2% 4%			<u> </u>				\$ 13,648,918 \$ 1,819,856 \$ 3,639,712	\$ 9,503,808 \$ 1,267,174 \$ 2,534,349		
Cor	ogram Mvanagement enstruction Bragement & Inspection Igineering Services During Construction	4% 10% 2%							\$ 3,639,712 \$ 9,099,279 \$ 1,819,856	\$ 2,534,349 \$ 6,335,872 \$ 1,267,174		
			33%									
				1	1	1		1		\$ 20,908,378	\$ 9,119,243	
total Professional ices and ronmental									\$ 30,027,621	5 20,000,070		

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	North-South Commuter Rail			Ellsworth to State St Freight Only	Passenger Service	Limits					
	Option 3: Starter Service High and Low Estimates	Host Carrier		Ann Arbor RR RR	Great Lakes Central RR	Great Lakes Central RR					
	1/13/2016	Mileposts From - To		41.75-44.0 44.0-47.5	47.5-57.6	57.6-74.0	Systemwide	JJR/Quandel Cost Total- High Estimate	JJR/Quandel Cost Total-Low Estimate	Delta	Potential Cost Reductio
		Route Miles		2.25 miles 3.5 miles 15 MPH (44, 45.4) 30	10.1 miles	16.4 miles	_				
		Maximum Authorized Speed		MPH (45.4- 47.19) 60MPH	60 MPH	60 MPH					
Trackwork	Cost Element	Unit	Unit Cost			Quantity	1				
	Add Rail Spikes Eliminate Joint (Inspect, Crop, and Weld) Replace Switch Timbers	EA MI EA	\$ 2 \$ 118,519 \$ 250		14297 10.1 4	27618 16.4		\$ 97,997 \$ 3,555,556 \$ 1,000	\$ 97,997 \$ 3,555,556 \$ 1,000		
	Replace Turnout Switch Point Install Heel Block Replace Frog	EA EA EA	\$ 3,500 \$ 1,000 \$ 15,000		2 2 4	2		\$ 7,000 \$ 2,000 \$ 90,000	\$ 7,000 \$ 2,000 \$ 90,000		
	Replace Rail with 115 CWR Remove Turnouts (Pocket Track) Construct Track Ballasted (at yrade)	LFT EA TF	\$ 70 \$ 4,000 \$ 310	18,480		2000		\$ 1,433,600 \$ 4,000 \$ 6,657,827	\$ 1,433,600 \$ 4,000 \$ 6.657,827		
	Install #10 Turnout - Timber Install Split Point Derail	EA EA	\$ 93,302 \$ 60,000	4 1	6	2		\$ 559,812 \$ 780,000	\$ 559,812 \$ 780,000		
	Install SOK The Replacement Surface Align and Ballast Install New Guardrali on Washington St. Bridge, MP, 45.48	MI FT	\$ 444,000 \$ 100,000 \$ 40	3.5				\$ 1,554,000 \$ 350,000 \$ 3,200	\$ 3,200		
	Install New Guardrail and Redeck Timbers on Huron St. Bridge. MP 45.55 Install New Guardrail and Redeck Timbers on Miller Ave., MP 45.69 Install New Guardrail and Redeck Timbers on FelS. XIM 94.589	FT FT FT	\$ 100 \$ 100 \$ 100	75				\$ 9,500 \$ 7,500 \$ 8,500	\$ 9,500 \$ 7,500 \$ 8,500		
	Rebuild Ballast at Private Grade Crossing at MP 55.55 Rebuild and Improve Drainage at Crooked Lake Rd MP 65.40 Rebuild and Improve Drainage at Chilson Rd MP 65.59	TFT TFT TFT	\$ 50 \$ 900 \$ 900		100	40		\$ 5,000 \$ 36,000 \$ 36,000	\$ 5,000 \$ 36,000 \$ 36,000		
	Rebuild and Improve Drainage at Private Crossing MP 65.5	TFT	\$ 900			20		\$ 18,000			
Sub-total Trackwork (A)								\$ 15,216,492	\$ 15,216,492		
Systems	Install Electric Lock for Industry Turnout Install New Control Point (CP) for Temporal Separation with split point derail with bungalow, switch machine, home and remote	EA	\$ 120,000 \$ 700,000		7	5		\$ 1,560,000 \$ 2,100,000	\$ 1,560,000 \$ 2,100,000		
	Install Crossing Diamond Install Derail Control Point Install Intermediate	EA EA EA	\$ 1,280,000 \$ 700,000 \$ 280,000	1	5	1 1 9		\$ 1,280,000 \$ 1,400,000 \$ 4,480,000			
Sub-total Hardware	Install Locomotive On-Board Systems (Passenger and Freight)	EA	\$ 100,000		2	9	12	\$ 1,200,000 \$ 12,020,000			
	Systems Integration: Communications, Back office, dispatch, PTCDP, PTCSP	EA	82%					\$ 9,834,545			Eliminate PTC
Sub-total Systems +Hardware Crossings	 				<u> </u>	<u> </u>		\$ 21,854,545	\$ 10,820,000	\$ 11,034,545	components
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Liberty Street, MP 45.4 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Summit Street, MP 46.09 Replace Existing Warning System with New Gates (Eshear: and Bungalow at Widet Street MP 46.77	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000	1				\$ 166,000 \$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000 \$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Wright Street, MP 46.57 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Longshore Street, MP 46.6 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Pontac Trail, MP 46.64	EA EA	\$ 166,000 \$ 166,000	1				\$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Bowen Street, MP 46.71 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Traver Street, MP 46.74 Install Grade Crossing Start Modification at Batron Road, MP 47.19	EA EA EA	\$ 166,000 \$ 166,000 \$ 50,000	1				\$ 166,000 \$ 166,000 \$ -	\$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Barton Street, MP 47.19 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Traver Street, MP 48.39	EA EA	\$ 166,000 \$ 166,000	1	1			\$ 166,000 \$ 166,000	\$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Pontiac Trail, MP 49.71 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Warren Road, MP 50.02 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Joy Rood, MP 50.90	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000		1 1 1	<u> </u>	<u> </u>	\$ 166,000 \$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000 \$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Northfield Church Road, MP 51.90 Replace Existing Warning System with New Gates, Flashers, and Bungalow at N. Territorial Road, MP 53.19 Replace Existing Warning System with New Gates, Flashers, and Bungalow at S Nile Road, MP 53.01	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000		1 1 1		<u> </u>	\$ 166,000 \$ 166,000 \$ 166,000	\$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Main Street, MP 56.35 Install Grade Crossing Start Modification at 8 Mile, MP 57.56	EA	\$ 166,000 \$ 50,000		1	1		\$ 166,000 \$ -	\$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Hall Road, MP 58.75 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Strawberry Lake Road, MP 59.02 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Hamburg Road, MP 59.45	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000			1 1 1		\$ 166,000 \$ 166,000 \$ 166,000	\$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Merrill Road, MP 60.53 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Pettys Drive, MP 61.52 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Private-Trail Hamburg Township MP 61.7	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000			1 1		\$ 166,000 \$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Girard Road, MP 61.84 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Kress Road, MP 62.23	EA EA	\$ 166,000 \$ 166,000			1 1		\$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at W-36, MP 62.52 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Swarthout Road, MP 64.3 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Bishop Lake Road, MP 65.36	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000			1 1		\$ 166,000 \$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000 \$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Chilson Road, MP 65:99 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Coon Lake Road, MP 67.73 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Crooked Lake Road, MP 69.40	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000			1 1 1		\$ 166,000 \$ 166,000 \$ 166,000	\$ 83,000		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Educated take Road, MP 03-00 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Barnard Street, MP 73.68	EA EA EA	\$ 166,000 \$ 166,000			1		\$ 166,000 \$ 166,000			
Sub-total Crossings (C)								\$ 5,312,000	\$ 2,656,000	\$ 2,656,000	Allowance for MDOT Diagnostic Review
ROW											
NOW	Procure Howell Overnight Maintenance and Lavover Facility Site Procure Ann Arbor, Washington Dieury, Station Site	ACRE	\$ 20,000	1		12		\$ 240,000	\$ 240,000		
NOW	Procure Ann Arbor- Washington/Liberty Station Site Procure Ann Arbor-Barton Station Site Procure Whitmere Lake Station Site Procure Whitmere Lake Station Site	ACRE ACRE ACRE	\$ 100,000 \$ 20,000 \$ 145,000	1	4	12			\$ 240,000 \$ 100,000		
NUW	Procure Ann Arbor- Washington/Liberty Station Site Procure Ann Arbor-Barton Station Site	ACRE ACRE	\$ 100,000 \$ 20,000		4	12		\$ 240,000 \$ 100,000 \$ -	\$ 240,000 \$ 100,000		
	Procure An Adhor Washington/Liberty Station Site Procure An Adhor Safarin Station Site Procure Whitmore Lake Station Site Procure Whitmore Lake Station Site Procure Gena Stremish Station Stremish Station Stremish Station Strem	ACRE ACRE ACRE ACRE ACRE	\$ 100,000 \$ 20,000 \$ 145,000 \$ 20,000 \$ 20,000		4			\$ 240,000 \$ 100,000 \$	\$ 240,000 \$ 100,000 \$ 580,000 \$ 80,000		
Sub-total ROW (D)	Procure Ann Athor. Washington/Liberty Station Sile Procure Man Athor. Procure Manhards Station Sile Procure Manhards Station Sile Procure Genesa Township Station Sile Procure Genesa Township Station Sile Procure Manhards Station Sile Construct Ann Athor. Washington/Liberty Station	ACRE ACRE ACRE ACRE ACRE ACRE ACRE EA	\$ 100,000 \$ 20,000 \$ 145,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000		4			S 240,000 \$ 100,000 \$ - \$ \$\$ \$80,000 \$ - \$ \$\$ \$80,000 \$ - \$ - \$ - \$ - \$ - \$ - \$ 80,000	\$ 240,000 \$ 100,000 \$ 580,000 \$ 80,000 \$ 1,000,000		
Sub-total ROW (D)	Procure Ann Andro- Washington/Liberty Station Site Procure Minimore Lake Station Site Procure Minimore Lake Station Site Procure Howell Station Site Procure Howell Station Site Construct Ann Anfor- Washington/Liberty Station Construct Ann Anfor- Kashington/Liberty Station Construct Ann Anfor- Kashington Construct Minimore Lake Station Construct Minimore Lake Station Construct Minimore Lake Station Construct Minimore Minimore Construct Mi	ACRE	\$ 100,000 \$ 20,000 \$ 145,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 750,000 \$ 750,000 \$ 750,000		4			\$ 240,000 \$ 100,000 \$ 5 5 \$ 580,000 \$ 5 \$ 80,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ - \$ 750,000 \$ - \$ 750,000	\$ 240,000 \$ 100,000 \$ 580,000 \$ 80,000 \$ 1,000,000 \$ 1,000,000		
Sub-total ROW (D)	Procure Ann Aftor- Washington/Liberty Station Sile Procure MinAmore Like Station Sile Procure MinAmore Like Station Sile Procure Reamber Station Sile Procure Reamber Station Sile Procure Reamber Station Sile Construct Ann Aftor- Washington/Liberty Station Construct Ann Aftor- Washington/Liberty Station Construct Ann Aftor- Like Station Construct Ann Aftor- Like Station	ACRE ACRE ACRE ACRE ACRE ACRE ACRE ACRE ACRE ACRE ACRE ACRE	\$ 100,000 \$ 20,000 \$ 145,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 750,000 \$ 750,000		4			\$ 240,000 \$ 100,000 \$ 50,000 \$ - \$ 50,000 \$ - \$ 80,000 \$ 1,000,000 \$ 1,000,000 \$ -	\$ 240,000 \$ 100,000 \$ 580,000 \$ 80,000 \$ 1,000,000 \$ 1,000,000		
Sub-total ROW (D) Stations/Parking	Procure Ann Afron- Washington/Liberty Station Sile Procure Min.Micro Station Sile Procure Mintmore Like Station Sile Procure Mintmore Like Station Sile Procure Resona Township Station Sile Procure Resona Township Station Sile Construct Ann Afron- Washington/Liberty Station Construct Ann Afron- Like Station Construct Mannue Like Station Construct Mannue Like Station Construct Mannue Like Station Construct Mannue Station	ACRE ACRE	\$ 100,000 \$ 20,000 \$ 145,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 750,000 \$ 750,000 \$ 750,000		4			\$ 240,000 \$ 100,000 \$ 5 580,000 \$ 5 80,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 5 750,000 \$ 750,0000 \$ 750,0000 \$ 750,0000 \$ 750,0000 \$ 750,0000 \$ 750,00000 \$ 750,00000000 \$ 750,00000000000000000000000000000000000	\$ 240,000 \$ 100,000 \$ 580,000 \$ 1,000,000 \$ 1,000,000 \$ 750,000 \$ 750,000 \$ -		
Sub-total ROW (D) Stations/Parking Sub-total Stations/Parking (E)	Procure An Arbor Washington/Liberty Station Site Procure Withmore Lake Station Site Procure Withmore Lake Station Site Procure Romewing Station Site Procure Romewing Station Site Procure Romewing Station Site Construct Ann Arbor-Washington/Liberty Station Construct Ann Arbor-Washington/Liberty Station Construct Withmore Lake Station Construct Withmore Lake Station Construct Withmore Lake Station Construct Withmore Lake Station Construct Mithmore Mithmo	ACRE ACRE	\$ 100,000 \$ 20,000 \$ 145,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 750,000 \$ 750,000 \$ 750,000		4			\$ 240,000 \$ 240,000 \$ 100,000 \$ 5 50,000 \$ 5 - 5,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 750,000 \$ - 750,000 \$ 750,000 \$ - 750,0000 \$ - 750,00000 \$ - 750,00000 \$ - 750,00000000000000000000000000000000000	\$ 240,000 \$ 100,000 \$ 580,000 \$ 1,000,000 \$ 1,000,000 \$ 750,000 \$ 750,000 \$ -		
Sub-total ROW (D) Stations/Parking Sub-total Stations/Parking (E)	Procure Ann Abor, Washington/Liberty Station Site Procure Withmore Like Station Site Procure Withmore Like Station Site Procure Homburg Station Site Procure Geosa Township Station Site Procure Geosa Township Station Site Construct Hom Abor: Washington/Liberty Station Construct Ann Abor: Washington/Liberty Station Construct Homburg Hombu	ACRE ACRE	\$ 100,000 \$ 20,000 \$ 145,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 750,000 \$ 750,000 \$ 750,000		4		6 10	\$ 240,000 \$ 240,000 \$ 100,000 \$ 5 50,000 \$ 5 - 5,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 750,000 \$ - 750,000 \$ 750,000 \$ - 750,0000 \$ - 750,00000 \$ - 750,00000 \$ - 750,000000 \$ - 750,00000000000000000000000000000000000	\$ 240,000 \$ 100,000 \$ 580,000 \$ 580,000 \$ 1,000,000 \$ 1,000,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$		
Sub-total ROW (D) Stations/Parking Sub-total Stations/Parking (E) Vehicles Sub-total Vehicles	Procure An Arbor Washington/Liberty Station Site Procure Withmore Lake Station Site Procure Withmore Lake Station Site Procure Browney Station Site Procure Browney Station Site Procure Browney Station Site Construct Ann Arbor-Washington/Liberty Station Construct Ann Arbor-Washington/Liberty Station Construct Ann Arbor-Barton Station Construct Minimore Lake Station Construct Whitmore Lake Station Construct Minimore Lake Station Construct Howel Station Construct Minimore Lake Station Construct Howel Station Construct Howel Station Construct Howel Station Construct Minimore Lake Station Construct Minimore Lake Station Construct Minimore Lake Station Construct Howel Station Constru	ACRE ACRE EA EA EA EA EA EA EA EA EA EA EA EA	\$ 100,000 \$ 22,000 \$ 145,000 \$ 220,000 \$ 220,000 \$ 220,000 \$ 20,000 \$ 75,000 \$ 575,000 \$ 555,000 \$ 555,000\$ \$ 555,000\$ \$ 555,000\$ \$ 555,000\$ \$ 555,000\$ \$ 555,000\$ \$ 555,000\$ \$ 555,000\$ \$ 555,000\$ \$ 555,000\$ \$ 555,000\$ \$ 555,000\$ \$ 5		4			\$ 240,000 \$ 240,000 \$ 100,000 \$ 5 - 50,000 \$ - 5, - 5, - 5, - 5, - 5, - 5, - 5, - 5	\$ 240,000 \$ 100,000 \$ 580,000 \$ 580,000 \$ 1,000,000 \$ 1,000,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 5 \$ 2,500,000 \$ 5 \$ 3,990,000 \$ 5 \$ 3,990,000 \$ 5 \$ 3,990,000 \$ 5 \$ 3,990,000 \$ 5 \$ 3,990,000 \$ 5 \$ 5 \$ 3,990,000 \$ 5 \$ 5 \$ 3,990,000 \$ 5 \$ 5 \$ 5 \$ 3,990,000 \$ 5 \$ 5 \$ 5 \$ 5 \$ 5 \$ 5 \$ 5 \$ 5		
Sub-total ROW (D) Stations/Parking Sub-total Stations/Parking (E) Vehicles	Procure An Andro- Washington/Uberty Station Sile Procure MonAndro-Like Station Sile Procure MonText Station Sile Procure Research Station Sile Procure Research Station Sile Procure Research Station Sile Procure Research Station Sile Construct MonText Station ConStruct	ACRE ACRE EA EA	\$ 100,000 \$ 20,000 \$ 145,000 \$ 20,000 \$ 750,000 \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,00		1			\$ 240,000 \$ 240,000 \$ 100,000 \$ 5 50,000 \$ 5 00,000 \$ 5 00,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 5 0,000 \$ 5 0,0000 \$ 5 0,00000 \$ 5 0,00000 \$ 5 0,00000 \$ 5 0,00000 \$ 5 0,00000 \$ 5 0,00000 \$ 5 0,000000 \$ 5 0,000000 \$ 5 0,0000000000000000000000000000000000	\$ 240,000 \$ 100,000 \$ 580,000 \$ 580,000 \$ 1,000,000 \$ 1,000,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 5 \$ 2,500,000 \$ 5 \$ 3,990,000 \$ 5 \$ 3,990,000 \$ 5 \$ 3,990,000 \$ 5 \$ 3,990,000 \$ 5 \$ 3,990,000 \$ 5 \$ 5 \$ 3,990,000 \$ 5 \$ 5 \$ 3,990,000 \$ 5 \$ 5 \$ 5 \$ 3,990,000 \$ 5 \$ 5 \$ 5 \$ 5 \$ 5 \$ 5 \$ 5 \$ 5		
