FINAL REPORT

Grand Rapids Streetcar

Route Refinement Study

Grand Rapids, Michigan

October 2014

HDR

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Message from the

Streetcar Advisory Committee Chair

Next Stop – Grand Rapids!

In the 1890s there were streetcars all around Grand Rapids, with tracks from downtown out to Reeds Lake before East Grand Rapids became a city. We were in the process of changing over from horse-drawn to electric-powered vehicles supplied by wires mounted on buildings above the tracks. We even had a San Francisco-like cable car to get up and down the Michigan Street hill. Our streetcars were replaced by buses and automobiles many years ago, but our community still needs better mobility for our residents and visitors and new economic development opportunities to create jobs and sustain growth. Now, fast forward almost 100 years. Desiring to build upon Grand Rapids "streetcar legacy," in the last several months, the Streetcar Advisory Committee has been hard at work to identify what will become the first streetcar to begin running through downtown since the last one shut down in the 1930's.

In January of 2014, the Advisory Committee began to explore what might be the best option for this new beginning. Our study committee met several times and listened to streetcar and city planning experts. This process is similar to local planning for the new Bus Rapid Transit (BRT) system, which will begin service before the end of August. At our June meeting, the committee voted for a preferred streetcar route to re-establish streetcar service in Grand Rapids.

But let me be very clear. Our committee cannot do this undertaking without the support of the City of Grand Rapids, the community and other stakeholders, many who are still serving on this committee. We see our role as the spark to help light the way for this project, and keep it going. The clear voices from many cities that have implemented streetcars in their communities state emphatically that these streetcars have encouraged large amounts of economic development. Past experience indicates that local streetcar commitment emboldens people to make investments they otherwise might not.

In my State of the City address in 1995, I challenged the citizens to create more housing in downtown. Specifically, I challenged them to build 5,000 new residential dwellings of all types, and to do it in 10 years. We almost made it, with 4,500 new units by the end of 2005. Today, we have more than 16,000 people living in downtown. Grand Rapids is READY for this next development. I have had the privilege of serving as the Chairman of this Streetcar Advisory Committee, and look forward to helping get the job done.

John H. Logie, Mayor of Grand Rapids – 1991-2003

Executive Summary

Background

Streetcars have had a rich history in Grand Rapids, beginning with horse-drawn carriages operating on steel tracks in 1865. In the late 1920's, electric streetcars were a common sight along Monroe Avenue, the city's main street. By 1935, however, the streetcar era officially ended in Grand Rapids, making if the the second city in the nation to abandon electric rail service entirely.

Streetcars are experiencing resurgence throughout the United States due to their unique ability to move people quickly and conveniently in urban areas, encourage private development/redevelopment, and attract millennials and baby boomers who are seeking a transit-oriented lifestyle. In January 2008, the Interurban Transit Partnership (ITP, The Rapid) initiated a Modern Streetcar study. Through its Public Transportation Tomorrow Taskforce and after evaluation of several route options, a specific route was proposed. The route generally followed Monroe and Market Avenues, connecting to Central station using Bartlett Street. The study recommended further review and development of the proposed route, which was initiated in 2014 and documented in this Route Refinement Study.

Streetcar Advisory Committee

The Route Refinement Study was led by the Streetcar Advisory Committee (SAC) chaired by former Mayor John Logie. This committee includes representatives of the City of Grand Rapids, downtown businesses, institutions, civic organizations and developers. During the project, the SAC:

- Provided technical-level input into the various work items throughout the study,
- Shared unique perspectives that combined ongoing, detailed knowledge of the project with respective partner agencies, residents, businesses and organizations within the study area,
- Identified key implementation challenges such as the development of a feasible financial plan.

The SAC adopted a streetcar Mission Statement to guide the development and evaluation of alternatives, and selection of a preferred route. That Mission Statement is stated below:

"*The Grand Rapids Streetcar will advance the City's image as a progressive and robust community by adding a unique alternative transportation mode which expands the boundaries of downtown, enriches the community's sense of place, stimulates private investment, expands walkability options, and strengthens a vibrant and dense urban environment where more people can live, work, visit and enjoy the community*."

Selection of a Preferred Streetcar Route

The SAC considered a broad range of potential Streetcar routes, shown in **Figure ES-1**. Routes 3 and 4 were initially dismissed in order to focus the starter line in the core area of downtown. Options 1 and 2 were carried forward for additional analysis. These options overlap at the north end from 6th to Monroe Center, and between Cherry and Franklin to the south.

The major difference between alternatives 1 and 2 is the nature of the service area in the downtown core. Option 1 provides excellent access to future development sites in the Arena South and the South Riverfront areas. Option 2 provides better service to existing retail development along Monroe Center and the Entertainment Distirct along Ionia. The Streetcar Committee recommended Route 1 because of its superior development opportunities. This route also runs along the edge of the retail and entertainment districts, providing a balance between existing and future streetcar markets.

Figure ES-2 depicts the recommended route and proposes future extensions from downtown. The timing of the individual route extensions would be dependent upon the funding options that would be pursued beyond implementation of the initial project.

Figure ES-1: Initial Streetcar Alternatives

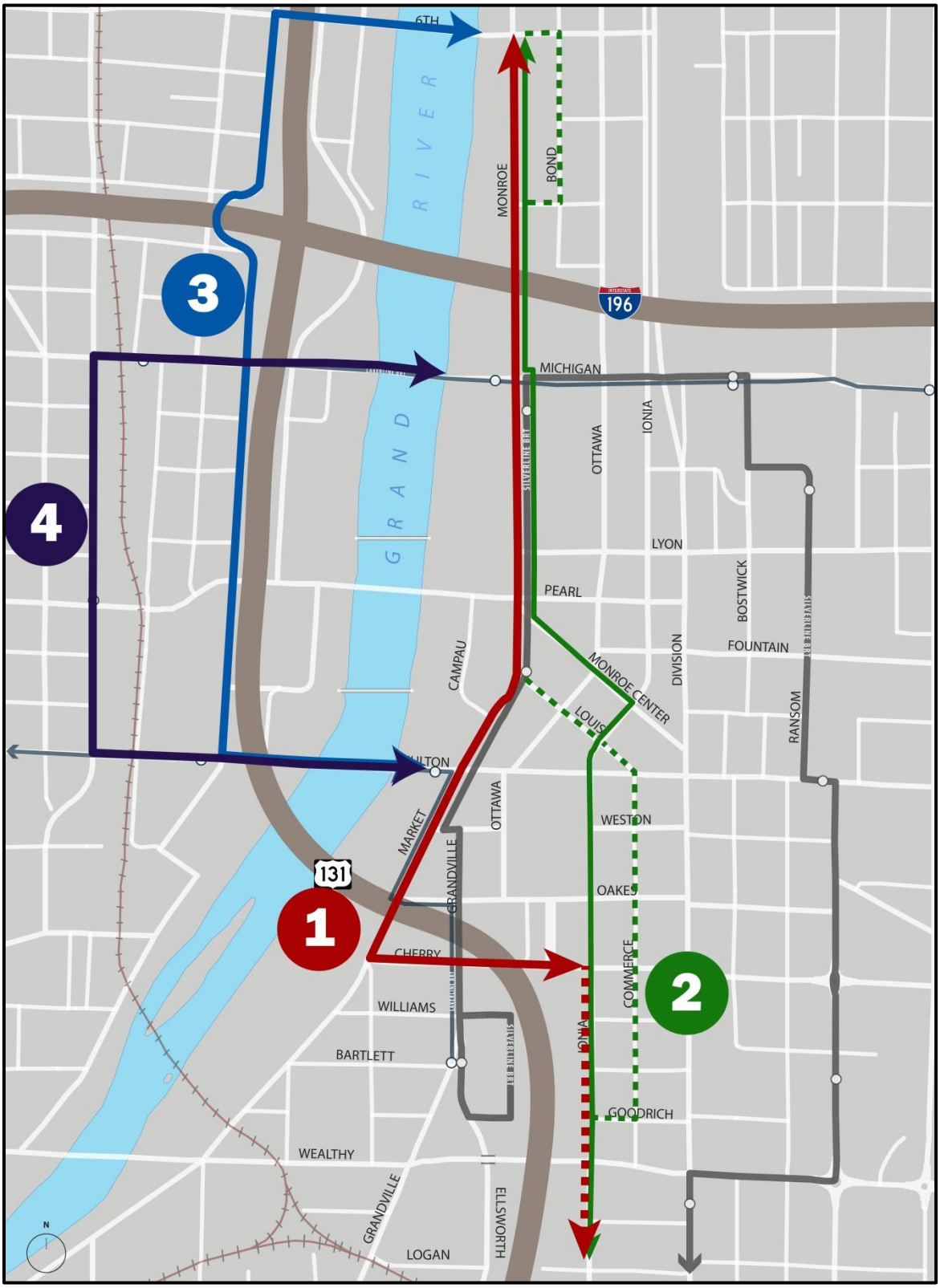


Figure ES-2: Recommended Route and Future Extension Opportunities

Recommended Alternative Cost Characteristics

The recommended option is approximately 1.8 miles in length (about 3.88 miles of track). Service is planned to operate at 10-15 minute frequency much of the day depending on time of day and day of the week (weekday peak and mid-day versus weekday evenings and Saturdays). The capital costs are identified in **Table ES-1** below in current and future dollars, representing an opening day in 2019.

Table ES-1: Cost Summary

Characteristic	
Segment Length [track/mi]	3.88
(2014) Cost Per Mile [track/mi]	$31.2 M
(2019) Cost Per Mile [track/mi]	$36.2 M
Total Capital Cost (2014)	$118.3 M
Total Capital Cost (2019)	$137.1 M
Annual Operating Cost (2014)	$3.3 M
Annual Operating Cost (2019)	$3.8 M

Funding Options

Each of the modern streetcar projects constructed in the United States has had a unique mix of funding sources. Federal funding has been used for a number of projects, which decreases the local investment necessary to implement the project. At the same time, the use of federal funds increases the implementation time in order to satisfy the federal review process, which in turn, tends to increase the overall cost. In many instances, the State government has supported streetcar implementation. In Michigan, there are state funds that may be available of offset some of the capital and operating costs. Local funding options vary widely, ranging from donations to assessment districts. A specific funding approach has not been identified for the initial streetcar project in Grand Rapids, although there is an interest in advancing the project quickly without the schedule impact associated with federal funding.