Sub-total ROW (D) Stations/Parking Sub-total Stations/Parking (E) vehicles Sub-total Vehicles	Procure An Andro- Washington/Uberty Station Sile Procure Multimore Like Station Sile Procure Multimore Like Station Sile Procure Membry Station Sile Procure Membry Station Sile Procure Membry Station Sile Procure Membry Station Sile Construct Ann Andro- Washington/Uberty Station Construct Man Andro- Barton Station Construct Manuage Station Construct Manu	ACRE ACRE FA EA EA EA EA EA EA EA EA EA EA EA	\$ 100,000 \$ 20,000 \$ 145,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 750,000 \$ 750,000\$ 750,000\$ \$ 750,		1			\$ 240,000 \$ 240,000 \$ 100,000 \$ 5 50,000 \$ 5 0.000 \$ 5 0.000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 2,000,000 \$ 2	\$ 240,000 \$ 100,000 \$ 580,000 \$ 580,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 2,500,000 \$ 5 2,500,000 \$ 5 2,500,000 \$ 5 3,090,000 \$ 3,000,000 \$ 3,000,000,000 \$ 3,000,000 \$ 3,000,0000 \$ 3,000,000 \$ 3,000,		
Sub-total ROW (D) Stations/Parking Sub-total Stations/Parking (E) Vehicles Sub-total Vehicles	Procure An Andro-Washington/Liberty Station Site Procure Multimore Lake Station Site Procure Multimore Lake Station Site Procure Receiver Station Site Procure Receiver Station Site Procure Receiver Station Site Construct Ann Andre-Washington/Liberty Station Construct Manual Station Procure Science Station Construct Manual Station Procure Science Station Construct Manual Station Construct Ann Andre Station Construct Ann Andre Manual Station Station Construct Ann Andre Manual St	ACRE ACRE EA EA EA EA EA EA EA EA	\$ 100,000 \$ 20,000 \$ 145,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 750,000 \$ 750,000\$		4			\$ 240,000 \$ 240,000 \$ 100,000 \$ 5 50,000 \$ 5 00,000 \$ 5 00,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 5 0,000 \$ 5 0,0000 \$ 5 0,00000 \$ 5 0,00000 \$ 5 0,00000 \$ 5 0,00000 \$ 5 0,00000 \$ 5 0,00000 \$ 5 0,000000 \$ 5 0,000000 \$ 5 0,0000000000000000000000000000000000	\$ 240,000 \$ 100,000 \$ 580,000 \$ 580,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 2,500,000 \$ 5 2,500,000 \$ 5 2,500,000 \$ 5 3,090,000 \$ 3,000,000 \$ 3,000,000,000 \$ 3,000,000 \$ 3,000,0000 \$ 3,000,000 \$ 3,000,		
Sub-total ROW (D) Stations/Parking Sub-total Stations/Parking (E) Vehicles Sub-total Vehicles Sub-total Vehicles Sub-total Vehicles	Procure An Andro- Washington/Liberty Station Site Procure Michael Station Site Procure Michael Station Site Procure Reveal Station Site Procure Reveal Station Site Procure Reveal Station Site Construct Ann Andre- Marchael Station Construct Ann Andre Station and Layover MOC Construct Ann Andre Station Station Site Procure Station Site Construct Ann Andre Station Site Procure Reveal Station Site Procure Station Site Construct Ann Andre Station Site Procure Station Site Procure Station Site Construct Ann Andre Station Site Procure Station Construct Station Site Procure Station Construct Ann Andre Station Site Procure Station Construct Ann Andre Station Site Procure Station Construct Ann Andre Station Site Procure Station Construct Ann Andre Station Site Procure Station Si	ACRE ACRE IA IA	\$ 100,000 \$ 20,000 \$ 145,000 \$ 20,000 \$ 750,000 \$ 750,000\$ \$ 750,000			4		\$ 240,000 \$ 240,000 \$ 100,000 \$ 5 56,000 \$ 3 80,000 \$ 1,000,000 \$ 1,000,000 \$ 2,000,000 \$ 775,000 \$ 775,000 \$ 2,500,000 \$ 2,500,0000 \$ 2,500,0000 \$	\$ 240,000 \$ 100,000 \$ 100,000 \$ 580,000 \$ 580,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 750,000 \$ 750,000 \$ 2,500,000 \$ 2,500,0000 \$ 2,500,000000 \$ 2,500,0000000		
Sub-total ROW (D) Stations/Parking Sub-total Stations/Parking (E) Vehicles Sub-total Vehicles	Procure An Andro- Washington/Liberty Station Site Procure Michael Station Site Procure Michael Station Site Procure Reveal Station Site Procure Reveal Station Site Procure Reveal Station Site Construct Ann Andre- Marchael Station Construct Ann Andre Station and Layover MOC Construct Ann Andre Station Station Site Procure Station Site Construct Ann Andre Station Site Procure Reveal Station Site Procure Station Site Construct Ann Andre Station Site Procure Station Site Procure Station Site Construct Ann Andre Station Site Procure Station Construct Station Site Procure Station Construct Ann Andre Station Site Procure Station Construct Ann Andre Station Site Procure Station Construct Ann Andre Station Site Procure Station Construct Ann Andre Station Site Procure Station Si	ACRE ACRE IA IA	\$ 100,000 \$ 20,000 \$ 145,000 \$ 20,000 \$ 750,000 \$ 750,000\$ \$ 750,000		1	4		\$ 240,000 \$ 100,000 \$ 5 56,000 \$ 5 56,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 2,000,000 \$ 7,750,000 \$ 7,750,000 \$ 2,500,000 \$ 2,500,0000 \$ 2,500,000 \$ 2,500,000 \$ 2,500,000 \$ 2,500,00	\$ 240,000 \$ 100,000 \$ 100,000 \$ 580,000 \$ 580,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 750,000 \$ 750,000 \$ 2,500,000 \$ 2,500,0000 \$ 2,500,000000 \$ 2,500,0000000		
Sub-total RDW (b) Stations/Parking Sub-total Stations/Parking (t) Vehicles Sub-total Vehicles Sub-total Vehicles Sub-total Vehicles	Procure An Anton- Washington/Uberty Station Sile Procure Multimore Like Station Sile Procure Multimore Like Station Sile Procure Model Station Sile Procure Model Station Sile Procure Model Station Sile Construct Ann Antor- Washington/Uberty Station Construct Mann Autor-Barton Station Construct Mann Autor-Barton Station Construct Mann Autor-Barton Station Construct Mannay Construc	ACRE FA	\$ 100,000 \$ 20,000 \$ 145,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 750,000 \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$			4		\$ 240,000 \$ 240,000 \$ 100,000 \$ 5 56,000 \$ 3 80,000 \$ 1,000,000 \$ 1,000,000 \$ 2,000,000 \$ 775,000 \$ 775,000 \$ 2,500,000 \$ 2,500,0000 \$ 2,500,0000 \$	\$ 240,000 \$ 100,000 \$ 100,000 \$ 580,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 2,500,000 \$ 2,500,000 \$ 2,500,000 \$ 3,990,000 \$ 3,900,000 \$ 3,900,00		
Sub-total ROW (D) Stations/Parking Sub-total Stations/Parking (E) Sub-total Stations/Parking (E) Sub-total Vehicles Sub-total Vehicles Sub-total Maintenance Facilities Sub-total Maintenance Facilities (f)	Procure Ann Andro- Washington/Liberty Station Sile Procure Multimore Liak Station Sile Procure Multimore Liak Station Sile Procure Multimore Liak Station Sile Procure Memory Station Sile Procure Memory Station Sile Construct Ann Andro: Multimore Annow Station Construct Annow Liak Station Construct Annow Multimore Station Construct Annow Multimore Station Construct Annow Multimore Station Construct Annow Station Annow Construct Annow Andor Station Annow Construct Annow Andor Station and Layover MOC Construct Annow Andor Station and Layover Facility Construct Howell Committed Station Construct Annow Andor Station Annow Construct Ann	ACRE EA	\$ 100,000 \$ 22,000 \$ 145,000 \$ 22,000 \$ 22,000 \$ 22,000 \$ 22,000 \$ 22,000 \$ 22,000 \$ 22,000 \$ 22,000 \$ 22,000 \$ 750,000 \$ 750,0000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000\$ \$ 750		1	4		\$ 240,000 \$ 240,000 \$ 100,000 \$ 3 \$ 50,000 \$	\$ 240,000 \$ 100,000 \$ 100,000 \$ 580,000 \$ 580,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 2,500,000 \$ 3,42,200 \$ 3,42,200 \$ 3,42,200 \$ 3,42,000 \$ 3,42,000		
Sub-total ROW (D) Stations/Parking Sub-total Stations/Parking (E) Vehicles Sub-total Vehicles Sub-total Vehicles Sub-total Maintenance Facilities (f)	Procure An Andro- Washington/Liberty Station Site Procure Multimore Like Station Construct Manifer Station Site Procure Multimore Like Station Construct Manifer Multiday Layover MOC Construct Manifer Multiday Layover Facility Construct Manifer Multiday Layover Facility Construct Manifer Multiday Layover Facility Construct Manifer Multiday Likewer F	ACRE ACRE EA EA	\$ 100,000 \$ 20,000 \$ 145,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 750,000 \$ 750,0000 \$ 750,0000 \$ 750,0000\$ 750,000 \$ 750,000\$ 750,000\$ 750,000\$ 75			4	10	\$ 240,000 \$ 240,000 \$ 100,000 \$ 3 \$ 80,000 \$ 3 \$ 80,000 \$ 1,000,000 \$ 1,000,000 \$ \$ 70,000 \$	\$ 240,000 \$ 100,000 \$ 580,000 \$ 580,000 \$ 80,000 \$ 1,000,000 \$ 1,000,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 2,500,000 \$ 2,258,478 \$ 114,225,942 \$ 114,200 \$ 1		
Sub-total ROW (D) Stations/Parking Sub-total Stations/Parking (E) Vehicles Sub-total Vehicles Sub-total Vehicles Sub-total Maintenance Facilities (f)	Procure An Anton- Washington/Liberty Station Sile Procure Molthmore Like Station Sile Construct Ann After-Washington/Liberty Station Construct Monthly Station Sile Construct Ann After-Washington/Liberty Station Construct Monthly Constraint Construct Monthly Constraint Construct Monthly Station and Liyover MOC Construct Monthly Station Molty Liyover Facility Construct Monthly Monthly Construct Monthly Monthly Construct Monthly Construct Monthly Monthly Construct Monthly Station Construct Monthly Monthly Station Action Construct Monthly Station Action Monthly Monthly Station Construct Monthly Monthly Monthly Station Construct Monthly Monthly Station Construct Monthly Monthly Monthly Constructions 40 CFR 217.7(a) Development of Monthly Monthly Constructions 40 CFR 21	ACRE ACRE EA EA	\$ 100,000 \$ 22,000 \$ 145,000 \$ 22,000 \$ 22,000 \$ 22,000 \$ 22,000 \$ 22,000 \$ 22,000 \$ 22,000 \$ 22,000 \$ 22,000 \$ 750,000 \$ 750,0000 \$ 750,0000\$ \$ 750,0000\$ \$ 750,000\$ \$ 750,000\$ \$ 750,000			4	10 10 1 1 1 1 1 1 1 1 1	\$ 240,000 \$ 240,000 \$ 100,000 \$ 3	\$ 240,000 \$ 100,000 \$ 100,000 \$ 580,000 \$ 80,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 250,000 \$ 2,500,000 \$ 3,225,478 \$ 114,225,942 \$ 114,220 \$ 3,214,200 \$ 114,200 \$		
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Sub-total ROW (D) Sub-total ROW (D) Sub-total Row (D) Sub-total Stations/Parking (E) Utilities Sub-total Stations/Parking (E) Sub-total Vehicles Sub-total Vehicles Sub-total Vehicles Sub-total Maintenance Facilities Sub-total Construction Elements Sub-total States Sub-total States Sub-total Construction Elements Sub-total Construction Eleme	Procure An Anton- Washington/Liberty Station Site Procure Washington Station Site Procure Mainteen Like Station Site Procure Instantia Station Construct Manuface Like Station Construct Manuface Like Station Construct Manuface Like Station Construct Manuface Like Station Construct Manuface Station Construct Ann Andre Registry Station Construct Ann Andre Middiay Layover MOC Construct Ann Andre Middiay Layover Facility Construct Howell Overnight Layover Facility Construct Manuface Manuface Station Station and Layover MOC Construct Manuface Manuface Station Station and Layover And Manuface Station Station and Layover And Construct Manuface Manuface Manuer Reguest 40 CFR 37.42 Development of ANA Compliance Waver Reguest 40 CFR 27.40 Development of ANA Compliance Waver Reguest 40 CFR 27.42 Development of Construct Manuface Manuface Station Registry Advertising Program Properties of Manuface Intervent Statistion Registry Advertising Program Properties Statistics Program and Careating Program Properties Program and Careating Program Properties Program an	ACRE EA	\$ 100,000 \$ 20,000 \$ 145,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 750,000 \$ 720,000 \$ 720,0000\$ \$ 720,000\$			4		\$ 240,000 \$ 240,000 \$ 100,000 \$ 3 \$ 3 \$ 3 \$ 1,000,000 \$ 3 \$ 1,000,000 \$ 7,000,000 \$ 7,000,000 \$ - \$ 2,000,000 \$ 2,000,000 \$ 2,000,000 \$ 2,000,000 \$ 2,000,000 \$ 2,000,000 \$ 4,240,000 \$ 4,240,000 \$ 4,240,000 \$ 1,4,200,000 \$ 1,4,200,000 \$ 1,4,200,000 \$ 1,4,200,000 \$ 1,4,200,000 \$ 1,4,200,000 \$ 1,4,200,000 \$ 1,4,200,000 \$ 1,4,200,000 \$ 1,4,200,000 \$ 1,4,200,000 <td>\$ 240,000 \$ 100,000 \$ 100,000 \$ 580,000 \$ 580,000 \$ 10,000,000 \$ 1,000,000 \$ 1,000,000 \$ 750,000 \$ 750,000 \$ 2,500,000 \$ 2,500,000 \$ 2,500,000 \$ 2,500,000 \$ 2,500,000 \$ 2,500,000 \$ 2,500,000 \$ 2,500,000 \$ 2,500,000 \$ 4,240,000 \$ 14,225,942 \$ 14,225,942 \$ 14,225,942 \$ 13,600 \$ 7,100 \$ 28,400 \$ 14,200 \$ 14,202,000 \$ 14,202,000 \$ 14,200 \$ 14,200 \$ 12,84,000 \$ 12,20,000 \$ 12,84,000 \$ 12,84,000 \$ 12,84,000 \$ 12,84,000 \$ 12,200,000 \$ 12,200,000 \$ 12,200,000 \$ 10,02,000 \$ 10,02,000 \$ 10,02,000</td> <td>\$ 9,337,846 \$ 9,337,846 \$ 23,028,391 \$ 23,028,391</td> <td></td>	\$ 240,000 \$ 100,000 \$ 100,000 \$ 580,000 \$ 580,000 \$ 10,000,000 \$ 1,000,000 \$ 1,000,000 \$ 750,000 \$ 750,000 \$ 2,500,000 \$ 2,500,000 \$ 2,500,000 \$ 2,500,000 \$ 2,500,000 \$ 2,500,000 \$ 2,500,000 \$ 2,500,000 \$ 2,500,000 \$ 4,240,000 \$ 14,225,942 \$ 14,225,942 \$ 14,225,942 \$ 13,600 \$ 7,100 \$ 28,400 \$ 14,200 \$ 14,202,000 \$ 14,202,000 \$ 14,200 \$ 14,200 \$ 12,84,000 \$ 12,20,000 \$ 12,84,000 \$ 12,84,000 \$ 12,84,000 \$ 12,84,000 \$ 12,200,000 \$ 12,200,000 \$ 12,200,000 \$ 10,02,000 \$ 10,02,000 \$ 10,02,000	\$ 9,337,846 \$ 9,337,846 \$ 23,028,391 \$ 23,028,391	
Sub-total ROW (D) Sub-total ROW (D) Sub-total Row (D) Sub-total Stations/Parking Sub-total Stations/Parking (E) Sub-total Stations/Parking (E) Sub-total Vehicles Sub-total Vehicles Sub-total Maintenance Facilities Sub-total Maintenance Facilities Sub-total Maintenance Facilities Sub-total Allocations for Special Elements (F) Sub-total Allocations for Special Elements Sub-total Construction Elements Sub-total Co	Procure An Anton- Washington/Liberty Station Site Procure Multimore Like Station Construct Mannus Like Station Procure Station Site Procure Multimore Like Station Construct Multimore Station and Layover MOCC Construct Multimore Multimore Multimore Multimore Construct Multimore Multimore Multimore Multimore Construct Multimore Multimore Multimore Multimore Construct Multimore Multimore Station Construct Multimore Multimore Multimore Multimore Multimore Construct Multimore Multimore Multimore Multimore Construct Multimore Multimore Multimore Multimore Multimore Multimore Multimore Construct Multimore Multimor	ACRE EA	\$ 100,000 \$ 20,000 \$ 145,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 20,000 \$ 750,000 \$ 720,000 \$ 720,0000\$ \$ 720,000\$			4		\$ 240,000 \$ 240,000 \$ 100,000 \$ 30,000 \$ 30,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 2,000,000 \$ 1,000,000 \$ 1,000,000 \$ 2,000,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 1,000,000 \$ 2,000,000 \$ 2,000,000 \$ 2,000,000 \$ 2,000,000 \$ 2,000,000,000 <td>\$ 240,000 \$ 100,000 \$ 100,000 \$ 580,000 \$ 580,000 \$ 580,000 \$ 10,000,000 \$ 1,000,000 \$ 1,000,000 \$ 2,000,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 25,0000 \$ 20,0000 \$ 42,400,000 \$ 13,600 \$ 13,600 \$ 14,220 \$ 14,220 \$ 14,200 \$ 14,200 \$ 14,200 \$ 14,200 \$ 128,400 \$ 24,200 \$ 128,400 \$ 24,200 \$ 128,400 \$ 24,200 \$ 128,400 \$ 5,1,138,934 \$ 5,1,1</td> <td>\$ 9,337,846 \$ 9,337,846 \$ 23,028,391 \$ 23,028,391 \$ 27,634,069 \$ 27,634,069</td> <td>Reduced Maintenand Facility functionality</td>	\$ 240,000 \$ 100,000 \$ 100,000 \$ 580,000 \$ 580,000 \$ 580,000 \$ 10,000,000 \$ 1,000,000 \$ 1,000,000 \$ 2,000,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 750,000 \$ 25,0000 \$ 20,0000 \$ 42,400,000 \$ 13,600 \$ 13,600 \$ 14,220 \$ 14,220 \$ 14,200 \$ 14,200 \$ 14,200 \$ 14,200 \$ 128,400 \$ 24,200 \$ 128,400 \$ 24,200 \$ 128,400 \$ 24,200 \$ 128,400 \$ 5,1,138,934 \$ 5,1,1	\$ 9,337,846 \$ 9,337,846 \$ 23,028,391 \$ 23,028,391 \$ 27,634,069 \$ 27,634,069	Reduced Maintenand Facility functionality

	North-South Commuter Rail			Barton Road Station to Whitmore Lake Station Site #1	Barton Layover/Station Track	8 Mile Layover/Station Track				
	Option 4A: Minimum Operable Configuration (MOC) w/ PTC High and Low Estimates	Host Carrier		Great Lakes Central RR	Great Lakes Central RR	Great Lakes Central RR				
	1/13/2016	Mileposts From - To		47.5-57.6			Systemwide	JJR/Quandel Cost Total-High Estimate	JJR/Quandel Cost Total- Low Estimate Delta	Potential Cost Reduction
		Route Miles		10.1 miles						
		Maximum Authorized Speed		40 MPH						
Trackw	Cost Element	Unit	Unit Cost	Quantity	Quantity	Quantity				
	Add Rail Spikes Eliminate Joint (Inspect, Crop, and Weld) Replace Switch Timbers	EA MI EA	\$ 2 \$ 118,519 \$ 250					\$ 28,593 \$ - \$ 1,000	\$ 28,593 \$ - \$ 1,000	
	Replace Turnott Switch Point Install Heel Block	EA EA	\$ 3,500 \$ 1,000	2				\$ 7,000 \$ 2,000	\$ 7,000 \$ 2,000	
	Replace Frog Replace Rail with 115 CWR Remove Turnouts (Pocket Track)	EA LFT EA	\$ 15,000 \$ 70 \$ 4,000					\$ 60,000 \$ - \$ -	\$ 60,000 \$ - \$ -	
	Construct Track: Ballasted (at-grade) Install #10 Turnout - Timber	TF EA	\$ 310 \$ 93,302		450 1	1013 1		\$ 453,530 \$ 186,604	\$ 453,530 \$ 186,604	
	Install Split Point Derail Install S0% Tie Replacement Surface Align and Ballast	EA MI MI	\$ 60,000 \$ 444,000 \$ 100,000		1	1		\$ 540,000 \$ - \$ -	\$ 540,000 \$ - \$ -	
	Install New Guardrail on Washington St. Bridge, MP. 45.48 Install New Guardrail and Redeck Timbers on Huron St. Bridge, MP 45.55	FT FT	\$ 40 \$ 100 \$ 100					\$ - \$ - \$ -	\$ - \$ -	
	Install New Guardrail and Redeck Timbers on Miller Ave., MP 45.69 Install New Guardrail and Redeck Timbers on Felch St. MP 45.89 Rebuild Ballst at Private Grade Crossing at MP 55.55	FT FT TFT	\$ 100 \$ 100 \$ 50					\$ - \$ -	\$ - \$ - \$ -	
	Rebuild and Improve Drainage at Crioked Lake Rd MP 69.40 Rebuild and Improve Drainage at Chilson Rd MP 65.99	TFT TFT	\$ 900 \$ 900					\$ -	\$ - \$ -	
Sub-tot	Rebuild and Improve Drainage at Private Crossing MP 65.5	TFT	\$ 900					\$ - \$ - \$ 1,278,727	\$ - \$ - \$ 1,278,727	
System	stall Electric Lock for Industry Turnout	EA	\$ 120,000	7	1	1		\$ 1,080,000	\$ 1,080,000	
	Install New Control Point (CP) for Temporal Separation with split point derail with bungalow, switch machine, home and remote signals	EA	\$ 700,000		1	1		\$ 1,400,000	\$ 1,400,000	
	Install Crossing Diamond Install Derail Control Point Install Install Intermediate	EA EA	\$ 1,280,000 \$ 700,000 \$ 280,000					\$ - \$ -	\$ - \$ - \$ 1,120,000	
Sub-tot	Install Locomotive On-Board Systems (Passenger and Freight) al Hardware	EA	\$ 100,000				8	\$ 800,000 \$ 4,400,000	\$ 800,000 \$ 4,400,000	
	Systems Integration: Communications, Back office, dispatch, PTCDP, PTCSP	EA	82%					\$ 3,600,000	\$ 3,600,000	
Sub-tot Crossin	al Systems +Hardware							\$ 8,000,000	\$ 8,000,000	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Liberty Street, MP 45.4 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Summit Street, MP 46.09	EA EA	\$ 166,000 \$ 166,000					\$ - \$ -	\$ - \$ -	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Wright Street, MP 46.57 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Longshore Street, MP 46.6 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Pontiac Trail, MP 46.64	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000					\$ - \$ - \$ -	> - \$ - \$ -	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Bowen Street, MP 46.71 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Traver Street, MP 46.74	EA EA	\$ 166,000 \$ 166,000					\$ - \$ -	\$ - \$ -	
	Install Grade Crossing Start Modification at Barton Road, MP 47.19 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Barton Street, MP 47.19 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Traver Street, MP 48.39	EA EA EA	\$ 50,000 \$ 166,000 \$ 166,000					\$ 50,000 \$ - \$ -	\$ 50,000 \$ - \$ -	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Pontiac Trail, MP 49.71 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Warren Road, MP 50.02	EA EA	\$ 166,000 \$ 166,000	1				\$ 166,000 \$ 166,000	\$ 83,000 \$ 83,000	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Joy Road, MP 50.90 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Northfield Church Road, MP 51.90 Replace Existing Warning System with New Gates, Flashers, and Bungalow at N. Territorial Road, MP 53.19	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000					\$ - \$ - \$ -	\$ - \$ - \$ -	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at 5 Mile Road, MP 53.91 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Main Street, MP 56.35	EA EA	\$ 166,000 \$ 166,000	1				\$ - \$ 166,000	\$ - \$ 83,000	
	Install Grade Crossing Start Modification at 8 Mile, MP 57.56 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Hall Road, MP 58.75 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Strawberry Lake Road, MP 59.02	EA EA EA	\$ 50,000 \$ 166,000 \$ 166,000					\$ 50,000 \$ - \$ -	\$ 50,000 \$ - \$ -	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Hamburg Road, MP 59.45 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Merrill Road, MP 60.53	EA EA	\$ 166,000 \$ 166,000					\$ - \$ -	\$ - \$ -	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Pettys Drive, MP 61.52 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Private-Trail Hamburg Township MP 61.7 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Girard Road, MP 61.84	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000					\$ - \$ - \$ -	+	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Kress Road, MP 62.23 Replace Existing Warning System with New Gates, Flashers, and Bungalow at M-36, MP 62.52	EA EA	\$ 166,000 \$ 166,000					\$ - \$ -	\$ - \$ -	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Swarthout Road, MP 64.3 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Bishop Lake Road, MP 65.36 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Chilson Road, MP 65.99	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000					\$ - \$ - \$ -	\$ - \$ - \$ -	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Coon Lake Road, MP 67.73 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Crooked Lake Road, MP 69.40	EA EA	\$ 166,000 \$ 166,000					\$ \$	\$ - \$ -	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Beck Road, MP 71.02 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Barnard Street, MP 73.68	EA	\$ 166,000 \$ 166,000					\$ - \$ -	\$ - \$ -	Allowance for MDOT Diagnostic
	al Crossings (C)							\$ 598,000	\$ 349,000 \$ 249,0	00 Review Reductions
ROW	Procure Howell Overnight Maintenance and Layover Facility Site Procure Ann Arbor- Washington/Liberty Station Site	ACRE	\$ 20,000 \$ 100,000					\$ - \$ -	\$ - \$ -	
	Procure Ann Arbor-Barton Station Site Procure Whitmore Lake Station Site	ACRE ACRE	\$ 20,000 \$ 145,000		1	4		\$ 20,000 \$ 580,000	\$ 20,000 \$ 580,000	
	Procure Hamburg Station Site Procure Genoa Township Station Site Procure Howell Station Site Procure Howell Station Site	ACRE ACRE ACRE	\$ 20,000 \$ 20,000 \$ 20,000					\$ - \$ - \$ -	\$ - \$ -	
Sub-tot	al ROW (D)	, none	20,000					\$ 600,000	\$ 600,000	
Station	/Parking [Construct Ann Arbor- Washington/Liberty Station	EA	\$ 1,000,000					\$ -	\$	
	Construct Ann Arbor-Barton Station Construct Whitmore Lake Station	EA EA	\$ 750,000 \$ 750,000					\$ \$	\$ - \$ -	
	Construct Hamburg Station Construct Genoa Township Station Construct Howell Station	EA EA EA	\$ 750,000 \$ 750,000 \$ 750,000					\$ - \$ - \$ -	\$ - \$ -	
Sub-tot	Construct Howell Station al Stations/Parking (E)		, /SU,UUU					\$ \$	\$	
Vehicle	S Procure Locomotives	EA	ś -					\$ -	\$ -	
	Procure Cars (Coaches and Cab Cars) Procure Hybrid Bus (new)	EA EA	\$ - \$ 665,000				6	\$ - \$ 3,990,000	\$ - \$ 3,990,000	
Sub-to-	Procure Agency Automobiles al Vehicles	EA	\$ 25,000				6	\$ 150,000 \$ 4,140,000	\$ 150,000 \$ 4,140,000	
	nance Facilities									
	Construct Ann Arbor Barton Station and Layover MOC Construct 8 Mile Station and Layover MOC Construct Ann Arbor Midday Layover Facility	EA EA EA	\$ 385,000 \$ 2,679,142 \$ 6,967,464		1	1		\$ 385,000 \$ 2,679,142	\$ 385,000 \$ 2,341,900	Eliminate train shed
	Construct Howell Overnight Layover Facility	EA	\$ 16,596,324							
Sub-tot	al Maintenance Facilities (F)							\$ 3,064,142	\$ 2,726,900 \$ 337,2	42 Reduced Maintenance Facility functionality
Allocat	l ons for Special Elements Development of ADA Compliance Waiver Request 49 CFR 37.42	LS	\$ 13,600				1	\$ 13,600	\$ 13,600	
	Development of Modifications to Operating Rules, Timetables, and Timetable Special Instructions 49 CFR 217.7(a) Development of Operational Tests and Inspection Program 49 CFR 217.7(b) Development of Training Program on Operating Rules 49 CFR 217.9(b)	LS LS LS	\$ 28,400 \$ 14,200 \$ 14,200				1 1 1	\$ 28,400 \$ 14,200 \$ 14,200	\$ 28,400 \$ 14,200 \$ 14,200	
	Develop Emergency Preparedness Plan and train employees 49 CFR 101 and 201 Modify Conductor Certification Program 49 CFR 242.103	LS LS	\$ 14,200 \$ 7,100				1 1	\$ 14,200 \$ 7,100	\$ 14,200 \$ 7,100	
	Prepare System Safety Program and Collision Hazard Analysis 49 CFR 270 (proposed rule) Develop and implement Training and Trial Running Program Advertising of Service in the Media and Development of Website	LS LS LS	\$ 19,600 \$ 74,400 \$ 17,100				1 1 1	\$ 19,600 \$ 74,400 \$ 17,100	\$ 19,600 \$ 74,400 \$ 17,100	
	Development and Printing of Schedules and User Information Procure and Train Fare Collection System including Hardware and Software	LS LS	\$ 24,200 \$ 128,400				1	\$ 24,200 \$ 128,400	\$ 24,200 \$ 128,400	
Sub-To-	Develop and Implement Local Grade Crossing Safety Advertising Program Prepare PTCIP al Allocations for Special Elements (E)	LS LS	\$ 23,100 \$ 102,000				1	\$ 23,100 \$ 102,000 \$ 480,500	\$ 23,100 \$ 102,000 \$ 480,500	
	al Allocations for Special Lements (L) al Construction Elements (A+B+C+D+E+F)							\$ 480,500 \$ 18,161,369		42
Conting	ency Contingency		20%					\$ 3,632,274	\$ 3,515,025 \$ 117,2	48
	al Construction Elements and Contingency		2070					\$ 3,632,274 \$ 21,793,643	\$ 3,515,025 \$ 117,2 \$ 21,090,153 \$ 703,4	
Profess	ional Services and Environmental Design Engineering Insurance and Bonding	15% 2%						\$ 3,269,046 \$ 435,873	\$ 3,163,523 \$ 421,803	
	Program Management Construction Management & Inspection	4% 10%						\$ 871,746 \$ 2,179,364	\$ 843,606 \$ 2,109,015	
Subtot	Engineering Services During Construction al Professional Services and Environmental	2%	33%					\$ 435,873 \$ 7,191,902	\$ 421,803 \$ 6,959,750 \$ 232,1	52
305-101		i.	i.			1		1	\$ 28,049,903 \$ 935,6	