Governance

Governance refers to the organizational structure to build, operate, and maintain the streetcar system. The proposed responsibilities are identified below by role.

- Owner**:** Responsible that all capital, operating and maintenance needs are met – **City of Grand Rapids**

- Sponsor: Responsible for securing funding, and satisfying federal funding requirements if federal funding is used (National Environmental Policy Act, Grants Management, Oversight) – **The Rapid or Non-Profit Organization**

- Implementer: Responsible for design, right-of-way, permitting, construction, procurement – **Partnership between City of Grand Rapids and The Rapid.**

- Operator: Responsible for day-to-day management of operations, maintenance, fare collection, training, marketing – **The Rapid**

Next Steps

The next steps for implementation of the Grand Rapids Streetcar begin with development of a detailed funding plan and implementation of a governance structure consistent with the funding approach. The scope of the individual steps will depend upon whether federal funding will be pursued for the initial project or subsequent phases; in any case, the technical steps will include more refined engineering, cost estimating and environmental analysis, and public involvement. The details of the technical approach and the management of the project will be documented in a program management plan (PMP).

Section 1 |

Introduction

Mission Statement

The Mission of the Grand Rapids Streetcar is to:

> ***"Advance the City's image as a progressive and robust community by adding a unique alternative transportation mode which expands the boundaries of downtown, enriches the community's sense of place, stimulates private investment, expands walkability options and strengthens a vibrant and dense urban environment where more people can live, work, visit and enjoy the community."***

Streetcars are not new to Grand Rapids. Like most North American cities, Grand Rapids has its own distinguished streetcar history. In 1865, a horse-drawn carriage rode along tracks built by the city. Later, a variety of streetcar types were explored, including a steam driven car and a cable car line similar to those of San Francisco. The streetcar connected the city's compact, walkable neighborhoods to its major employers and downtown.

In the late 1920's, streetcars were a common sight on Monroe Ave, the city's main hub. Early service ran from the railroad station along Canal Street (now lower Monroe Avenue), taking Monroe and Fulton Street to Jefferson Avenue.

However, in 1934, buses began to replace the streetcars, making Grand Rapids the second city in the nation to abandon electric rail service entirely. Grand Rapids' streetcar era officially ended on August 23, 1935, when the last streetcar made a final run along the Cherry Street route.

In January 2008, seeking to recapture this rich placemaking heritage, the Interurban Transit Partnership (ITP, The Rapid) initiated a Modern Streetcar study. Through its Public Transportation Tomorrow Taskforce and after evaluation of several route options, a specific route was proposed. The route

(**Figure 1.1**) generally followed Monroe and Market Avenues, extended from Monroe Avenue at Newberry Street (at the Sixth Street Bridge) to Market Avenue at Bartlett Street. Bartlett Street was used to provide the transit connection to Central Station.

A feasibility study was then conducted for the route to estimate the capital and operating costs for the system, to draft an operating plan and to assess development potential within the three to four blocks surrounding the route. The feasibility study concluded that a streetcar system, utilizing four vehicles at a frequency of 10 minutes intervals, could be built and operated along this corridor at a projected cost of approximately $79 million with an annual operating cost of $1.75 million (2008$). The feasibility study examined, among other items, the following:

- Station location and station concepts
- Transit Oriented Development (TOD) opportunities around stations
- Fares and fare collection mechanisms
- Capital and operating costs and operating plan
- Risk Assessment associated with cost, schedule, timing of implementation, project funding and agency coordination
- Potential ridership
- Funding plan and funding sources
- Economic Development/Market Analysis
- Future extensions

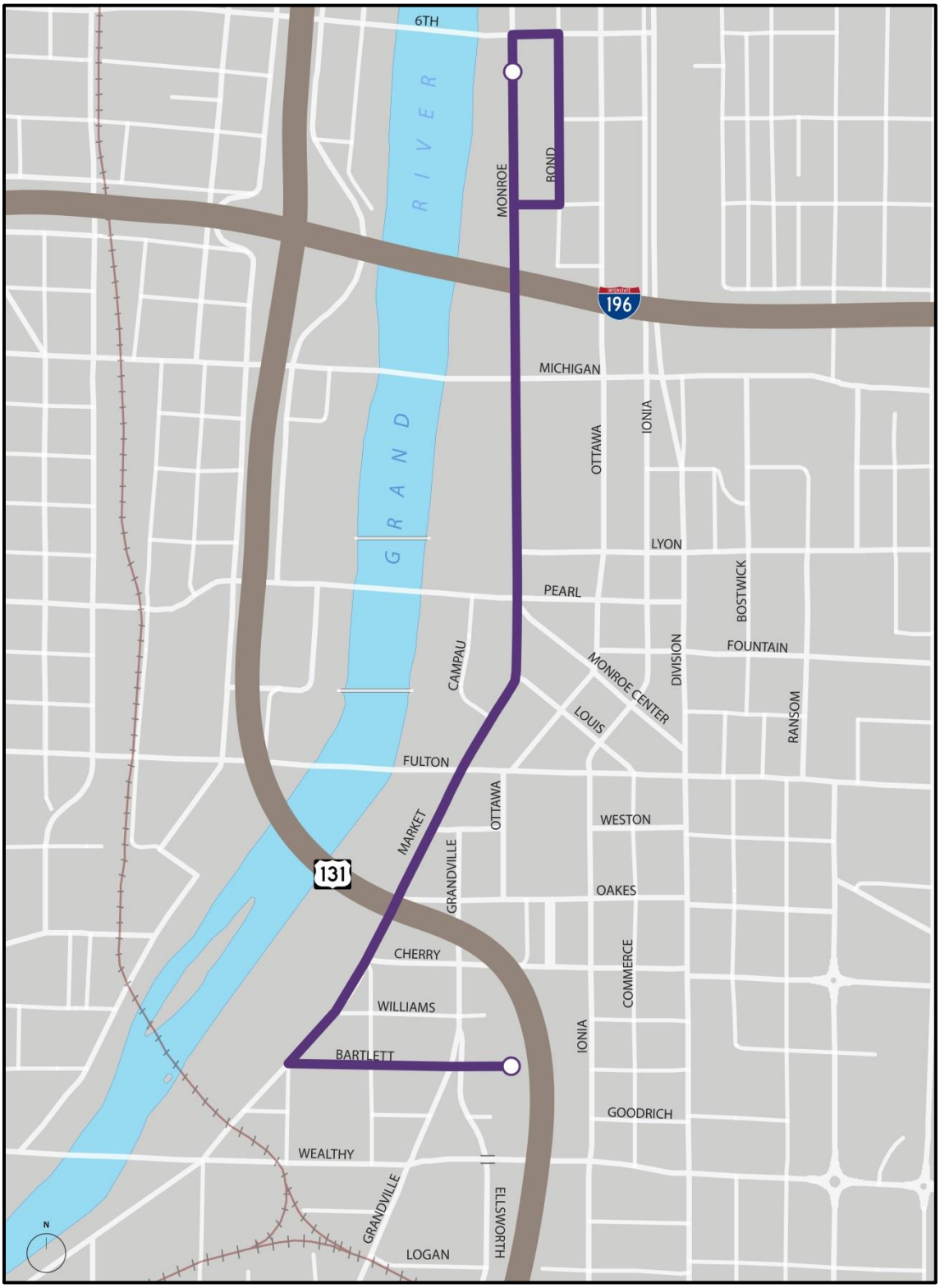
The feasibility study also recommended next steps for implementation. One of those recommendations was the refinement of an alignment to be based on future public involvement, potential for reduction in capital costs and connectivity with the existing transit system.

In 2014, seeking to pursue implementation of a streetcar system, The Rapid initiated this Route Refinement Study, overseen by the Streetcar Adisory Committee (SAC) to determine if the original streetcar alignment recommendation along Monroe/Market was still feasible. This report is the product of that effort. Since the 2008 study was completed, activities within the study area made it a necessity to engage in a route refinement study to determine both the continued feasibility of the recommended route and examine new opportunities that may have emerged in the intervening six years. These activities include:

- The annual ArtPrize, which features world class art work from all over the world attracting an estimated 400,000 visitors nationally and from almost 50 countries over a 3-week period.

- The Silver Line BRT service (due to begin revenue service in August 2014) linking downtown Grand Rapids with the cities of Kentwood and Wyoming (the BRT line travels along Monroe from Rapid Central Station).

Figure 1.1: Original 2008 Streetcar Route



- The Laker Line BRT project under study to link downtown Grand Rapids with Grand Valley State University (GVSU) in Allendale, MI.
- The new Downtown Farmers Market located on Ionia.
- The relocation of the Amtrak Station closer to The Rapid Central Station.
- Ongoing development of housing, office and commercial activities in the area south of Van Andel arena (South Arena).
- Purchase of the former Grand Rapids Press building along Monroe by Michigan State University (MSU).
- Continued investment by MSU's School of Human Medicine and Grand Valley's downtown campuses.
- Re-purposing of former industrial buildings in the Monroe North area into office lofts, hotels and residences, with a high percentage of young professionals and university students now living there.
- New city plans and policies that focus on "Complete Streets", travel demand, Transit Oriented Development, and Green Infrastructure.

Section 2 |

Streetcars in North America

Streetcars – What Are They?

The word "streetcar" conjures up different images in people's minds: San Francisco cable cars, a "Streetcar Named Desire," and historic, vintage or modern-looking streetcar vehicles. Grand Rapids has a rich history of streetcar usage on its streets. In recent years, Streetcars have made a remarkable resurgence in the United States. As shown on page 6, there are currently 14communities operating streetcar services (with Portland, Salt Lake City, Seattle and Tacoma operating Modern Streetcar systems) while approximately 45 communities are planning, designing and building streetcar projects

While different communities have varying reasons for planning to invest in streetcars, there is a need to understand what streetcars are and what they are not. Overall, streetcars are not:

- Commuter rail or light rail or a metro-rail (subway) systems
- Designed to serve long trips from suburban areas to Downtowns
- Bus Rapid Transit (BRT) system.