	North-South Commuter Rail			Barton Road Station to Whitmore Lake	Barton Layover/Sta	8 Mile Layover/Station				
	Option 48: Minimum Operable Configuration (MOC) without PTC High and Low Estimates	Host Carrier		Great Lakes Central RR	tion Track Great Lakes Central RR	Track Great Lakes Central RR				
	1/13/2016	Mileposts From - To		47.5-57.6	Central RK	RK	Systemwide	JJR/Quandel Cost Total	JJR/Quandel Cost Total-Low Estimate	Delta Potential Cost Reduction
		Route Miles		10.1 miles				Total	Listinate	
		Maximum Authorized		40 MPH						
	Anthron	Speed	Unit Cost		Quantitu	Quantitu				
Trackw	Add Rail Spikes	EA	Unit Cost \$ 2	Quantity 14297	Quantity	Quantity		\$ 28,593	\$ 28,593	
	Eliminate Joint (Inspect, Crop, and Weid) Replace Switch Timbers Replace Turnot Switch Point	EA EA	\$ 118,519 \$ 250 \$ 3,500	4				\$ - \$ 1,000 \$ 7,000		
	Instal Heel Block Replace Frog Replace Rail with 115 CWR	EA EA LFT	\$ 1,000 \$ 15,000 \$ 70	2 4				\$ 2,000 \$ 60,000 \$ -		
	Remove Turnouts (Pocket Track) Construct Track: Ballasted (at-grade)	EA TF	\$ 4,000 \$ 310		450	1013		\$ - \$ 453,530		
	Install #10 Turnout - Timber Install Split Point Derail Install 50 Er Replacement	EA EA MI	\$ 93,302 \$ 60,000 \$ 444,000	7	1	1		\$ 186,604 \$ 540,000 \$ -	\$ 186,604 \$ 540,000 \$ -	
	Surface Align and Ballast Instail New Guardrail on Washington St. Bridge, MP. 45.48 Instail New Guardrail and Redeck Timbers on Huron St. Bridge, MP 45.55	MI FT FT	\$ 100,000 \$ 40 \$ 100					\$ - \$ - \$ -	\$ - \$ -	
	Install New Guardrail and Redeck Timbers on Miller Ave., MP 45.69 Install New Guardrail and Redeck Timbers on Felch St. MP 45.89	FT FT	\$ 100 \$ 100					\$ - \$ -	\$ - \$ -	
	Rebuild Ballast at Private Grade Crossing at MP 55.55 Rebuild and Improve Drainage at Crooked Lake Rd MP 69.40 Rebuild and Improve Drainage at Chilson Rd MP 65.99	TFT TFT TFT	\$ 50 \$ 900 \$ 900					\$ - \$ - \$ -		
Sub tot	Rebuild and Improve Drainage at Private Crossing MP 65.5	TFT	\$ 900					\$ - \$ - \$ 1,278,727	\$ - \$ - \$ 1,278,727	
Sub-tot	i rackwork (A)							\$ 1,278,727	\$ 1,278,727	
	Install Electric Lock for Industry Turnout Install New Control Point (CP) for Temporal Separation with split point derail with bungalow, switch machine, home and remote signals	EA	\$ 120,000 \$ 700,000	7	1	1		\$ 1,080,000 \$ 1,400,000	\$ 1,080,000 \$ 1,400,000	
	Install Crossing Diamond Install Derail Control Point	EA EA	\$ 1,280,000 \$ 700,000					\$ - \$ -	\$ - \$ -	
Sub-tot	Install Intermediate Install Locomotive On-Board Systems (Passenger and Freight) Hardware Hardware	EA	\$ 280,000 \$ 100,000	4				\$ 1,120,000 \$ - \$ 3,600,000	\$ 1,120,000 \$ 3,600,000	
	Systems Integration: Communications, Back office, dispatch, PTCDP, PTCSP	EA	82%					\$ -		
Sub-tot Crossin	\$									
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Liberty Street, MP 45.4 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Summit Street, MP 46.09 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Wright Street, MP 46.57	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000						\$ - \$ - \$ -	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Longshore Street, MP 46.6 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Pontiac Trail, MP 46.64	EA EA	\$ 166,000 \$ 166,000					\$ - \$ -	\$ - \$ -	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Bowen Street, MP 46.71 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Traver Street, MP 46.74 Install Grade Crossing Start Modification at Barton Road, MP 47.19	EA EA EA	\$ 166,000 \$ 166,000 \$ 50,000	1				\$ - \$ - \$ 50,000	\$ -	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Barton Street, MP 47.19 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Traver Street, MP 48.39	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000	1				\$ - \$ - \$ 166,000	\$ - \$ - \$ 83,000	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Pontiac Trail, MP 49.71 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Warren Road, MP 50.02 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Joy Road, MP 50.90	EA EA	\$ 166,000 \$ 166,000	-				\$ 166,000 \$ 166,000	\$ 83,000	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Northfield Church Road, MP 51.90 Replace Existing Warning System with New Gates, Flashers, and Bungalow at N. Territorial Road, MP 53.19 Replace Existing Warning System with New Gates, Flashers, and Bungalow at S. Mie Road, MP 53.91	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000					\$ - \$ - \$ -	<u>\$</u> - <u>\$</u> - \$-	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Main Street, MP 56.35 Install Grade Crossing Start Modification at 8 Mile, MP 57.56	EA EA	\$ 166,000 \$ 50,000	1				\$ 166,000 \$ 50,000	\$ 83,000 \$ 50,000	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Hall Road, MP 58.75 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Strawberry Lake Road, MP 59.02 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Hamburg Road, MP 59.45	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000					\$ - \$ - \$ -	\$ - \$ -	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Merrill Road, MP 60.53 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Pettys Drive, MP 61.52 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Private-Trail Hamburg Township MP 61.7	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000					\$ - \$ - \$ -		
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Girard Road, MP 61.84 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Kress Road, MP 62.23	EA EA	\$ 166,000 \$ 166,000					\$ - \$ -	\$ - \$ -	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at M-36, MP 62.52 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Swarthout Road, MP 64.3 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Bishop Lake Road, MP 65.36	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000						\$ - \$ - \$ -	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Chlison Road, MP 65 99 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Coon Lake Road, MP 67.73 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Crookel Lake Road, MP 69.40	EA EA EA	\$ 166,000 \$ 166,000 \$ 166,000					\$ - \$ - \$ -	\$ -	
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Beck Road, MP 71.02 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Barnard Street, MP 73.68	EA EA EA	\$ 166,000 \$ 166,000					\$ - \$ -	\$ - \$ -	
Sub-tot	(C)							\$ 548,000	\$ 349,000	\$ 199,000 Allowance for MDOT Diagnostic Review Reductions
	Procure Howell Overnight Maintenance and Layover Facility Site Procure An Arbor- Washington/Lberry Station Site Procure Ann Arbor-Barton Station Site	ACRE ACRE ACRE	\$ 20,000 \$ 100,000 \$ 20,000		1			\$ - \$ - \$ 20,000	\$ - \$ - \$ 20,000	
	Procure Whitmore Lake Station Site Procure Hamburg Station Site	ACRE ACRE	\$ 145,000 \$ 20,000		1	4		\$ 580,000 \$ -	\$ 20,000 \$ 580,000 \$ -	
	Procure Genoa Township Station Site Procure Howell Station Site	ACRE	\$ 20,000 \$ 20,000					\$ - \$ -	\$ - \$ -	
	I ROW (D)							\$ 600,000	\$ 600,000	
Station	/Parking Construct Ann Arbor-Washington/Liberty Station Construct Ann Arbor-Barton Station	EA EA	\$ 1,000,000 \$ 750,000					\$ - \$ -	\$ - \$ -	
	Construct Whitmore Lake Station Construct Hamburg Station Construct Gene Township Station Construct Gene Township Station	EA EA EA	\$ 750,000 \$ 750,000 \$ 750,000						\$ - \$ - \$ -	
	Construct Howell Station	EA	\$ 750,000					\$-	\$ -	
Sub-tot Vehicle	I Stations/Parking (E)							\$ -	\$ -	
	Procure Locomotives Procure Cars (Coaches and Cab Cars)	EA EA EA	\$ - \$ - \$ 665,000				6	\$ - \$ - \$ 3,990,000	\$ - \$ - \$ 3,990,000	
	Procure Hybrid Bus (new) Procure Agency Automobiles	EA	\$ 665,000 \$ 25,000				6	\$ 150,000	\$ 150,000	
	I Vehicles ance Facilities							\$ 4,140,000	\$ 4,140,000	
	Construct Ann Arbor Barton Station and Layover MOC Construct 8 Mile Station and Layover MOC	EA EA EA	\$ 385,000 \$ 2,679,142 \$ 6,967,464		1	1		\$ 385,000 \$ 2,679,142	\$ 385,000 \$ 2,341,900	Eliminate train shed
	Construct Ann Arbor Midday Layover Facility Construct Howell Overnight Layover Facility	EA	\$ 6,967,464 \$ 16,596,324							
	I Maintenance Facilities (F) ons for Special Elements							\$ 3,064,142	\$ 2,726,900	\$ 337,242 Reduced Maintenance Facility functionality
	Development of ADA Compliance Waiver Request 49 CFR 37.42 Development of Modifications to Operating Rules, Timetables, and Timetable Special Instructions 49 CFR 217.7(a)	LS LS	\$ 13,600 \$ 28,400					\$ 13,600 \$ 28,400	\$ 28,400	
E	Development of Operational Tests and Inspection Program 49 CFR 217.70 Development of Training Program on Operating Rules 49 CFR 217.90 Develop Emergency Preparedness PIAn and train employees 49 CFR 101 and 201	LS LS LS	\$ 14,200 \$ 14,200 \$ 14,200				1	\$ 14,200 \$ 14,200 \$ 14,200	\$ 14,200 \$ 14,200	
	Modify Conductor Certification Program 49 CFR 242.103 Prepare System Safety Program and Collision Hazard Analysis 49 CFR 270 (proposed rule) Develop and implement Training and Trial Running Program	LS LS	\$ 7,100 \$ 19,600 \$ 74,400					\$ 7,100 \$ 19,600 \$ 74,400	\$ 7,100 \$ 19,600	
	Advertising of Service in the Media and Development of Website Development and Printing of Schedules and User Information	LS LS LS	\$ 17,100 \$ 24,200					\$ 17,100 \$ 24,200	\$ 17,100 \$ 24,200	
-	Procure and Train Fare Collection System including Hardware and Software Develop and Implement Local Grade Crossing Safety Advertising Program Prepare PTCIP Prepare PTCIP	LS LS LS	\$ 128,400 \$ 23,100 \$ 102,000				1 1 1	\$ 128,400 \$ 23,100 \$ 102,000		
Sub-To	al Allocations for Special Elements (E)						-	\$ 480,500	\$ 480,500	\$ E26.747
Conting								\$ 13,711,369		
	Contingency I Construction Elements and Contingency		20%					\$ 2,742,274 \$ 16,453,643	\$ 2,635,025 \$ 15,810,153	\$ 107,248 \$ 643,491
Profess	onal Services and Environmental Design Engineering	15%						\$ 2,468,046.48		
E	Insurance and Bonding Program Management Construction Management & Inspection	2% 4% 10%						\$ 329,072.86 \$ 658,145.73 \$ 1,645,364	\$ 632,406 \$ 1,581,015	
	Engineering Services During Construction IProfessional Services and Environmental	2%	33%					\$ 329,073 \$ 5,429,702	\$ 316,203	\$ 212,352
	gment Cost	-	1		1			\$ 21,883,345	\$ 21,027,503	\$ 855,842