Streetcars are:

- Designed to serve as urban circulators
- Operate on short routes serving downtown and adjoining neighborhoods
- Run on steel tracks in the street, usually in mixed traffic
- Are powered with overhead wires
- Provide frequent service with small rail vehicles
- Allow riders to make short trips and get "on" and "off" the vehicles quickly and conveniently
- Serve as a catalyst for new economic investment

Streetcar Characteristics

Streetcars can operate on existing streets in dedicated lanes or sharing a lane with cars. They accelerate or extend the pedestrian experience, hence the reference to "walk extender" or "pedestrian accelerator" when referring to streetcars. Unlike other modes of public transit, streetcars are not just tools for public transportation but more importantly serve as a catalyst for economic development.

They allow a pedestrian to comfortably reach nearby neighborhoods, restaurants, or services without the use of a car.

Modern Streetcars are usually characterized by a sleek vehicle interior and exterior and provide multiple, wide doors and low floors for ease of getting on and off the vehicle. Typically, they have shorter lengths and slightly narrower width than conventional light rail vehidles, which allows streetcars to operate efficiently in a dense, urban environment where tighter turns may be required.

Modern Streetcars generally run between 10 and 30 miles per hour, depending on local speed limits and traffic conditions. While they are capable of going faster, up to 45 mph, to foster an enhanced, pedestrian friendly downtown environment, they typically do not run at their higher speed capability. The primary transportation objective of most streetcar projects is to facilitate safe and convenient neighborhood connectivity, particularly for non-motorized travel modes, instead of allowing rapid travel on downtown streets.

Streetcar Communities

Among the communities operating and planning for streetcar systems in the United States, there are five common elements in these communities:

- Connectivity between existing activities and planned new development
- Active urban real estate market…or an urban renaissance
- Pedestrian-oriented streets
- Strong local leadership/champion, and
- Project partner support and investment

Each community decides the type of streetcar system it wants to implement – whether historic or modern. Various factors such as the context of the neighborhood, capital and operating cost and street characteristics can determine the type of vehicles. From the onset of this study, the SAC determined that in order to employ the Grand Streetcar as an economic development tool, a Modern Streetcar would be appropriate for Downtown Grand Rapids.

Section 3 |

The 2014 Streetcar Advisory Committee

Committee Structure

Prior to the start of the Route Refinement Study, a SAC was constituted by The Rapid. Composed of elected officials, a representative of The Rapid Board of Directors, the business community, transit riders and City of Grand Rapids staff, the SAC met several times throughout the duration of the six-month study. Their primary role was to provide guidance to staff and consultants at key milestones during the Study process.

Other roles played by the SAC included:

- Providing technical-level input into the various work items throughout the study,
- Sharing unique perspectives that combined ongoing, detailed knowledge of the project with respective partner agencies, residents, businesses and organizations within the study area,
- Identifying key implementation challenges such as the development of a feasible financial plan.

Recognizing the extent and diversity of opinions on the potential service design for the Streetcar, a series of activities was conducted to engage the SAC in the discussion of the potential alternatives routes.

Among these were:

Streetcar 101: On January 31, 2014, the group participated in its first working session that discussed what has made Streetcar projects successful, or unsuccessful, in the United States. This session discussed the engineering details of a typical streetcar system as well as how to fund implementation of a future Streetcar service in Grand Rapids.

Streetcar Route Planning Exercise: On February 25, 2014, a streetcar route planning exercise was conducted. The focus was on identifying key connections and destinations in the Downtown area, defining "*what is economic development?*" and establishing the evaluation criteria for the alternative routes. Four alternative corridors were identified by the SAC as potentials for the streetcar service. Participants, during the routing exercise, were able to map out their own routes with markers on roll plots.

Streetcar Workshop - A workshop was held on April 18, 2014 to identify and evaluate the top streetcar routes based on the outcome of the Route Planning Exercise. The goal for the workshop was to involve members in further evaluating and selecting the top Streetcar route(s) based on the established goals and objectives. The workshop consisted of a presentation of the initial screening of the previously identified routes and an alignment evaluation exercise. In addition, the workshop focused on the dynamics of securing operating funds. The alignment exercise and presentation on funding helped the study team advance route segments for further analysis.

Following up on the Streetcar Workshop, the group met on May 23, 2014 to review the detailed route evaluation and decide the preferred streetcar route. At this meeting, the SAC also discussed the various options of governance models for implementing and operating the streetcar.

The final SAC meeting was held on June 26, 2014. At this meeting, the group met to review and act upon the study team's report and key findings – See *Sections 5* and *6* of this Report.

Section 4 |

Governance – Implementing and Operating the Grand Rapids Streetcar

Background

Streetcar projects have created a unique niche within the transit industry. While traditional transit projects such as bus rapid transit (BRT), light rail, and commuter rail generally serve large geographic areas impacting multiple jurisdictions, streetcars typically have a limited service area size (generally less than three miles of total system length) and most operate within one municipality, concentrating their impact within a ¼-mile of the alignment. As a result, streetcar systems are somewhat unique in their implementation and operation compared to other forms of public transit. Streetcars promote active street environments and streetlife in predictable locations with fixed rails and permanence. They support creating neighborhoods in which people are attracted to live, shop, work and play. And they serve as an image for a particular place. Therefore, the governance structure adopted for each streetcar system must address several common factors, tailored to the unique local conditions.

Funding tends to be a key consideration in the development of a streetcar governance plan. Streetcar funding must address the short-term needs for the initial starter line, and anticipate longer-term needs for an expanded system of streetcar extensions. Funding for the ongoing operations and maintenance and capital replacement for the streetcar system often is independent from the local bus operations. Potential system expansion may introduce a new set of funding mechanisms and stakeholders, particularly if the system were extended into another municipality. The governance plan must offer a stable and long-term structure that will span different political administrations.

Governance Roles

There are four major components or roles for the overall governance of a streetcar system:

- Owner
- Sponsor
- Implementer
- Operator

Each of these roles carries varying responsibilities to ensure the project can advance successfully from the planning phase into project development, design, construction, and then operation – consistent with the planned schedule and budget. One entity can assume one or more, or even all of these roles, but often agencies are limited in experience, scope, financial and staffing capacity, and political influence to be able to manage such projects singularly. Often, the governance structure assigns specific responsibilities to individual entities with either more experience or capability to responsibly deliver the desired results of that particular role. The key streetcar governance roles are summarized below.

ROLE	RESPONSIBILITIES
Owner	The project owner must be able to effectively direct the management, implementation, and operations of the system. The owner may delegate one or more of these responsibilities to other agencies or entities, but retains ultimate responsibility for the project, including ensuring that all capital and operating funding needs are met. The owner is also responsible for covering any cost overruns and ultimately determines funding for system expansion, as well as ongoing annual operating and system maintenance.
Sponsor	The project sponsor must successfully secure funding from all public and private sources identified in the financial plan. If federal funds are to be used, the sponsor leads the project through United States Department of Transportation/Federal Transit Administration (USDOT/FTA) environmental process, design process, and construction oversight. The project sponsor's demonstrated ability to manage the project for the owner will ultimately determine the available capital funding that the streetcar would receive from federal and state sources. This sponsoring agency would have to demonstrate the capacity to manage a transit project from planning to ultimately carrying passengers, including ability to secure and efficiently spend both public and private sector funding. The unique nature of streetcars has led to an increased significance in raising private funding for the public transportation service. If private contributions are a significant element of the financial plan, the sponsor must also be capable of generating these resources. This ability depends upon the sponsor's credibility and familiarity with local private sector sources.

ROLE	RESPONSIBILITIES
Implementer	The project implementer is responsible for design and construction of the system. The implementer would ensure that right-of-way acquisition, the environmental process, permitting, preliminary engineering, final design, vehicle procurement, and construction all were performed in accordance with federal, state and local standards. These duties have sometimes led to the creation of public-private partnerships or public-public partnerships via separate streetcar entities as an implementing agency.
Operator	This role is focused upon management of daily service operation and maintenance of the facilities. The operator is responsible for fare collection, vehicle maintenance, operations staff, training, marketing, guideway and facilities maintenance, and ensuring the route operates as planned. Another important duty may include assisting the owner in obtaining the supplemental funding necessary to keep the system revenue from operating at a loss. The operating entity could directly manage, operate and maintain the streetcar system or could elect to delegate different levels of contract management, operations and maintenance to a third-party vendor.

Governance Models of Streetcar Systems

Governance models applied for existing U.S. streetcar projects generally fall into six categories:

1. Exclusively managed and operated by the Transit Agency (examples include New Orleans, Little Rock, Memphis)
2. Managed and operated by the Transit Agency with a supporting nonprofit (examples include Tampa, San Francisco)
3. Exclusively managed and operated by County or City government or a County/City-operated transit system (examples include Galveston, Kenosha)
4. Managed exclusively by a Nonprofit Corporation, operated by nonprofit organization employees and volunteers (examples include Dallas-McKinney Avenue Trolley, other small operations like Astoria, Oregon)
5. Managed by a Non-profit Corporation, operated by a combination of City and Transit agency staff by agreement (Portland is an example of this model)
6. Managed by the City, operated by Transit Agency staff by agreement (Seattle is an example of this model)

The economic development emphasis of most streetcar projects has led to a general shift from transit agencies managing and/or owning the systems. Transit providers are oriented primarily towards meeting the service needs of their customers, with local economic development as a desired, but secondary goal of the agency. While some governance structures include a private non-profit element, only the smaller systems such as the historic McKinney Avenue Trolley in Dallas tend to be owned/managed by non-profit corporations. The more recent streetcar systems tend to be owned by the City with the transit agency and other entities providing supportive roles.

Recommended Governance Structure for Grand Rapids

As outlined above, there are a variety of options for organizing the governance structure. However, the structure that appears to be most viable for the Grand Rapids Streetcar is the City-owned/Rapid-operated model with non-profit assistance in private fund raising. This section describes the respective roles for the governance plan.

ROLE	RESPONSIBILITIES
Owner	The streetcar will be constructed within the City of Grand Rapids streets, requiring close cooperation with the City's Public Services Department during planning, design, construction, and operation. In addition, the project should be coordinated with City land use tools such as zoning and development incentives in order to optimize economic development along the route. In most jurisdictions, the City holds the franchise agreements with private utilities, which often cannot be passed on to another agency. This would be another advantage to city ownership of the route. The streetcar would effectively become another part of the City infrastructure, owned and managed by the City. The City can be supported as the owner in the additional governance roles as outlined below.

ROLE	RESPONSIBILITIES
Sponsor	While the details of a project financial plan are to be determined, it is appropriate to maintain both public and private funding options at this time. For federal funding, it is important that the governance structure include an entity that can demonstrate a track record advancing a transit capital project through the USDOT/FTA planning and implementation process. The Rapid has a successful working relationship with the FTA implementing the Silver Line Bus Rapid Transit (BRT) project and is, therefore, the logical candidate to act as the project sponsor in future applications for federal funds, if federal funds are used. A private, non-profit 501(c) (3) would offer the best mechanism to pursue local private funding. A Board consisting of both private and public representatives who are familiar with local stakeholders would be suited to pursue local contributions from local stakeholders. Separating this activity from The Rapid's federal and state sponsorship role would also reinforce the independence of the local bus and streetcar capital and operating resources.
Implementer	The Rapid's experience implementing the Silver Line BRT service provides the appropriate background and credibility with the FTA to oversee the right-of-way acquisition, environmental process and permitting, project development, vehicle procurement and construction associated with the project. The Rapid and the City of Grand Rapids have already developed a working partnership for project implementation through this BRT project.
Operator	The Rapid is accustomed to scheduling, operating, and maintaining regular transit services, and is well-suited to do the same for the streetcar service. The Rapid also has a sound understanding of issues that drive transit operating and maintenance budgets and can work with the City of Grand Rapids on budgeting issues. At the same time, as the owner, the City can work with The Rapid to develop service policies that optimize development impacts related to the streetcar operation.

The recommended governance structure provides a team that makes the most of the local skill set and existing working relationships. The team is led by the City of Grand Rapids, which owns the right-of-way in which the project operates and has the greatest stake in the project. The Rapid's working relationship with the FTA and past project experience makes it the ideal candidate to oversee implementation and operations. Finally, a separate 501 (c) (3) could be tailored to pursue the unique private funding resources available to the project, and maintain separation between streetcar and bus service (Rapid) budgets.

Section 5 |

Development and Evaluation of Potential Streetcar Alignments

The physical and operational characteristics of the modern streetcar provide great flexibility in developing route alignment options. The streetcar vehicles can generally operate effectively in shared traffic lanes with automobiles, allowing consideration of much of the local street network for streetcar use. The quiet nature of the vehicles makes them compatible with most types of land uses found along downtown streets.

The streetcar system's primary goal is to be a development incubator and a convenient, quick transit option for pedestrians. The route evaluation process must balance development opportunities, pedestrian connections and integratation of the streetcar into the rest of the Rapid's successful transit network.

Route Analysis Approach

The Grand Rapids Streetcar route analysis followed a phased approach that facilitated consideration of a broad range of alternatives. In the first phase, the SAC identified street segments that reached high numbers of pedestrians through important destinations or served adjacent land uses that could benefit from streetcar access.

The consultant team created functional streetcar routes that would provide effective transportation service using the individual segments. These preliminary alternatives were then evaluated, leading to selection of two preferred alternatives.

Conceptual engineering was conducted for the preferred alternatives to more fully develop their service and cost characteristics, and identify likely implementation impacts. The SAC then selected the recommended route based upon the conceptual engineering analysis.

Preliminary Route Screening

Evaluation criteria were formulated with the SAC to facilitiate review of a broad set of initial options. These criteria, shown in **Table 5-1** reflect the SAC Mission Statement.

> ***"The Grand Rapids Streetcar will advance the City's image as a progressive and robust community by adding a unique alternative transportation mode which expands the boundaries of downtown, enriches the community's sense of place, stimulates private investment, expands walkability options and strengthens a vibrant and dense urban environment where more people can live, work, visit and enjoy the community."***

While there were many factors to consider, stimulating long- term economic development was clearly the main goal articulated by the SAC. Therefore, Economic Development criteria include both new development and redevelopment.

Table 5-1: Evaluation Criteria

EVALUATION CRITERIA	
Economic Development	New development opportunities Redevelopment opportunities
Activity Center Connectivity	Hotels to entertainment, restaurants, convention center, arena Arena to parking, hotels, restaurants, entertainment Residential to restaurants, retail, workplace Parking to workplace, education, entertainment, restaurants
Service	Travel speeds Conflicts with special events Integration with other modes (bus, rail, local shuttles, BRT) Ridership potential
Physical and Operational Issues	Traffic or pedestrian conflicts Intersection geometry constraints Major cost elements

Activity Center Connectivity represents the key local linkages identified by the SAC. Service characteristics primarily reflect pedestrian walkability and comfort features that are significant to the passenger. Physical and Operational Issues present major impacts that would substantially offset any streetcar advantages along a particular route.

Conceptual Alignment Options

The proposed streetcar segments identified by the SAC are shown in **Figure 5-1**. The red segments received the greatest support and light blue segments received the least support. The consultant team assembled functional routes using these segments, as shown in **Figure 5-2**. These route options connect the north and south ends of downtown while providing access to key pedestrian attractors and generators.

Route 1 follows a path similar to the proposed alignment from the 2008 Study. The route travels south along Monroe and Market, but instead of terminating at Central Station it runs along the Arena South District using Cherry Street and turns south on Ionia. This modification offers significantly higher development opportunities, but offers less direct access to Central Station.

Route 2 follows Monroe south, then turns on Monroe Center and proceeds down Ionia, or turns on Louis to Commerce. The Monroe Center/Ionia option serves the historic retail core and entertainment district and accesses some prominent development sites south of the Arena. The Louis/Commerce alignment avoids disrupting parking and activities along Monroe Center and directly serves the growing residential area along Commerce.

Route 3 begins at 6th and Monroe, but crosses the river and continues down Mt. Vernon to Fulton where it crosses back and can link to either Route 1 or 2. While this option serves the museums along the river and the ever-expanding GVSU campus, it misses the core downtown activity centers, Medical Mile and much of the residential development in the Monroe North district.

Route 4 also crosses the river, but serves the Monroe North district and MSU's proposed facility at Michigan and Monroe. It also allows access to and from the Medical Mile. Crossing at Michigan, the route travels west into the Bridge Street business district to Seward where it would serve GVSU and encircle the museums before crossing back to the east side of the river along Fulton. While this option still serves the existing development north of Michigan, it misses the heart of downtown.

Each of these options was evaluated (as shown in **Table 5-2**) based on the preliminary evaluation criteria described previously.

A rating of *Best*, *Good*, *Fair* or *Poor* was used and color coded. The alternatives crossing the west side of the river were generally rated poorly because they do not serve the core downtown. Both may also require significant modifications to the bridges over the river, increasing project cost. As a result, these options were dropped from further consideration. Routes 1 and 2 each performed well with respect to the criteria, and advanced for further analysis.