House House <th< th=""><th></th><th></th><th></th><th></th><th>Ellsworth to</th><th>1</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></th<>					Ellsworth to	1							
Description Description <thdescription< th=""> <thdescription< th=""></thdescription<></thdescription<>		North-South Commuter Rail			State St Freight	Pa	assenger Service L	imits					
PAR PAR PAR PAR PAR PAR		Option 5A: Shuttle Service: WL-BD-AA: One Train Set	Host Carrier		Ann Arbor RR			Layover/Station					
Image: 1000 and 1000 a		10/14/2016							stemwide				
Image:Imag					2.25 miles	15 MPH (44.0-	10.1 miles			-			
Image Image <t< td=""><td></td><td></td><td></td><td></td><td></td><td>47.19)</td><td>60 MPH</td><td></td><td></td><td></td><td></td><td></td><td></td></t<>						47.19)	60 MPH						
SectorSect		Cost Element	Unit	Unit Cost	Quantity	(47.19-47.5)	Quantity	Quantity					
Subset Subset </td <td></td> <td></td> <td></td> <td>\$ 2 \$ 118,519</td> <td></td> <td>7083</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>				\$ 2 \$ 118,519		7083							
Indee to the problem of the problem		Replace Switch Timbers Replace Turnout Switch Point	EA	\$ 250 \$ 3,500			4			\$ 1,000 \$ 7,000			
Image in the second s		Replace Frog Replace Rail with 115 CWR	EA LFT	\$ 15,000 \$ 70		18,480				\$ 60,000			
Mathem Mathm Mathm Mathm <td></td> <td>Construct Track: Ballasted (at-grade)</td> <td>TF</td> <td>\$ 310</td> <td></td> <td></td> <td></td> <td>1013</td> <td></td> <td></td> <td></td> <td></td> <td></td>		Construct Track: Ballasted (at-grade)	TF	\$ 310				1013					
Product of the sectorProduct of the secto		Install 50% Tie Replacement	MI	\$ 444,000		3.5	6	1		\$ 1,554,000			
Image and a sector of the sector of		Install New Guardrail on Washington St. Bridge, MP. 45.48 Install New Guardrail and Redeck Timbers on Huron St. Bridge, MP 45.55	FT FT	\$ 40 \$ 100		80 95				\$ 3,200 \$ 9,500			
Description Description <thdescription< th=""> <thdescription< th=""></thdescription<></thdescription<>		Install New Guardrail and Redeck Timbers on Felch St. MP 45.89 Rebuild Ballast at Private Grade Crossing at MP 55.55	FT TFT	\$ 100 \$ 50			100			\$ 8,500			
Ansame Ansame <td></td> <td>Rebuild and Improve Drainage at Chilson Rd MP 65.99</td> <td>TFT</td> <td>\$ 900</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>\$ - \$ -</td> <td></td> <td></td> <td></td>		Rebuild and Improve Drainage at Chilson Rd MP 65.99	TFT	\$ 900						\$ - \$ -			
PACE PACE PACE PACE PA													
Image: Section of the section of										\$ 12,366,162			
Image: state of the state of		Install New Control Point (CP) for Temporal Separation with split point derail with bungalow, switch machine, home and remote	EA	\$ 700,000				2		\$ 1,400,000			
Description D <thd< th=""> D <thd< th=""> D <thd< th=""> <thd< <="" td=""><td></td><td>Install Control Point for End of Siding with Derail Install Intermediate</td><td>EA EA</td><td>\$ 700,000 \$ 280,000</td><td></td><td></td><td></td><td></td><td></td><td>\$ 1,400,000 \$ 1,960,000</td><td>20101</td><td></td><td></td></thd<></thd<></thd<></thd<>		Install Control Point for End of Siding with Derail Install Intermediate	EA EA	\$ 700,000 \$ 280,000						\$ 1,400,000 \$ 1,960,000	20101		
PropertyProper	Sub-total Hardware									\$ 6,680,000	2 GLC freight, 4 passe	eneger for 5A, 6 passen	ger for 5B
	Sub-total Systems +Hardware (B)												
NormNo	Crossings		EA										
Introduction of the second		Replace Existing Warning System with New Gates, Flashers, and Bungalow at Wright Street, MP 46.57 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Longshore Street, MP 46.6	EA	\$ 166,000 \$ 166,000		1				\$ 166,000 \$ 166,000			
Image: state s		Replace Existing Warning System with New Gates, Flashers, and Bungalow at Pontiac Trail, MP 46.64 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Bowen Street, MP 46.71	EA	\$ 166,000 \$ 166,000		1				\$ 166,000 \$ 166,000			
Note of the original strain		Install Grade Crossing Start Modification at Barton Road, MP 47.19 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Barton Street, MP 47.19	EA	\$ 50,000 \$ 166,000						\$ - \$ 166,000			
Note of the second o		Replace Existing Warning System with New Gates, Flashers, and Bungalow at Pontiac Trail, MP 49.71	EA EA	\$ 166,000 \$ 166,000			1			\$ 166,000			
NormalNorma		Replace Existing Warning System with New Gates, Flashers, and Bungalow at Joy Road, MP 50.90 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Northfield Church Road, MP 51.90	EA	\$ 166,000 \$ 166,000			1			\$ 166,000 \$ 166,000			
Number of the state of the s		Replace Existing Warning System with New Gates, Flashers, and Bungalow at 5 Mile Road, MP 53.91 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Main Street, MP 56.35	EA	\$ 166,000 \$ 166,000			1			\$ 166,000 \$ 166,000			
Normal water and the state of the		Replace Existing Warning System with New Gates, Flashers, and Bungalow at Hall Road, MP 58.75 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Strawberry Lake Road, MP 59.02	EA EA	\$ 166,000 \$ 166,000			1			\$ -			
Note: Note: <th< td=""><td></td><td>Replace Existing Warning System with New Gates, Flashers, and Bungalow at Hamburg Road, MP 59.45 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Merrill Road, MP 60.53</td><td>EA</td><td>\$ 166,000</td><td></td><td></td><td></td><td></td><td></td><td>\$ - \$ - \$ -</td><td></td><td></td><td></td></th<>		Replace Existing Warning System with New Gates, Flashers, and Bungalow at Hamburg Road, MP 59.45 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Merrill Road, MP 60.53	EA	\$ 166,000						\$ - \$ - \$ -			
Note:		Replace Existing Warning System with New Gates, Flashers, and Bungalow at Private-Trail Hamburg Township MP 61.7 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Girard Road, MP 61.84	EA	\$ 166,000 \$ 166,000						\$ -			
Normal ControlNorma		Replace Existing Warning System with New Gates, Flashers, and Bungalow at M-36, MP 62.52 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Swarthout Road, MP 64.3	EA EA	\$ 166,000 \$ 166,000						\$ - \$ -			
Notice where the state of th		Replace Existing Warning System with New Gates, Flashers, and Bungalow at Chilson Road, MP 65.99	EA	\$ 166,000						\$ -			
StatemanStatema		Replace Existing Warning System with New Gates, Flashers, and Bungalow at Crooked Lake Road, MP 69.40 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Beck Road, MP 71.02	EA EA	\$ 166,000 \$ 166,000						\$ - \$ -			
Prime 		Hepiace Existing Warning System with New Gates, Flashers, and Bungalow at Barnard Street, MP 73.68	EA	\$ 166,000									
Product NameProduct Name<	ROW					1				\$ - \$ 100.000			
Part of the band band band band band band band band		Procure Ann Arbor-Barton Station Site Procure Whitmore Lake Station Site	ACRE	\$ 20,000 \$ 145,000				4		\$ 20,000			
AndA		Procure Genoa Township Station Site	ACRE	\$ 20,000		<u> </u>				\$ - \$ -			
Bit of the transport of the sector]	\$ 700,000			
Image: sector of the sector	Stations/Parking	Construct Ann Arbor-Washington/Liberty Station				1	1						
Image: Sector of the sector		Construct Whitmore Lake Station Construct Hamburg Station	EA	\$ 750,000 \$ 750,000						\$ 750,000			
Image: Section of the sectin of the section of the section of th													
Prime 	Sub-total Stations/Parking (E)				-					\$ 2,500,000			
Image: state of the state o	Vehicles			s -						<u>\$</u> -			
Horizent Image		Procure Cars (Coaches and Cab Cars) Procure Hybrid Bus (new)	EA	\$ - \$ 665,000 \$ 25,000					6	\$ 3,990,000			
Image: Section of Loope Disc and Loope Disc. Ch S </td <td>Sub-total Vehicles</td> <td></td> <td>EA</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>\$ -</td> <td></td> <td></td> <td></td>	Sub-total Vehicles		EA							\$ -			
Image: Sector of Loope Discription of Loope Disc. Control Andoe Discription Disc. Control Andoe Discription Discription Disc. Control Andoe Discription Disc	Maintenance Facilities												
$ \begin{array}{ $		Construct 8 Mile Station and Layover MOC and Abreviated	EA	\$ 2,609,642				1					
Anome Image: Marcine of Special Function Image: Marcine Image: Marcine Special Function <td></td> <td>Construct Howell Overnight Layover Facility</td> <td>EA</td> <td>\$ 16,596,324</td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		Construct Howell Overnight Layover Facility	EA	\$ 16,596,324		1							
Anome Image: Marcine of Special Function Image: Marcine Image: Marcine Special Function <td>Sub-total Maintenance Englisher (*)</td> <td></td>	Sub-total Maintenance Englisher (*)												
Bendingment of Adding times wave request 90 of \$1.7.2 15 5 1.400 1 5 1.000 1 1 1 1 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>- 3,352,579</td> <td></td> <td></td> <td></td>										- 3,352,579			
Development of pregnation regression and result and result method of 212 30 15 5 14.20 1 5 14.20 Development of trains pregnations result and result method res	Allocations for Special Elements	Development of ADA Compliance Waiver Request 49 CFR 37.42											
Deckip transport systematics: Yis and trans majores: 40 (2013 and 2011) 15 5 1,200 1 5 1,200 1 5 1,200 1		Development of Operational Tests and Inspection Program 49 CFR 217.7® Development of Training Program on Operating Rules 49 CFR 217.9®	LS LS	\$ 14,200 \$ 14,200					1	\$ 14,200 \$ 14,200			
Decise and implement Tailoung Regam 15 5 7.400 1 7.400 1 7.400 1 7.400 1 7.400 1 7.400 1 7.400 1 7.400 1 7.400 1 7.400 1 7.400 1 7.400 1 7.400 1 7.400 1 7.400 1 7.400 1 7.400 1 <		Develop Emergency Preparedness Plan and train employees 49 CFR 101 and 201 Modify Conductor Certification Program 49 CFR 242.103	LS LS	\$ 7,100						\$ 7,100			
Process and insperse collection system including Hardware and Software 15 5 12.00 1 1 1 1 1 1 1 1 1 <		Develop and implement Training and Trial Running Program Advertising of Service in the Media and Development of Website	LS	\$ 74,400 \$ 17,100					1	\$ 74,400 \$ 17,100			
sub-tail dications for special interest of the second seco		Procure and Train Fare Collection System including Hardware and Software Develop and Implement Local Grade Crossing Safety Advertising Program	LS LS	\$ 128,400 \$ 23,100					1	\$ 128,400 \$ 23,100			
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$			LS	\$ 102,000				\vdash	1				
Interfer Inter										- 480,500			
contagency Imagency Ima	Sub-total Construction Elements (A+B+C+D+E+F+G)									\$ 38,390,696			
Sub-total Construction Elements and Contingency Construction Elements and Environmental Construction Elements and Elements and Bonding Construction Management & Repetion Construction Management & Repetion Construction Management & Repetion Construction Elements and Elements and Elements		Fastlanany		2011									
Configency Image: Configency <thi< td=""><td></td><td>Frausikeurk</td><td></td><td>20%</td><td></td><td></td><td></td><td></td><td></td><td>, 7,678,139</td><td></td><td></td><td></td></thi<>		Frausikeurk		20%						, 7,678,139			
Environmental Image: Imag										\$ 46,068,835			
Design Engineering Design Engineering 15% F F S													
Construction Management & Inspection 10% Image: Construction Management & Inspection 5 4,006,881 Image: Construction 5 9,21,377 Image: Construction 2 3 Image: Construction 3 Image: Construction 3 Image: Construction 3 Image: Construction 3 3 3		Insurance and Bonding	2%							\$ 921,377			
		Construction Management & Inspection	10%							\$ 4,606,884			
				33%						\$ 15,202,715.67			
Total Segment Cost \$ 61,271,551	Total Segment Cost												