Figure 5-1: Initial Streetcar Segments

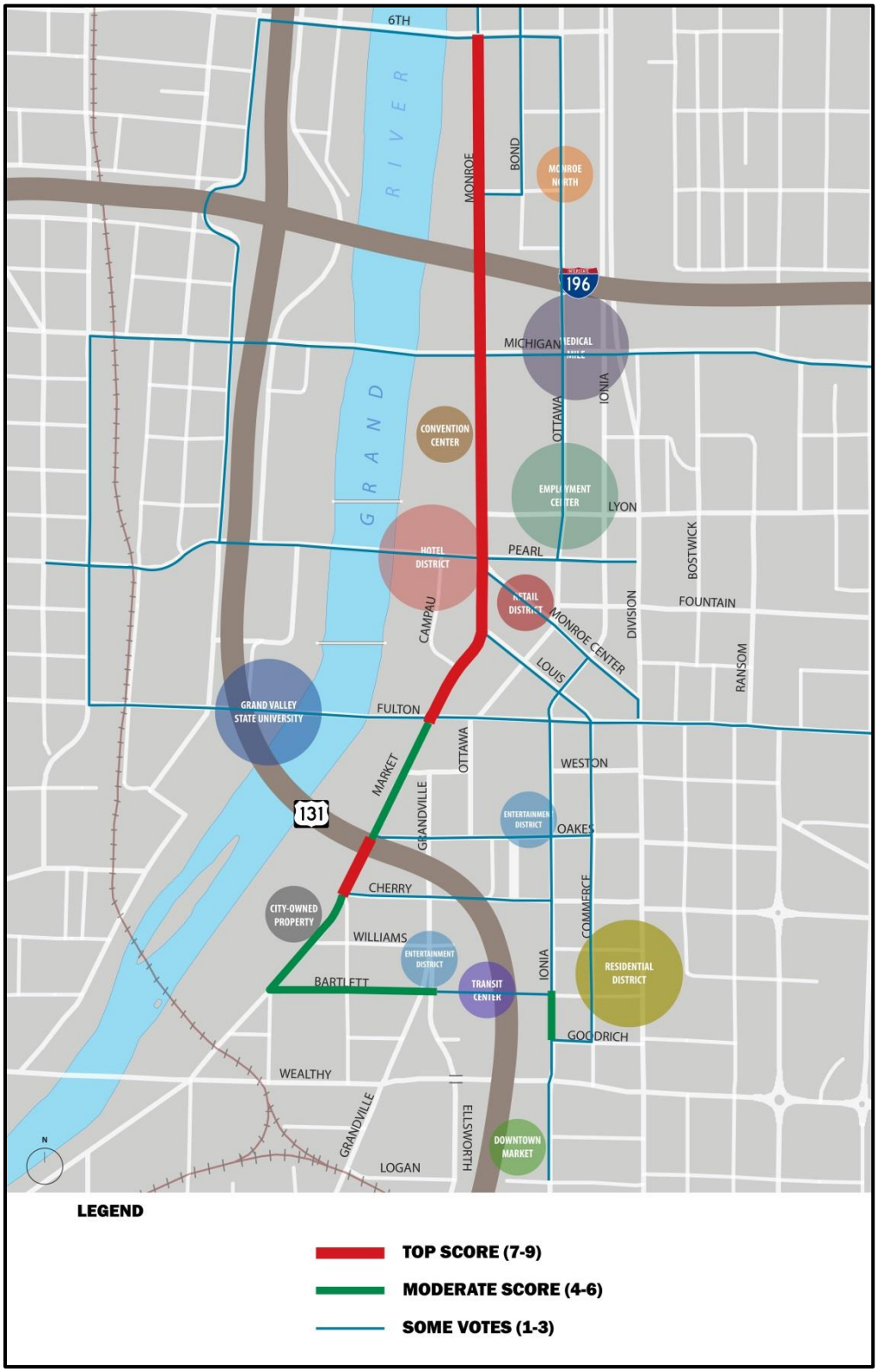


Figure 5-2: Initial Streetcar Alternatives

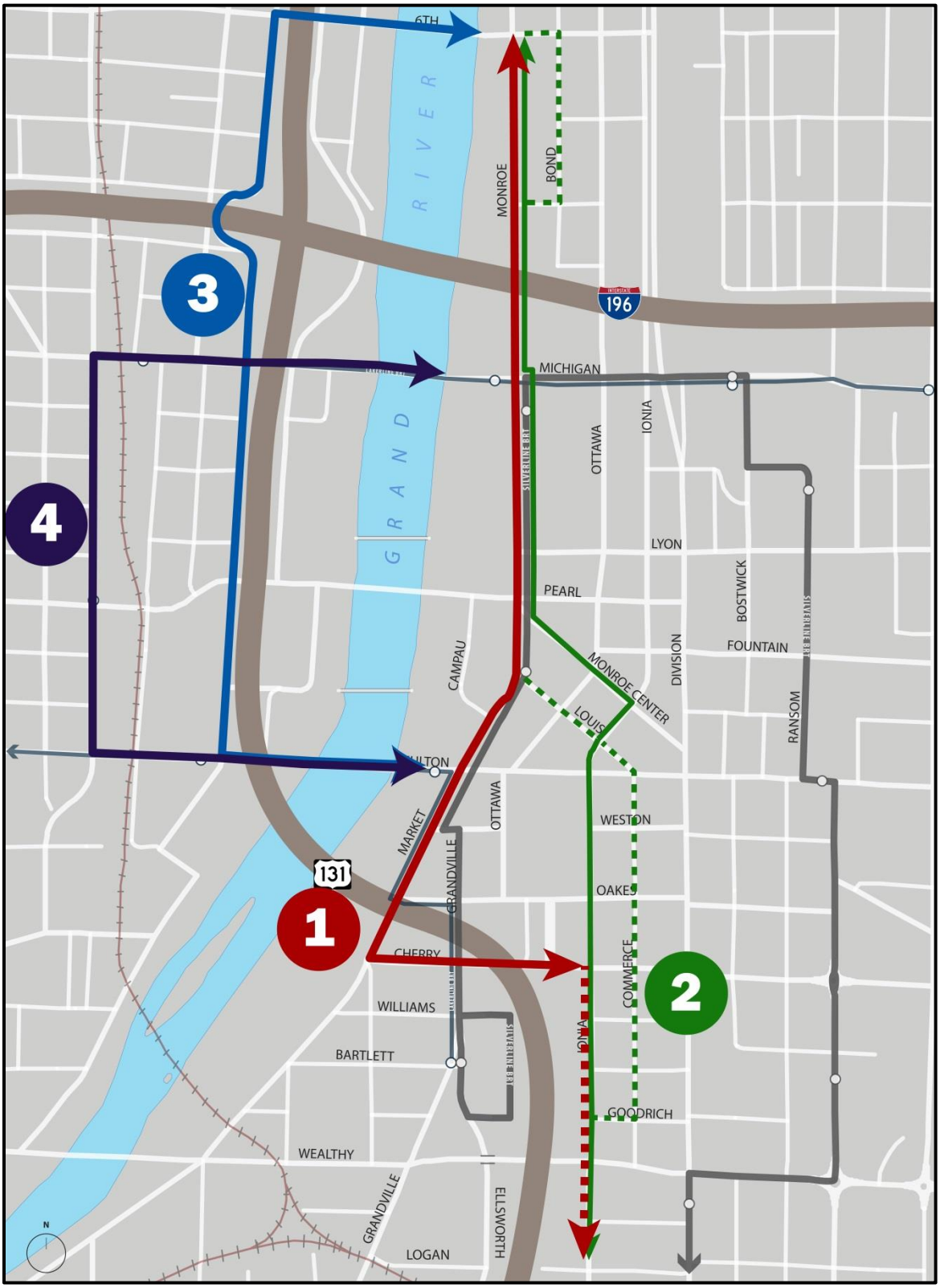


Table 5-2: Evaluations of Options

EVALUATION CRITERION	1 Original Route - Monroe/ Market/ Cherry/ Ionia	2 Entertainment Dist. - Monroe/ Ionia/ Commerce	3 West Short - 6th Bridge/ Turner/ Fulton	4 West Long - 6th Bridge/ Seward/ Fulton
ECONOMIC DEVELOPMENT				
New Development Opportunities	Best	Poor	Good	Best
Redevelopment Opportunities	Fair	Fair	Fair	Fair
ACTIVITY CENTER CONNECTIVITY				
Hotels to entertainment, restaurants, convention center, arena	Good	Best	Poor	Poor
Arena to parking, hotels, restaurants, entertainment	Good	Best	Poor	Poor
Residential to restaurants, retail, workplace	Good	Best	Fair	Fair
Parking to workplace, education, entertainment, restaurants	Good	Good	Best	Best
SERVICE				
Travel Speeds	Good	Good	Fair	Best
Conflicts with special events	Good	Poor / Fair	Good	Good
Integration with other modes (bus, rail, local shuttles, BRT)	Best	Good	Poor	Fair
Ridership Potential	Good	Best	Poor	Poor
PHYSICAL/OPERATIONAL ISSUES				
Traffic or Pedestrian Conflicts	Good	Good	Poor	Poor
Intersection Geometry Constraints	Fair	Fair	Good	Best
Major Cost Elements	Good	Good	Poor	Poor

Development and Evaluation of Final Alternatives

The SAC identified potential revisions to the final alternatives, Alterntives 1 and 2, during the review process. The Committee requested a Route 1 deviation that could better serve the development sites in the Arena South area. This resulted in an option using Oakes rather than Cherry as the east/west connection from Market to Ionia. The SAC also eliminated the Route 2 option using Monroe Center because the area is already fully developed, has potential parking conflicts, and the street is closed frequently for special events. Therefore, only the Route 2 alternative using Louis was advanced. The modified Final Alternatives and their variations are shown in **Figures 5-3 and 5-4.**

Figure 5-3: Alternative 1

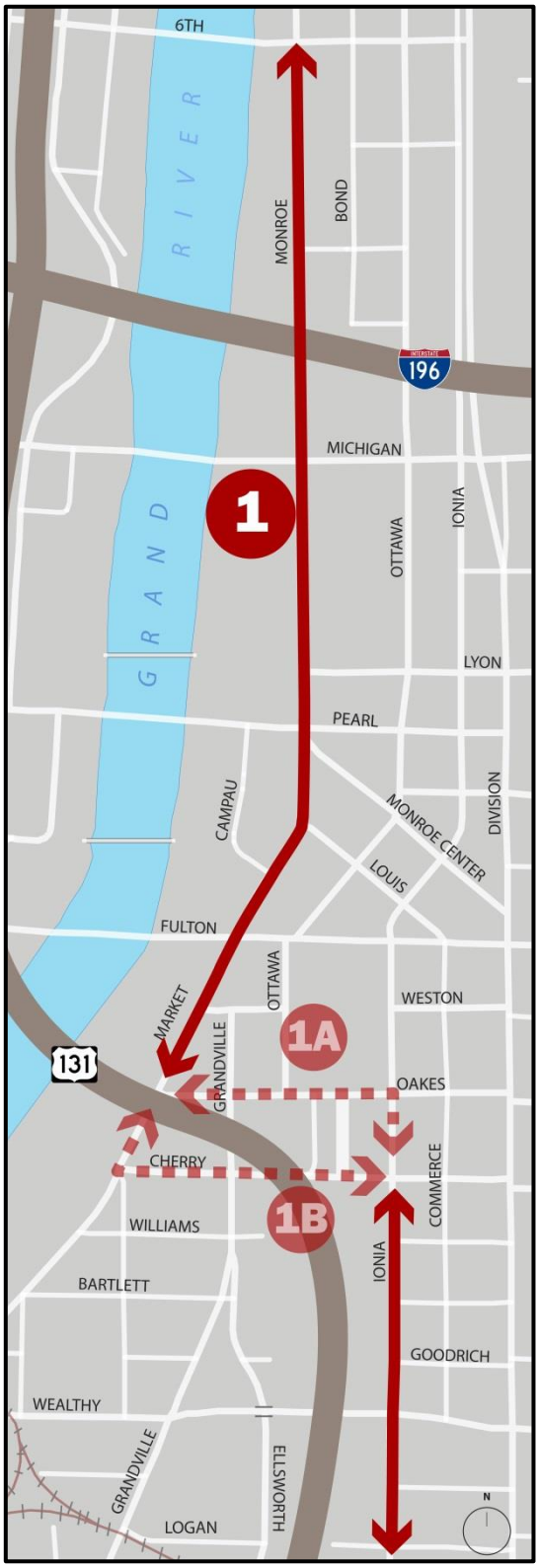


Figure 5-4: Alternative 2

To aid the further refinement and ultimate selection of a preferred alternative, conceptual engineering plans were developed for the final two route options (Appendix A). Track geometry was identified to define design constraints at streetcar stop locations and determine whether intersection modifications would be required to accommodate turns. In some instances, additional right-of-way acquisitions were identified to facilitate the required intersection geometrics. This design effort highlighted the potential impacts in greater detail and enhanced the cost estimate.