	North-South Commuter Rail				Ellsworth to								
					State St Freight Only	Pa	assenger Service L	imits					
1	Option 5B: Shuttle Service: WL-BD-AA: Two Train Sets	Host Ca	rrier		Ann Arbor RR	Ann Arbor RR	Great Lakes Central RR	8 Mile Layover/Station Track					
	10/14/2016	Mileposts F			41.75-44.0	44.0-47.5	47.5-57.6	THE	Systemwide	JJR/Quandel Cost Total- High Estimate			
		Route M	Ailes		2.25 miles	3.5 miles 15 MPH (44.0- 45.4) 30	10.1 miles						
		Maximum A Spee				MPH (45.4- 47.19) 60MPH	60 MPH						
	Cost Element	Uni	t	Unit Cost	Quantity	(47.19-47.5)	Quantity	Quantity					
Trackwork	Add Rail Spikes Eliminate Joint (Inspect, Crop, and Weld)	EA MI		\$ 2 \$ 118,519		7083	14297 10.1			\$ 42,760 \$ 1,197,037			
	Replace Switch Timbers Replace Turnout Switch Point Install Heel Block	EA EA EA		\$ 250 \$ 3,500 \$ 1,000			4 2 2			\$ 1,000 \$ 7,000 \$ 2,000			
	Replace Frog Replace Rail with 115 CWR	EA LFT		\$ 15,000 \$ 70		18,480	4			\$ 60,000 \$ 1,293,600			
	Remove Turnouts (Pocket Track) Construct Track: Ballasted (at grade) Install #10 Turnout - Timber	EA TF EA		\$ 4,000 \$ 310 \$ 93,302	21,477 4			1013		\$ - \$ 6,971,857 \$ 373,208			
	Install Split Point Derail Install SD% Tie Replacement Surface Align and Ballast	EA MI MI		\$ 60,000 \$ 444,000 \$ 100,000		1 3.5 3.5	6	1		\$ 480,000 \$ 1,554,000 \$ 350,000			
	Install New Guardrail on Washington St. Bridge, MP. 45.48 Install New Guardrail and Redeck Timbers on Huron St. Bridge, MP 45.55	FT FT FT		\$ 40 \$ 100		80 95 75				\$ 3,200 \$ 9,500			
	Install New Guardrail and Redeck Timbers on Miller Ave., MP 45.69 Install New Guardrail and Redeck Timbers on Fich St. MP 45.89 Rebuild Ballist at Private Grade Crossing at MP 55.55	FT TFT		\$ 100 \$ 100 \$ 50		85	100			\$ 7,500 \$ 8,500 \$ 5,000			
	Rebuild and Improve Drainage at Crooked Lake Rd MP 69.40 Rebuild and Improve Drainage at Chilson Rd MP 65.99 Rebuild and Improve Drainage at Private Crossing MP 65.5	TFT TFT TFT		\$ 900 \$ 900 \$ 900						\$ - \$ -			
	Repuile and improve dramage at Private Crossing MP 05.5	IFI		\$ 900						\$ -			
Sub-total Trackwork (A) Systems										\$ 12,366,162			
	Install Electric Lock for Hand Operated Turnout Install New Control Point (CP) for Temporal Separation with split point derail with bungalow, switch machine, home and remote	EA EA		\$ 120,000 \$ 700,000		2	5	2		\$ 1,080,000 \$ 1,400,000	Osmer wes	t siding becomes remote	ly operated CP
	Install Crossing Diamond Install Control Point for End of Siding with Derail Install Control Point for End of Siding with Derail Install Intermediate	EA EA EA		\$ 1,280,000 \$ 700,000 \$ 280,000		1 2	3			\$ 2,800,000 \$ 1,960,000	Osmer wes	t siding becomes remote	ly operated CP
Sub-total Hardware	Install Locomotive On-Board Systems (Passenger and Freight) Systems Integration: Communications, Back office, dispatch, PTCDP, PTCSP	EA		\$ 100,000					8	\$ 800,000 2 \$ 8,040,000	GLC freight, 4 pass	eneger for 5A, 6 passeng	er for 5B
Sub-total Systems +Hardware (B)	Pracess in Egisteric Communications, BBCK Office, Objectiv, PTCDP, PTCSP	EA		82%						\$ 6,578,182 \$ 14,618,182			
Crossings	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Liberty Street, MP 45.4	EA		\$ 166,000		1				\$ 166,000			
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Summit Street, MP 46.09 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Wright Street, MP 46.57	EA EA		\$ 166,000 \$ 166,000		1 1				\$ 166,000 \$ 166,000			
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Longshore Street, MP 46.6 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Pontiac Trail, MP 46.64 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Bowen Street, MP 46.71	EA EA EA		\$ 166,000 \$ 166,000 \$ 166,000		1 1 1				\$ 166,000 \$ 166,000 \$ 166,000			
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Traver Street, MP 46.74 Install Grade Crossing Start Modification at Barton Road, MP 47.19	EA EA		\$ 166,000 \$ 50,000		1				\$ 166,000 \$ -			
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Barton Street, MP 47.19 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Traver Street, MP 48.39 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Ornitac Trail, MP 49.71	EA EA EA		\$ 166,000 \$ 166,000 \$ 166,000		1	1			\$ 166,000 \$ 166,000 \$ 166,000			
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Warren Road, MP 50.02 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Joy Road, MP 50.90	EA EA EA		\$ 166,000 \$ 166,000 \$ 166,000			1 1			\$ 166,000 \$ 166,000 \$ 166,000			
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Northfield Church Road, MP 51.90 Replace Existing Warning System with New Gates, Flashers, and Bungalow at N. Territorial Road, MP 53.19 Replace Existing Warning System with New Gates, Flashers, and Bungalow at S Mile Road, MP 53.31	EA EA EA		\$ 166,000 \$ 166,000 \$ 166,000			1 1			\$ 166,000 \$ 166,000 \$ 166,000			
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Main Street, MP 56.35 Install Grade Crossing Start Modification at 8 Mile, MP 57.56	EA EA EA		\$ 166,000 \$ 50,000 \$ 166,000			1			\$ 166,000 \$ 50,000			
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Hall Road, MP 58.75 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Strawberry Lake Road, MP 59.02 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Hamburg Road, MP 59.45	EA EA		\$ 166,000 \$ 166,000						\$ - \$ -			
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Merrill Road, MP 60.53 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Petrys Drive, MP 61.52 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Private-Trail Hamburg Township MP 61.7	EA EA EA		\$ 166,000 \$ 166,000 \$ 166,000						\$ - \$ -			
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Girard Road, MP 61.84 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Kress Road, MP 62.23	EA EA		\$ 166,000 \$ 166,000						\$ - \$ -			
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at M-36, MP 62.52 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Swarthout Road, MP 64.3 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Bishop Lake Road, MP 65.36	EA EA EA		\$ 166,000 \$ 166,000 \$ 166,000						\$ - \$ -			
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Chilson Road, MP 65.99 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Coon Lake Road, MP 67.73	EA EA		\$ 166,000 \$ 166,000						\$ - \$ -			
	Replace Existing Warning System with New Gates, Flashers, and Bungalow at Crooked Lake Road, MP 65.40 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Beck Road, MP 71.02 Replace Existing Warning System with New Gates, Flashers, and Bungalow at Barnard Street, MP 73.68	EA EA EA		\$ 166,000 \$ 166,000 \$ 166,000						\$ - \$ -			
Sub-total Crossings (C)										\$ 2,706,000			
KOW	Procure Howell Overnight Maintenance and Layover Facility Site Procure Ann Arbor- Washington/Liberty Station Site	ACRE ACRE		\$ 20,000 \$ 100,000		1				\$ - \$ 100,000			
	Procure Ann Arbor-Barton Station Site Procure Writtmore Lake Station Site Procure Hamburg Station Site	ACRE ACRE ACRE		\$ 20,000 \$ 145,000 \$ 20,000		1		4		\$ 20,000 \$ 580,000 \$ -			
	Procure Genoa Township Station Site Procure Howell Station Site	ACRE ACRE		\$ 20,000 \$ 20,000						\$ - \$ -			
Sub-total ROW (D)										\$ 700,000			
Stations/Parking	Construct Ann Arbor- Washington/Liberty Station Construct Ann Arbor-Barton Station	EA EA		\$ 1,000,000 \$ 750,000		1	1			\$ 1,000,000 \$ 750,000			
	Construct Whitmore Lake Station Construct Hamburg Station	EA EA		\$ 750,000 \$ 750,000			1			\$ 750,000 \$ -			
	Construct Genoa Township Station Construct Howell Station	EA EA		\$ 750,000 \$ 750,000						\$ - \$ - \$ -			
Sub-total Stations/Parking (E)	·									\$ 2,500,000			
Vehicles	Procure Locomotives	EA		<u>د</u> .						s -			
	Procure Cars (Coaches and Cab Cars) Procure Hybrid Bus (new)	EA EA		\$ - \$ 665,000 \$ 35,000					6	\$ - \$ 3,990,000			
Sub-total Vehicles	Procure Agency Automobiles	EA EA		\$ 25,000					6	\$ 150,000 \$ - \$ 4,140,000			
Maintenance Facilities	Construct Ann Arbor Barton Station and Layover MOC Construct 8 Mile Station and Layover MOC and Abreviated	EA		\$ 385,000 \$ 2,609,642				1		\$ - \$ 2,609,642			
	Construct Ann Arbor Midday Layover Facility Construct Howell Overnight Layover Facility	EA EA		\$ 6,967,464 \$ 16,596,324						\$ - \$ 742,937			
	Construct Ann Arbor Milday Layover Facility-Abreviated	EA		\$ 742,937		1			<u> </u>	- /42,937			
Sub-total Maintenance Facilities (F)										\$ 3,352,579			
Allocations for Special Elements									-				
	Development of ADA Compliance Waiver Request 49 CFR 37.42 Development of Modifications to Operating Rules, Timetables, and Timetable Special Instructions 49 CFR 217.7(a) Development of Operational Tests and Inspection Program 49 CFR 217.7(b)	LS LS LS		\$ 13,600 \$ 28,400 \$ 14,200					1 1 1	\$ 13,600 \$ 28,400 \$ 14,200			
	Development of Training Program on Operating Rules 49 CFR 217.90 Develop Emergency Preparedness Plan and train employees 49 CFR 101 and 201 Modify Conductor Certification Program 49 CFR 22.03	LS LS LS		\$ 14,200 \$ 14,200 \$ 7,100					1 1	\$ 14,200 \$ 14,200 \$ 7,100			
	Prepare System Safety Program and Collision Hazard Analysis 49 CFR 270 (proposed rule) Develop and implement Training and Trial Running Program	LS LS		\$ 19,600 \$ 74,400					1	\$ 19,600 \$ 74,400			
	Advertising of Service in the Media and Development of Website Development and Printing of Schedules and User Information Procure and Tran Fare Collection System including Hardware and Software	LS LS LS		\$ 17,100 \$ 24,200 \$ 128,400					1 1 1	\$ 17,100 \$ 24,200 \$ 128,400			
	Develop and Implement Local Grade Crossing Safety Advertising Program Prepare PTCIP	LS		\$ 23,100 \$ 102,000					1	\$ 23,100 \$ 102,000			
Sub-Total Allocations for Special Elements (G)										\$ 480,500			
Sub-total Construction Elements (A+B+C+D+E+F+G) Contingency										\$ 40,863,423			
	Contingency			20%						\$ 8,172,685			
Sub-total Construction Elements and													
Contingency										\$ 49,036,108			
Professional Services and Environmental	Paries Emilandias	459/											
	Design Engineering Insurance and Bonding Program Management	15% 2% 4%								\$ 7,355,416 \$ 980,722 \$ 1,961,444			
	Construction Management & Inspection Engineering Services During Construction	10% 2%								\$ 4,903,611 \$ 980,722			
1				33%						\$ 16,181,915.67			
Sub-total Professional Services and Environmental										5 10,101,515.07			