Detailed evaluation criteria were formulated to further narrow the selection process (shown in **Table 5-3**). While in most cases the two options were not significantly different, the key economic development factor, developable land, revealed a strong preference for Route 1. Developable land reflects acreage abutting the proposed routes that is either vacant or currently used for surface parking and readily available for development. While the actual development influence of any streetcar option can be expected to extend two to three blocks beyond the route itself, the assessment of developable land was confined to the property immediately adjacent to the route. The measure was defined in this way to emphasize the most likely development impacts of the different options and minimize speculation regarding impacts within a broader area.

Table 5-3: Final Analysis Criteria

COMPARISON OF FINAL ALTERNATIVES	ALTERNATIVE	
Criteria	Route 1	Route 2
Developable land adjacent to routes	31-35 Acres	19-22 Acres
Service to key destinations	Improved Access to Central Station and Amtrak	Improved Access to Entertainment District and Monroe Center
Traffic/Parking impacts	Transit only phase at Market turn	Transit only phase at Louis and Ionia
Travel time (round trip)	25 minutes	23-25 minutes
Capital costs (2014 $)	$109-110 M	$101-108 M

In addition to the significant difference in potentially developable acreage, another distinction between the two routes is noteworthy. A review of the actual sites potentially available shows that many properties along Route 1 tend to be larger. The parking lot at the southwest corner of Fulton and Market is a prime example, offering not only a large area but prime river frontage and excellent visibility. Another sizeable property is found between Oakes and Cherry, just east of Grandville. By contrast, many of the sites along Route 2 tend to be smaller, infill properties that lend themselves to

development, but would not accommodate the range of options for mixed use or higher intensity projects that larger sites offer.

Although the SAC considered development impact to be the most significant criterion in selecting the Recommended Route, it was also important to identify any major differences that could potentially offset future development opportunities.

The Service to Key Destinations criterion revealed another distinction worth considering between the options. Route 1 provides closer access to Central Station and Amtrak. Route 2 offers better service to Monroe Center and the Entertainment District. In either case, however, the service advantage is not substantial since both routes are within the desired two to three block corridor of influence for a streetcar.

No other appreciable difference was found relative to the remaining criteria. Both options will require some intersection modifications and limited changes to traffic signals. Likewise, travel time and capital costs are almost the same for both alternatives.

Selection of Recommended Route

As a result of this analysis and the clear economic development advantage, the SAC selected Route 1 as the recommended streetcar alignment. None of the other characteristics offset this distinct advantage. Based upon the opportunity to acess riverfront property south of 131, the SAC selected Cherry as the preferred route to connect Market to Ionia, finalizing the recommended alignment

Potential for Expansion

The Recommended Route is conceived as the first phase of a network of streetcar system in the Grand Rapids metropolitan area. As a starter line, it is envisioned to expand beyond downtown in the long term. The 2008 Streetcar Study identified several potential system extensions. The Rapid's 2010 twenty-year Transit Master Plan also envisioned a network of streetcar systems in the long-term.

Figure 5.5 shows the potential route extensions identified in the recent transit planning studies. Looking north, the line could extend along Monroe, continuing to Leonard while a potential southern extension would continue along Ionia to the residential development at Franklin.

East Grand Rapids is most frequently identified as the key destination for a major expansion of the streetcar system. Wealthy could provide a direct path to East Grand Rapids from an initial streetcar phase. The East Grand Rapids connection could also be located along Franklin, if the southern extension is completed first.

Figure 5-5: Potential Streetcar Expansion Map

A Fulton streetcar leg could be extended west across the river to provide streetcar access to Grand Valley State University and the hotels and museums on the west side of the river. In addition to connecting both sides of the river, this streetcar route would bring additional passengers to the north/south line. It could potentially operate as a "shuttle" with passengers transferring between streetcar routes or be operationally connected to the North/South route. A physical connection would be required, regardless of the operational plan, in order to move streetcars between the west leg and the maintenance facility.

Expansion of the initial project would result in the need for additional streetcar vehicles and capacity to store and maintain the expanded fleet. This can be accomplished by "oversizing" the initial vehicle maintenance facility, or acquiring a starter line vehicle maintenance location that can be easily expanded.

These potential extensions would need further study to determine their feasibility.

Section 6 |

Characteristics of the Recommended Alternative

The recommended streetcar route for Grand Rapids is shown in **Figure 6.1.** This section of the report identifies the main characteristics of the route with respect to:

- Route refinement
- Proposed stop locations
- Operating cost
- Capital cost
- Ridership forecast
- Infrastructure issues

Recommended Route

The recommended route is shown in **Figure 6-1**. It incorporates the Bond Loop at the north end of the route, travels south along Monroe Avenue and Market Avenue, then turns east to Ionia Avenue along Cherry Street.

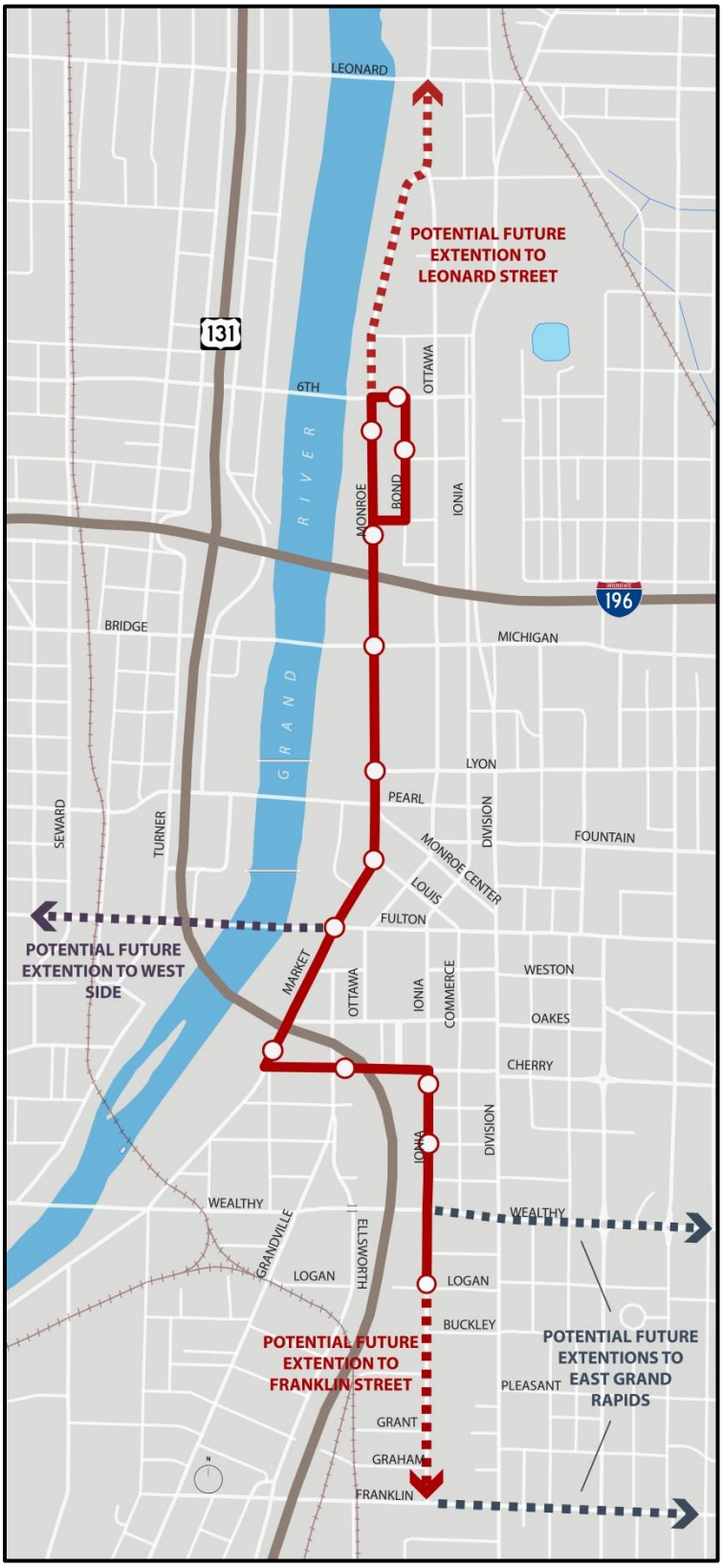
The specific route may evolve slightly during future project development in response to a range of possible considerations, some of which are identified below:

- Environmental/utility impacts identified during engineering and environmental analysis
- Joint development opportunities at individual sites
- Roadway/ramp modifications associated with potential closure of Wealthy/131 interchange
- Intersection modification options along Market at Cherry

While no major environmental or utility issues have been identified in the planning phase, it is possible that some factors could arise during more detailed project development.

Joint development opportunities will become more apparent as the project advances. The development community tends to wait for project certainty before investing resources in possible new developments. As funding for the project solidifies, developer interest will increase in the project and negotiations will ensue regarding an optimal route. That interest will also depend, however, on the state of the economy. Developer interest is generally proportional to the strength of the market.

Figure 6-1: Recommended Route



Potential closure of the Wealthy interchange may push significant traffic volumes to the ramps at Cherry (on and off) and the on ramp at Oakes. The increased traffic volumes could impact streetcar operation at these locations. With coordinated planning, however, a Wealthy ramp closure could result in added funding and major overhaul of the Cherry and Oakes ramp intersections, facilitating incorporation of the streetcar modications at the same time.

At this point, the implementation/cost issues that may influence route refinement are unknown. They are dependent upon the results of more detailed engineering that will follow. Utility impacts tend to create the largest budget impact. Responsibilty for relocation costs for private utilities in public right-of-way such as optic fiber can be a significant and contentious issue.

Proposed Stop Locations

Streetcar stops generally have more of a presence than bus stops but are significantly less intrusive than Light Rail stations. The Streetcar single car operation typically requires a platform of 60-70 feet long with level/near-level boarding area between the handicap accessible doors. The sidewalk is typically raised from an existing 6 inches to 10-14 inches for a portion of the boarding area to facilitate level boarding. The stop amenities would be similar to those provided for the downtown Silver Line BRT stops.

The initial streetcar stop locations proposed for this project are shown in **Figure 6.1**. These stops represent general locations rather than specific sites. Typically, stops for an urban-in-street streetcar alignment similar to Grand Rapids have stops spaced at about 1/5 mile. This guideline was used when locating the proposed stops in Grand Rapids. When intersection spacing or geometric constraints prohibited the placement of stops at this spacing, a conservative approach of closer stops spacing was taken. This resulted in an average stop spacing of approximately 1,000 feet. Closely spaced stops reduce the walking distance to and from the streetcar line; however this results in more stops. Frequent stops increase travel times for passengers and operating and capital costs for the system owner.

Several design considerations impact the specific location of streetcar stops. The optimal location is a tangent (straight) segment of track. Locations close to intersections or curves can be attractive since the vehicle is already operating at a slower speed, reducing time lost as the vehicle slows on its approach to a stop. Locations near a traffic signal may be prefered as existing crosswalks would

provide access to the stop from both sides of the street. Pedestrian movements to and from the stop should be accounted for by providing safe crossing areas.

Locating a stop on the far side of an intersection allows the streetcar to pass through a green traffic signal, without risking a signal change while picking up passengers. If the sidewalk is being used for the waiting area, it must be of sufficient width to accommodate the anticipated peak passenger loads at that location while facilitating pedestrian movement around the waiting passengers. Finally, design requirements of the Americans with Disabilities Act (ADA) are required in the design of the platforms.

While the design and operating considerations influence stop location, service is the key factor in selecting optimal sites. In order to minimize walking distance, stops are generally located at major trip origins or destinations such as conventions centers or residential towers. Implementing a stop in coordination with a new development provides the opportunity to orient the building entrance towards the stop or develop the property in the air right over the streetcar stop. Building workers or inhabitants would have convenient access to the streetcar while the building itself helps to provide weather protection for all streetcar passengers boarding at that location. This type of joint development has been more common in Light and Heavy Rail systems, but could still be applicable for streetcars.

The desired amenities for the stops (shelters, ticket vending, lighting, trash receptacles, etc) will be identified in subsequent design phases. Specific stop locations will also be determined as design advances. This activity should be closely related to development planning in the downtown area.

Operating Cost

The operating costs are generally determined by the desired level of service and local labor and electric power costs. They are typically comprised of the ongoing costs to operate and maintain streetcar service on an annual basis, including:

- Labor costs associated with vehicle operators and maintenance workers,
- Electrical power,
- Vehicle maintenance,
- Track maintenance,
- Station maintenance, and
- Administrative services

The Grand Rapids Streetcar operating cost estimates were developed based on the annual revenue vehicle hours of service required (refer to the streetcar operating plans in **Appendix B**). The streetcar is planned to operate from 6 a.m. to midnight on weekdays and Saturdays, with no service on Sundays and holidays (though Sunday service may be considered for future implementation). The streetcar will operate about every 10 minutes (11 minutes for Cherry with Bond options) during peak and midday periods and every 15 minutes during weekday evenings and all day on Saturdays.

A fleet of 4 streetcars would be required to operate the service, which includes 3 peak vehicles and one spare. An average streetcar unit cost per hour of $200 was applied to the estimated annual revenue vehicle-hours. This unit cost is based on a review and comparison of recent operating costs of other modern streetcar systems operated in the U.S. The following table presents a summary of operating requirements and operating costs for each streetcar alignment option.

Table 6-1: Streetcar Operating Costs

Annual Revenue Hours	Annual Operating Cost (2014 dollars)
16,530	$3,306,000

Capital Cost

The capital cost estimate includes all aspects of implementation from design through construction and vehicle testing. This includes engineering, utilities, structures, stations, traction power and communication systems, vehicles, fare collection equipment, rights-of-way, professional services, and contingencies. The estimate uses the Federal Transit Administration Standard Cost Category (SCC) format, which documents each of the project elements that sum to the total cost. The costs were estimated in both the current year (2014) as well as in the year of expenditure (YoE: 2019), and are based on historic cost data of similar streetcar projects.

The capital cost estimates include items related to vehicles, engineering and construction. Additionally, the costs include provisions for public agency allowances, project management and administration, construction management, community relations and involvement, insurance/legal, start up and testing and training. Because the level of design is still pre-conceptual, most of the items in the cost estimates are represented as allowances, which in effect act as a "place-holder" until further analysis and design identify quantifiable items which are needed to develop a more accurate cost estimate. These allowances are based on experience developing and implementing projects in other cities, historical data, and the engineer's professional judgment.

Estimates of project capital costs were developed in three general steps:

1. The individual project components needed for the desired level of design were identified and quantified for each alignment.

2. Unit costs or allowances for each of the project components documented in Step 1 were developed based on industry standards, past project experience and other project-specific factors. These cost components were assembled in a spreadsheet, where the unit costs/allowances were applied to the number of components that were needed (for example, the vehicle maintenance facility is an allowance for a typical site. When a site has been choosen and a layout has been developed, the estimates should then be revisted.)

3. Additional factors such as contingencies, engineering & administration, and year-of-expenditure escalation were added to the cost estimates.

Federal Transit Administration (FTA) Standard Cost Category Format (SCC)

The capital cost estimates use FTA's Standard Cost Category (SCC) format, which is a consistent format for reporting, estimating, and managing capital costs under FTA's New Starts program.

The SCC format is divided into three levels. The first level lists the ten main SCC categories: the guideway/track elements, stations, supporting facilities, sitework, operational systems, land, vehicles, professional services, unallocated contingency, and financing. The second level contains the SCC sub-categories, which focuses on components and tasks within the main SCC categories. Finally, a third level expands the sub-categories into each individual units of work, providing a level of detail more appropriate for unit pricing. As necessary, the estimate can roll these levels up into a cost summary using the SCC format for reporting purposes.

Capital costs for the first seven categories, which includes construction, rights-of-way costs, and vehicles (SCC 10-70), were calculated by using "order of magnitude" unit costs (since the price changes based on the number of units) and the measured quantities for each component. In contrast, system-wide costs and allowances were calculated based on route length, and not from measured quantities. A per track (or route) -mile unit cost was developed from historical data and applied to the alignment length. The final three categories, which include professional services, contingencies and finance (SCC 80-100) were calculated as a percentage of construction costs (excluding vehicle costs).

The following section provides an overview of the components on which the SCC formatting is based:

- **Construction (SCC 10-50) –** The construction cost of the project, which consists of SCC sections 10 through 50, includes all capital improvement costs for the streetcar project. This includes all track, civil, stations, maintenance and administration buildings, systems and contractor indirect costs. This section includes line-item contingencies (allocated) typically ranging from 20-30% to account for uncertainty in quantity and/or price for that particular item.

- **Right-of-Way (SCC 60) –** This cost component includes the anticipated right-of-way costs for the project. For a streetcar, the right-of-way costs are typically limited to the maintenance facility, substations, and an occasional encroachment for a streetcar stop or making 90-degree turns. At this stage of project development, the right-of-way costs assumed are an allowance.

- **Vehicles (SCC 70) –** This cost component includes the costs for procuring modern streetcar vehicles and spare parts. The vehicle unit cost is based on recent pricing of streetcar vehicle procurements and assumes a federally funded project where vehicles must meet Buy America requirements. It also includes an estimated cost for consultant services to develop vehicle specificatiosn and assist with procurement. Small orders, which are usually seen with starter streetcar projects, often result in a higher per-unit cost over larger orders typical of larger light rail systems.

- **Allocated Contingency (SCC 10-70) –** Contingency is typically included to address uncertainties based on the current level of engineering design. The contingency allowance addresses the potential for quantity fluctuations and cost variability when items of work are neither readily apparent nor known at the current level of design. Allocated contingencies are line-item contingencies applied to each item in SCC sections 10 through 70 (all construction, right-of-way costs, and vehicles components). Based on the limited level of design, an allocated contingency, generally in the range of 20-30 percent, was applied to the items in cost categories 10-70. The percentage selected was based on professional experience and judgment related to the potential variability of costs within each of these cost categories.

- **Professional Services (SCC 80) –** This category includes all professional, technical and management services related to the design and construction of fixed infrastructure (SCC 10–50) during the preliminary engineering, final design, and construction phases of the project. This includes, but is not limited to: design, engineering and architectural services, specialty services such as safety or security analyses, value engineering, risk assessment, cost estimating, scheduling, Before and After studies, auditing, legal services, administration and management. As a percentage of construction costs (SCC 10-50) professional services typically fall anywhere from 20-40% with the national average (based on a recent TRB study of 59 completed projects) of about 30%. The assumed soft costs for the streetcar estimates are 30.0% of construction costs (SCC 10-50).

- **Unallocated Contingency (SCC 90) –** This category is a contingency (an overall percentage of 10%) applied to the entire project and is intended to serve as a project reserve for unanticipated costs incurred during project design and/or construction. This contingency is in addition to the line item (allocated) contingency that is applied individually to each line item in categories 10-70.

- **Inflation –** Inflation is a key component to account for when developing the costs and establishing a project budget. The estimates were developed in 2013 dollars, and escalated to the year of expenditure (YoE) based on mid-year of construction/design. An annual inflation factor of 3.0% was used and mid-year of construction was assumed to be 2019.

- **Finance Charges (SCC 100) –** This category includes the projected finance charges to complete the project. Costs would typically be derived from the New Starts financial plan. At this stage, Finance Charges are not assumed or included in the estimate.

Unit Costs

Unit costs for each individual component were developed from historical cost data, including final engineering estimates, completed projects, standard estimating manuals, and standard estimating practices. A mix of historical data from various national streetcar projects was used in developing the appropriate unit costs and allowances to be applied to the cost estimate. In most cases, due to the limited level of engineering in this study, allowances were established based on the engineer's and

firm's experience. This allowance serves as a "place-holder" until further analysis and design can provide for more accurate and quantifiable units of work.

Escalation and Inflation factor

In order to establish accurate project budgets, an escalation factor must be used. The purpose of an escalation factor is to account for anticipated inflation and the increased cost of construction, materials and labor over time. The escalation factor is used to take the current year estimate and project it to a future base year or year of expenditure (YoE). For the purpose of this study, the YoE is the year in which the midpoint of construction is anticipated. The YoE is assumed to be 2019 for all estimates.

The annual factor by which the current year estimate has been escalated to the YoE was 3.0%. This value is a reasonable estimate of the possible inflation that could be expected given the constant fluctuation in the economy and cost of material, fuel and labor. The actual inflation or escalation realized over the next few years could be more or less than the assumed value.