	1					
AA Midday Layover						
WL-BD-AA						
9/29/2016						
Minimal facility on west side of main track, south of Hoover St with single side		-	uandel Unit		JJR/Quandel Cost Total	
track, turnouts on each end, security cameras, wayside air and power, sufficient length to store entire fleet: 3-loco, 3-coach, 3-cab: 1000 ft with access road. Signal is included in main line signal costs.		Ca	osts (2014)	Quantity		
	Unit					
#10 Turnout - Timber	EA	\$	93,302	2	186,604	
#8 Ballasted Turnouts in Yard	EA	\$	70,519	0	-	
Yard Track on New Roadbed	TFT	\$	158	1000	158,000	
TrainWasher	LS	\$	3,000,000	0	-	
Parking Lot - 3" asphalt on 8" gravel base, earthwork, drainage, lighting	EA	\$	3,000	0		
Security Fence + Gate - 12' fence w/graffiti wrap	LF	\$	100	1600	160,000	
10' Wide Access Roadway	CF	\$	2	9,167	18,333	
15'x30' Crew Building	SF	\$	120	0	-	
CCTV System	L SUM	\$	50,000	1	50,000	
Electrical	VEHICLE	\$	-	0	· · ·	
Wayside Air and Power	LSUM	\$	170,000	1	170,000	50% of 21 vehicle fleet for full service
AL COST AA LAYOVER FACILITY					\$ 742,937	
Whitmore Lake Overnight Layover						
WL-BD-AA						
10/14/2016						
Modest facility on east side of main track, south of 8 Mile Rd with single side track, turnouts on each end, security cameras, wayside air and power, sufficient length to store entire fleet: 3-loco, 3-coach, 3-cab: 800 ft with access road. Signal is included in main line signal costs. Pole barn building to provide shelter for inspections and light maintenence. Small pole barn facility for infrastructure stores and small building for staff assembly and reporting.		-	uandel Unit osts (2014)	Quantity	JJR/Quandel Cost Total	
	Unit					
#10 Turnout - Timber	EA	\$	93,302	2	186,604	
#8 Ballasted Turnouts in Yard	EA	\$	70,519	0	-	
Yard Track on New Roadbed	TFT	\$	158	1000	158,000	
Parking Lot - 600 cars, 3" asphalt on 8" gravel base, earthwork, drainage,	EA	\$	3,000	600		
Security Fence + Gate - 12' fence w/graffiti wrap	LF	\$	100	1524	,	
Mobile Office - 32'x8' with utility hook-ups (Means)	EA	\$	22,000	1	\$ 22,000	
Storage Shed - 24'x20' pole barn	SF	\$	50	480	\$ 24,000	
Wayside Air and Power	LSUM	\$	170,000	1	170,000	
15'x30' Crew Building	SF	\$	120	450	54,000	
CCTV System	L SUM	\$	50,000	1	50,000	
Train Shed 275X40 Including Utilities	EA	\$	337,242	1	\$ 337,242	
	1	1				1
AL COST WHITMORE LAKE OVERNIGHT FACILITY					\$ 2,609,642	

AA Midday Layover			AA Midday Layover		
Full Service		 uandel Unit		JJR/Quandel Cost Total	
6/18/2015		osts (2014)			
	Unit		Quantity		
#10 Turnout - Timber	EA	\$ 93,302	2	186,604	
#8 Ballasted Turnouts in Yard	EA	\$ 70,519	4	282,076	
Yard Track on New Roadbed	TFT	\$ 158	5648	892,384	
TrainWasher	LS	\$ 3,000,000	1	3,000,000	
Parking Lot - 3" asphalt on 8" gravel base, earthwork, drainage, lighting	EA	\$ 3,000	30	90,000	
Security Fence + Gate - 12' fence w/graffiti wrap	LF	\$ 100	3803	380,300	
10' Wide Access Roadway	CF	\$ 2	19,360	42,979	
15'x30' Crew Building	SF	\$ 120	450	54,000	
CCTV System	L SUM	\$ 50,000	1	50,000	
Electrical	VEHICLE	\$ 82,456	20	1,649,121	
Wayside Air and Power	LSUM	\$ 340,000	1	340,000	
AL COST AA LAYOVER FACILITY				\$ 6,967,464	

Minimum Operating Configuration Alternative (Layover Facility and Station Combined)				High Cost	Low Cost	
Station/Maintenance Facilities						
Survey, Borings and Engineering	LS	\$ 80,000	1	\$ 80,000	\$ 80,000	
Mobilization	LS	\$ 10,000	1	\$ 10,000	\$ 10,000	
Site Prepartion/Demolition	LS	\$ 15,000	1	\$ 15,000	\$ 15,000	
Parking Lot - 600 cars, 3" asphalt on 8" gravel base, earthwork, drainage, lighting	EA	\$ 3,000	600	\$ 1,800,000	\$ 1,800,000	
Platform - 12' wide x 250' long, wood	SF	\$ 50	3000	\$ 150,000	\$ 150,000	
Canopy - 100' x 14'	SF	\$ 20	1400	\$ 28,000	\$ 28,000	
Signage	LS	\$ 10,000	1	\$ 10,000	\$ 10,000	
Security Fence + Gate - 12' fence w/graffiti wrap	LF	\$ 100	1524	\$ 152,400	\$ 152,400	
Lift	EA	\$ 8,000	1	\$ 8,000	\$ 8,000	
Lift Shelter	EA	\$ 2,500	1	\$ 2,500	\$ 2,500	
Mobile Office - 32'x8' with utility hook-ups (Means)	EA	\$ 22,000	1	\$ 22,000	\$ 22,000	
Storage Shed - 24'x20' pole barn	SF	\$ 50	480	\$ 24,000	\$ 24,000	
Permitting + Construction Management	EA	\$ 40,000	1	\$ 40,000	\$ 40,000	
Barton Rd Bus Transfer roadway modifications	LS	\$ 64,000		\$-	\$-	
Barton Rd 480 volt Standby Power	EA	\$ 25,000		\$-	\$-	
Train Shed 275X40 Including Utilities	EA	\$ 337,242	1	\$ 337,242		Eliminate train shed
						-
Sub-total Station/Maintenance Facilities (D)				\$ 2,679,142	\$ 2,341,900	

Howell Overnight Layover ^{6/18/2015}			del Unit Costs (2014)	GLC		/Quandel Cost I-High Estimate		'Quand I-Low E
	Unit			Quantity				
#10 Turnout - Timber	EA	\$	93,302	2	\$	186,604	\$	
#8 Ballasted Turnouts in Yard	EA	\$	70,519	7	\$	493,633		4
Yard Track on New Roadbed	TFT	\$	158	6349	\$	1,003,142	\$	1,0
Wheel Changer Cost	EA	\$	400,000	1	\$ ¢	400,000	\$	4
10' Wide Access Roadway 24' Wide Access Roadway	CF CF	\$ \$	2	17307 69545	\$ \$	38,422 154,389	\$ \$	
General Construction	SF	\$ \$	31	27120	\$ \$	834,360	ې \$	1
Sitework	SF	\$	24	27120	\$	657,848	· ·	
Concrete Work	SF	\$	45	27120	\$	1,228,023		3
Masonry	SF	\$	43	27120	\$	570,223		1
Steel	SF	\$	139	27120	\$	3,759,761		7
Carpentry	SF	\$	1	27120	\$	23,570		
Insulation, Roofing, Waterproofing	SF	\$	22	27120	\$	595,857	-	1
Doors, Windows, Openings	SF	\$	22	27120	\$	583,635	<u> </u>	1
Painting & Coatings	SF	\$	9	27120	\$	241,586		
Specialties	SF	\$	4	27120	\$	103,829	· ·	
Equipment	SF	\$	12	27120	\$	336,766		
Furniture & Accessories	SF	\$	9	27120	\$	246,136		
Safety & Fire Protection	SF	\$	9	27120	\$	240,130		
Conveying Equipment	SF	\$	34	27120	\$	922,266	Ŷ	
Plumbing & HVAC					-		<u> </u>	
	SF	\$	48	27120	\$	1,303,671		2
Electrical	VEHICLE	\$	82,456	25	\$	2,061,401	\$	1,6
Parking Lot - 3" asphalt on 8" gravel base, earthwork, drainage, lighting	EA	\$	3,000	30	\$	90,000	\$	
Security Fence + Gate - 12' fence w/graffiti wrap	LF	\$	100	5165	\$	516,500	ć	5



APPENDIX II: DESIGN CRITERIA: FACILITIES

Appendix II: Design Criteria for Maintenance and Layover Facilities

Operational Assumptions

North-South Commuter Rail trains will be stored overnight at the Howell Maintenance Facility. They will operate from Howell to Ann Arbor in the morning peak period. They will lay over at the Ann Arbor Layover facility during the day and return to Howell in the late afternoon peak period.

The commuter train fleet consists of five train sets, each with a locomotive, 3 gallery coaches and a gallery cab control car. Four train sets will be used in daily service while a fifth is in maintenance or available as an operational spare. Train sets will be rotated to equalize utilization and balance maintenance requirements. All trains will have the locomotive on the north end of the train facing north, then three gallery coaches, then a gallery cab control car on the south end of the train with the cab facing south. Trains will be operated from the cab control car in the southbound direction and from the locomotive in the northbound direction. Train will be operated in push-pull service with a crew of one locomotive engineer and one conductor.

Initially, commuter rail service will be operated during peak periods only on Monday through Friday with no weekend or holiday service anticipated. In later years, changing ridership demands may result in revisions to the service plan.

Functional Requirements

The functional requirements of the Howell Maintenance & Storage Facility and the Ann Arbor Layover Facility are described below.

Howell Maintenance & Storage Facility

The Howell Maintenance and Storage Facility is expected to be located south of the Howell commuter rail station between the E. Grand River Ave. grade crossing and the CSX Ann Pere Interlocking on the west side of the existing Great Lakes Central Railroad main track. The function of this facility is to provide light maintenance and repairs, daily inspection, servicing, locomotive fueling, cleaning, and overnight storage for each of the 5 trainsets. Certain periodic inspections, major component replacement, heavy maintenance and repairs and wheel truing will all be performed at an off-site location. The facility will be the primary reporting location for train crews and commuter rail equipment maintenance personnel.

Ann Arbor Layover Facility

The Ann Arbor Layover Facility is expected to be located south of the Ann Arbor commuter rail station between the Hoover St. grade crossing and E. Stadium Blvd on the west side of the Ann Arbor Railroad main track. The function of this layover facility is to provide midday storage, exterior train washing, and interior cleaning of rail cars. An office/service building for employees will be located on site. The layover facility must accommodate the storage of 4 trainsets during the day after their arrival in Ann Arbor and before their evening departure to Howell.

Design and Construction Requirements

Track Design:

Storage tracks and yard leads shall be ballasted construction using 115 pound rail, 8'6" treated timber ties at 19" spacing, with 8 inches of hard rock ballast meeting AREMA specification for yard and shop track areas under the ties with additional ballast between the ties filled level to the top of the ties. The sub-ballast section must be constructed of approved material, at least 6 inches deep and meeting compaction requirements. Rail may be either new or used and may be either bolted or continuous welded rail. Rail must be inspected and tested for external and internal defects before installation. Track must be constructed to AREMA standards for yard and shop tracks and must, at a minimum meet Federal Railroad Administration Standards for Class 2 track.

Main track turnouts will be #10 turnouts. For both facilities, the north end turnout will be poweroperated within a centralized traffic control point. A power-operated derail to protect the main track will also be included in each control point. The south end of the each facility will be a #10 hand-throw turnout equipped with an electric lock and a locked hand-throw derail. The south entrance to each facility is the alternate entrance for use in case the north or main entrance is not available for service.

Storage/shop track turnouts will be #8 hand-throw turnouts with switch stands capable of being locked to facilitate the use of blue signal protection for workers as required by the FRA. Hand-throw derails, also capable of being locked must be located at each end of each storage track designed to derail equipment moving toward the storage/shop track. These also are to facilitate the use of blue signal protection for workers.

Lead (or ladder) tracks connect the mainline to the storage tracks. Lead tracks should be level or sloped away from the main track with a maximum grade of 0.5 percent. Storage tracks used for commuter trains shall have a turnout on each end, enabling access to the main track from either end of the facility.

Tracks used for the storage of a spare locomotive, spare cab control car or locomotive fuel tank cars may be single-end or stub tracks with the turnout on the <u>north</u> end and with a bumping post on the south end. Storage tracks shall be tangent and level. The centerline to centerline spacing of storage tracks shall be at least 19 ft. in order to allow access between stored trains for maintenance and cleaning. Shop tracks are both inside and outside of shop buildings where inspection, maintenance, testing, repair, and servicing are performed. Shop tracks shall be constructed on timber ties embedded in concrete.

Signal Design:

The north entrance to each facility shall be located within a new Centralized Traffic Control (CTC) control point operated by the railroad's train dispatcher. Access to the main track and use of the main track turnout is only permitted with the authority of the railroad's control operator (train dispatcher). All storage and shop tracks shall be located within a fenced area and all movements inside the secured area will be made under the direction of the designated shop or facility supervisor.

Howell Maintenance and Overnight Storage

The Howell Maintenance and Overnight Storage Facility shall include an employee welfare building, a shop building, and train layover/storage tracks.

Additional Elements and Details:

- Fuel delivery site for access by fuel trucks with spill protection
- Locomotive fuel storage tank(s) with fuel pump and filter system and control valves, meters, etc.
- Fuel spill protection trays spotted at the locomotive resting points on the storage tracks and acceptable method of cleaning/disposal of waste material
- Toilet Dumping System- toilet servicing capability (either fixed plant or service truck)
- Sanding Station (fixed plant or bag sand)
- Electrical Substation including switchgear and distribution and to shop and train storage tracks
- 480 volts three phase 60 Hz ground-mounted head end power sources for train air HVAC, lighting and other train electrical systems
- 140 PSI Compressed air system with drier for shop locations and connections for trains on storage tracks
- Access roadway to buildings, parking areas and storage tracks (for waste dump and coach cleaning)
- Employee parking
- Parking lot striping and signage
- Employee walkway system- 10 ft. platforms between tracks. These platforms adjacent to servicing tracks allow access for golf cart type service vehicles and foot access for inspection and maintenance of brakes, doors, wheels, couplers, and interior train cleaning, etc.
- Adequate number of servicing tracks and track lengths for storage of 5 trainsets, each consisting of one locomotive, three coaches and one cab control car.
- Track drainage system connected to the storm sewer system
- Potable and non-potable water hydrants with antifreeze protection
- Lockable yard switches and/or derails for blue flag protection
- 24-hour illuminated path and safety lighting
- Yard PA system
- Security system with exterior fencing along the perimeter of the facility
- 2 track shop building for inspection pit, train inspection, light maintenance and repairs capable of accommodating two entire train sets inside shop building with doors on either end closed. Shop building also contains:
 - Inventory storage area inside (a storage room) for parts and materials. Storage facilities contain cleaning supplies, maintenance equipment, and replacement parts such as air hoses, air filters, light bulbs, etc.
 - o Surface inspection and maintenance track
 - Transfer table and wheel set storage
 - o Space for future wheel lathe for truing car wheel
 - Mechanical department offices and room for the maintenance and materials inventory records.
 - o Transportation employee locker rooms, lockers, rest rooms, showers, lunch room.

- Mechanical employee locker rooms, lockers, rest rooms, showers, lunch room.
- o Communications room/computer terminal area for transportation crews
- o Training room
- Unloading dock for the storehouse area and room for a fork lift and other shop machinery
- Outside materials storage

Ann Arbor Midday Layover Facility

The Ann Arbor Midday Layover Facility shall include an employee welfare building, maintenance equipment storage building, car wash, and storage/servicing tracks.

Additional elements and details:

- Electrical Substation including switchgear and distribution to trains
- 480 volts three phase 60 Hz ground-mounted head end power sources for train air HVAC, lighting and other train electrical systems
- 140 PSI Compressed air system with drier and connections to trains on storage tracks
- Access roadways to buildings and parking for management personnel
- Parking lot striping and signage
- Employee walkway system- 8 ft. platforms between tracks. These platforms adjacent to servicing tracks allow access for golf cart type service vehicles and foot access for inspection and cleaning access.
- Adequate number of servicing tracks and track lengths for storage of 4 trainsets, each consisting of one locomotive, three coaches and one cab control car.
- Track drainage system connected to the storm sewer system
- Fuel spill protection trays spotted at the locomotive resting points on the track
- Potable and non-potable water hydrants with antifreeze protection
- Lockable yard switches and/or derails for blue flag protection
- 24-hour illuminated path and safety lighting
- Crew Facility that contains:
 - Inventory storage area inside (a storage room) for parts and materials. Storage facilities contain cleaning supplies, maintenance equipment, and replacement parts such as air hoses, air filters, light bulbs, etc.
 - Mechanical department offices and room for the maintenance and materials inventory records.
 - o Mechanical employee locker rooms, lockers, rest rooms, showers, lunch room.
 - o Transportation employee locker rooms, lockers, rest rooms, showers, lunch room.
 - o Communications room/computer terminal area for transportation crews
 - o Training room
 - Train Washer Building (pull-through building to wash train sets on arrival)

Security system with exterior fencing and two access gates along the perimeter of the facility

APPENDIX III: MAINTENANCE AND LAYOVER FACILITY DESIGN PLANS

NOTES:

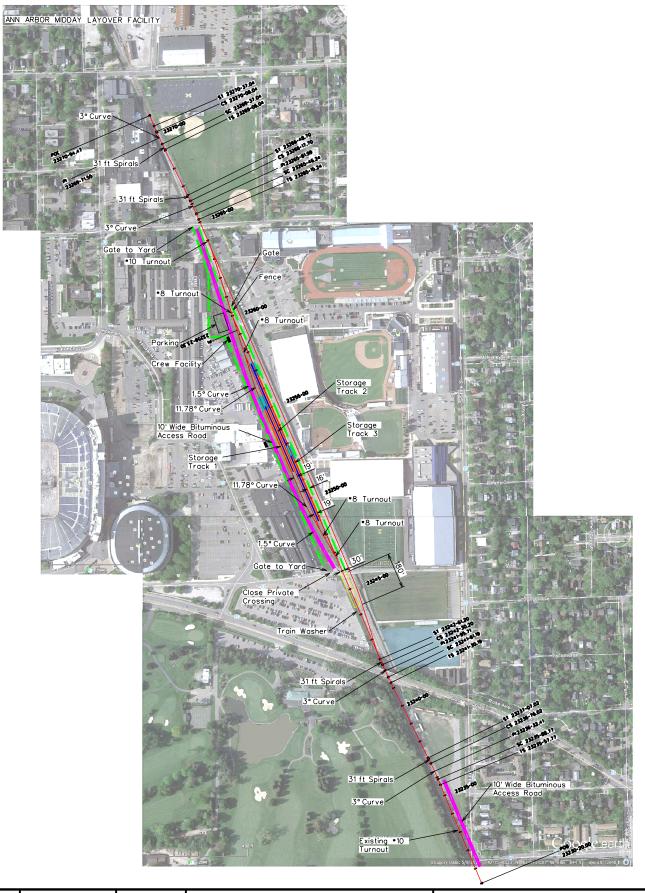
1) 4 trainsets fit in yard; 1 Trainset on Storage Track 1, 1 Trainset on Storage Track 2, 2 Trainsets on Storage Track 3

2) •10 Turnout Leads into Yard from North (Distance from POS to POF-77.4')

3) •8 Turnouts in yard (Distance from POS to POF+68')

4) Total Acreage Required= 3.8 Acres

5) Quantities of Track Elements: -1 No. 10 Turnouts Leading into Yard from north end -4 No. 8 Turnouts in Yard -600' Storage Track 1 -850' Storage Track 2 -1195' Storage Track 3 -Total New Track including S curvature- 5648'

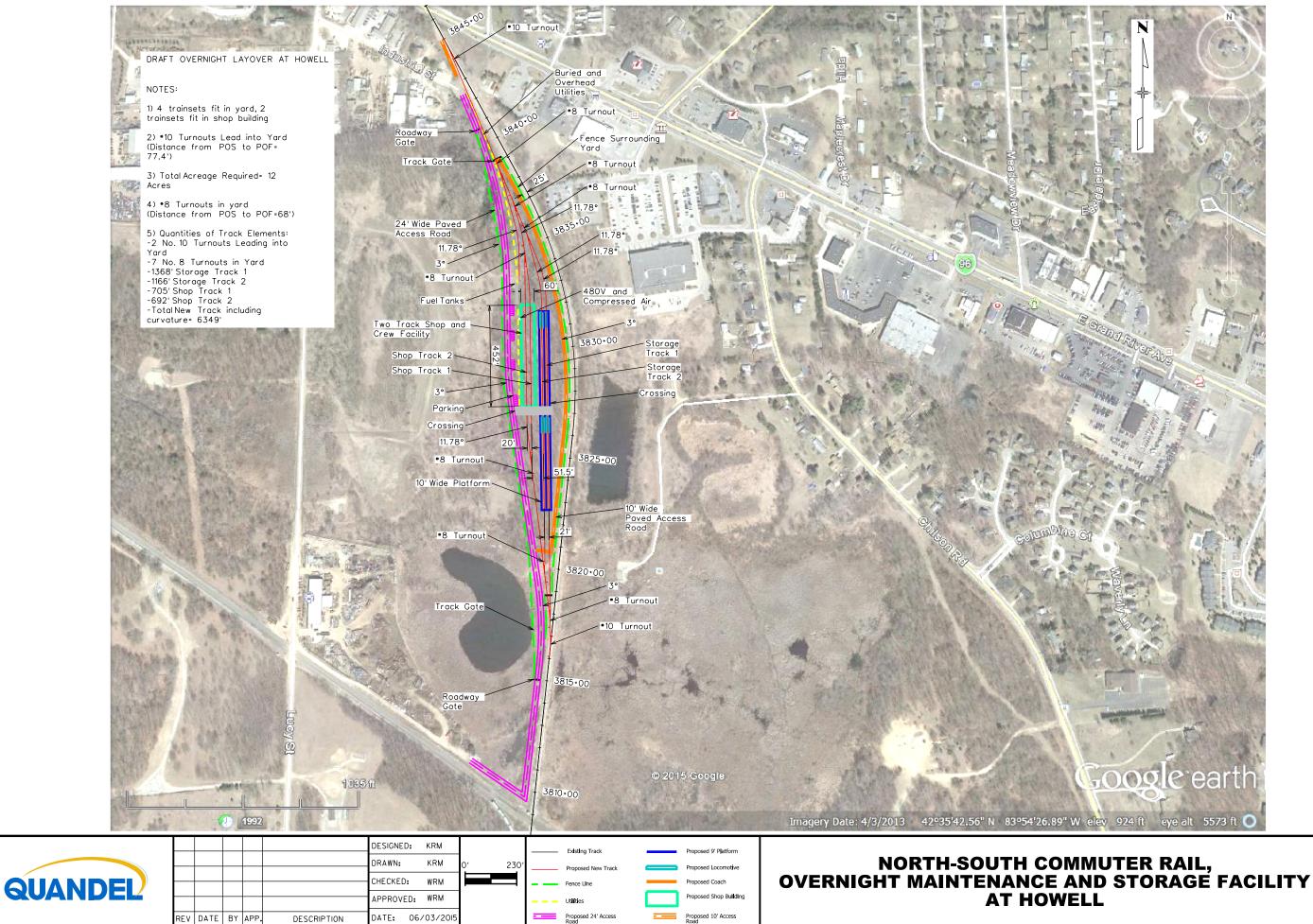




					DESIGNED	KRM		 Existing Track		Proposed 9' Platform	
					DRAWN:	KRM	0′ 80′	Proposed New Track	_	Proposed Locomotive	
					CHECKED:	WRM			_	Proposed Coach	
								 Proposed Fence		Proposed Coach	
					APPROVE	D: WRM		 Proposed 10' Access		Proposed Trainwasher	
REV	DATE	ΒY	APP.	DESCRIPTION	DATE:	06/12/2015		 Proposed 10' Access Road			

NORTH-SOUTH COMMUTER RAIL, MIDDAY LAYOVER FACILITY AT STADIUM SCALE: SHEET NO.





ROJECT ID

Quandel 1404

DRAWING NO.

SCALE:

SHEET NO.

APPENDIX IV: ELLSWORTH INTERCHANGE PLANS



Quandel 1404
DRAWING NO.
SCALE:
SHEET NO. 10F 5



SHEET	NO.	2	0F	







					DESIGNE	D:	KRM			
					DRAWN:		KRM	0′	100'	 Existing Track
					CHECKED):	WRM			
					APPROVE	ED:	WRM			 Proposed New Track
REV	DATE	ΒY	APP.	DESCRIPTION	DATE:	06	/16/2015			

NORTH-SOUTH COMMUTER RAIL, ELLSWORTH INTERCHANGE

DRAWING NO. SCALE: SHEET NO. 4 OF 5





 Image: Constraint of the second se

NORTH-SOUTH CO ELLSWORTH IN



	PROJECT ID Quandel 1404
OMMUTER RAIL,	DRAWING NO.
ITERCHANGE	SCALE:
	SHEET NO. 5 OF 5

APPENDIX V: PROJECT TIMELINE: OPTION 1: FULL SERVICE