Summary of Total Project Costs

The estimates include all project costs including construction, right-of-way, vehicles, professional services (soft costs), allocated and unallocated contingencies and inflation. Combined, the sum of all components equal the total project cost as viewed by FTA and are established using FTA's Standard Cost Categories (SCC) workbook.

Estimated Capital Cost Summary

Based on the approach and breakdown described above, an estimated capital cost was developed for the project. The estimates did not include betterments such as realigning the US-131 off ramps. The total project cost in year of expenditure is estimated in **Table 6.2**. A detailed summary of the project costs by major SCC cost categories per alternative can be found in **Appendix C**.

The 2019 cost is higher than the preliminary estimate for the alternative 1 option in Table 5.3 for several reasons. First, Table 5.3 presented costs in current (2014) dollars. Second, the Bond Street Loop which was an option in the initial alternatives has been added to the recommended alternative, increasing the cost by $7.3 million. Finally, there were minor adjustments made to the recommended alternative as it advanced from a preliminary option to the recommended alternative.

Table 6-2: Capital Cost Summary

Streetcar Segment Characteristics	
Segment Length [Track Mile]	3.88
Cost Per Mile [Track Mile] (2014)	$31.2 M
Cost Per Mile [Track Mile] (2019)	$36.2 M
Total Cost (2014)	$118.3 M
Total Cost (YoE 2019)	$137.1 M

Ridership Forecast

The Streetcar ridership potential for this project was estimated using a travel modeling software developed by FTA called STOPS (see **Appendix F)**. The STOPS (Simplified Trips-on-Project Software) model is a stand-alone ridership forecasting software package that applies a set of travel models to predict detailed transit travel patterns. The STOPS model was specifically developed by FTA to support New Starts and Small Starts projects.

STOPS utilizes a modified four-step (trip generation, trip distribution, mode choice and trip assignment) model structure to quantify total transit ridership, as well as determine transit dependent usage and compute the change in automobile vehicle miles travelled (VMT). The component models in STOPS have been calibrated with local adjustments and compared to rider-survey datasets from locations within six metropolitan areas, and validated against stop-specific counts of trips in nine other metropolitan areas, resulting in 24 total fixed-guideway systems. The STOPS model uses demographic and employment data and highway travel time data from the regional travel model, US Census data and transit level of service.

Design/Infrastructure Issues

The conceptual engineering for the recommended route provided a realistic assessment of the physical constraints and impacts associated with the recommended alternative. The design was performed at a level to allow reasonable assessment of potential issues related to streetcar implementation.

The conceptual design (**Appendix A**) was designed using industry standards and best practices. During final design, when specific design criteria are known and a vehicle has been selected, the alignment will be updated accordingly. Without a survey and detailed engineering this alignment should be treated as "approximate".

Field data was collected to assist in the design of the proposed alignment. Data was collected on existing street grades, vertical clearances, utilities, and traffic volumes as described below.

Street Grades and Vertical Clearances

Data for this study was collected through field measurements made by surveying staff. Slopes were measured using an electronic level. Multiple slopes were measured in each block to determine the maximum slope for each block of the proposed route. The heights of obstructions were measured using a laser distance meter. Measurements were made from the curb gutter to the lowest point on the obstruction.

Underground Utilities and Roadway Right-of-way

Data was collected based on Geographic Information Survey (GIS) provided by the City of Grand Rapids and as-built and engineering design drawings provided by the City of Grand Rapids Engineering Department. This information was compiled into a summary data spreadsheet and ranked. A physical walk over of the routes provided the final check on the data provided.

Traffic Data

The Syncro model that contained traffic data was provided by the City of Grand Rapids Traffic and Safety Department. Average Annual Daily Traffic (AADT) information was provided by the Grand Valley Metro Council.

The sections below summarize the review of the recommended route and possible options. The analysis did not identify any fatal flaws with the proposed alignment.

Grade

Modern streetcars can climb grades as much as 9% for short distances (approximately 700-800 feet), however, sustained grades over 7% are generally discouraged, particularly in climates where snow and ice are regular occurrences. Grand Rapids has no steep grades that could inhibit streetcar operation along the recommended route. A grade map of the corridor is located in **Appendix D.**

Street Geometry

This criterion identifies whether street geometry would inhibit streetcar operation or require significant capital investments that make operation infeasible. These include major modifications to interchanges, exclusive right-of-way needs or other types of transit infrastructure that would be required (such as bridges, underpasses, etc.).

The analysis also identified several locations where the streetcar route may require sidewalk modifications or small right-of-way easements or acquisitions. This happens typically when the streetcar needs to make a 90 degree turn and the existing geometry forces the dynamic envelope of the streetcar to impact adjacent property and/or parking spaces near an intersection.

Findings

- Track encroaches on sidewalk for turn from Monroe Avenue onto 6th Street.
- Track encroaches on existing landscape for turn from 6th Street onto Bond Avenue.
- There are currently existing freight tracks in the street on Bond Avenue. This portion of the track is located on the western edge of the roadway and is paved over. May also consider converting the 2-way stop at Bond Avenue and Trowbridge Street to a signal or 4-way stop.
- Track encroaches on right-of-way for turn from Bond Avenue onto Trowbridge Street.
- A signal needs to be added for the turn from Trowbridge Street onto Monroe Avenue.
- Requires transit-only phase to turn from right lane on Market Avenue onto Cherry Street. Northbound alignment encroaches onto sidewalk and landscaping on turn from Cherry Street to Market Avenue.
- Connections to a possible Vehicle Maintenance site underneath US-131 may result in additional infrastructure such as a transit signal and possible driveway modifications at the intersection of Cherry Street and the transit entrance to The Rapid Central Station.
- Southbound track encroaches on existing sidewalk for turn from Cherry Street onto Ionia Avenue. A signal may be needed at this intersection to provide the streetcar with a protected left turn.
- A transit-only phase is needed for the tail track on Ionia Avenue north of Logan Street.

Bridges/Structures

Adding a streetcar line to a bridge can potentially add dead load to a structure to accommodate the track slab and rail. Bridges need to have enough capacity for this additional weight in order to allow for a streetcar route. If a bridge is listed as a historic structure additional coordination and measures will need to be taken to accommodate the State Historic Preservations Office (SHPO) and address any issues or concerns they may have with installing track or overhead power supply infrastructure. However, the recommended route and potential route options do not cross any bridges.

Vertical Clearances

There are a number of bridges with low clearance in Grand Rapids. Low bridges (less than 16') can be a problem for the overhead catenary system (OCS) used to power streetcar vehicles. If the overhead obstruction doesn't provide adequate room for the pantograph to function properly a streetcar route may not be able to operate on the route beyond the low clearance point without modifications to the roadway or structure. The vertical clearance under bridges along the proposed alignment is at least a minimum of 16'.

Utility Impacts

Utility relocation tends to be the most significant source of cost increase in rail projects because of the uncertainty of actual utility location and characteristics. Existing plans do not always accurately depict current information. Fortunately, streetcar trackway design and operations generally provide greater flexibility in adjusting to utility conditions than other rail options. For example when there's an adjacent lane with less utility conflicts the alignment may be moved into that lane for a portion of the route to minimize impacts. A preliminary list of public utilities identified within the corridor can be found in **Appendix E.**

Lane Geometry

Another major concern with a streetcar corridor is providing enough space in the lane for the vehicle to operate. Streetcars require a minimum horizontal offset from centerline to operate safely at proposed design speeds. A reduced lane width may result in slower design speeds being required or a reduction in parking if parking exists. Insufficient lane widths may also lead to a need to purchase additional right-of-way. Typically a 10-11 foot lane is the minimum lane width needed for a streetcar.

Section 7 |

Potential Capital and Operating Funding Sources

The following provides an overview of potential capital and operating funding sources that could be targeted in the near future to construct and operate the Grand Rapids Streetcar Project. The potential sources reflect financial strategies developed for streetcar projects around the country that have either recently been implemented or will be implemented with the next few years. Included in the overview is a summary of the planned funding strategy for the M1-Rail Streetcar Project (Detroit) which recently started construction. The M1 Rail Project is the first streetcar project in Michigan and has already established funding and financing precedents that may be beneficial to the Grand Rapids Streetcar Project.

As the Grand Rapids Streetcar Project moves through the more detailed planning and engineering, the project partners will need to develop a detailed financial plan which documents the sources and uses of capital and operating funds. Specifically, the financial plan will specify the timing and level of funding from each source and the steps and/or required to fully commitment of these funds to construct and operating the streetcar project.

Capital Costs and Potential Revenues

As described in Section 6, at this conceptual stage of planning and design, the estimated capital cost of the Grand Rapids Streetcar Project is $137.1 million (2019 YoE $). As shown in Table 7-1, this conceptual estimate is consistent with capital costs for 16 streetcar project that have either recently been implemented or will be implemented in the near future. Table 7-1 also summarizes the capital funding strategies for the 16 streetcar projects. The majority financial strategies utilized a combination of federal, state, regional and local funding sources. Reflecting 14 of the 16 projects shown in Table 7-1, the average number of sources including in the strategies is three (3), while the range is from two to seven funding sources. The two projects not included in the average calculation are the Portland Streetcar Program (15 funding sources) and the Seattle First Hill Line (one source).

- **Federal Funding:** Fifteen of the sixteen streetcar lines were successful in obtaining some level of participation from federal programs. Federal participation ranged from $7.0 million to $83.0 million or between 10 percent and 70 percent of total project costs and included competitive

funding program from the Federal Transit Administration (FTA), formula funds from the Federal Highway Administration (FHWA), and competitive grants from the United States Department of Transportation (USDOT). A project is eligible to pursue multiple federal funding programs as long as the total federal share of funding is less than 80 percent of the total project costs.

The federal sources described below reflect programs included in current surface transportation legislation - Moving Ahead for Progress in the 21st Century (MAP-21). Historically, federal surface transportation legislation has typically provided funding for a six year period. However, due to the ongoing political and financial challenges in Washington DC, MAP-21 was enacted as a two-year funding bill (FY 2013 and FY 2014) and to date the next transportation bill has not been enacted. Discussions regarding the next transportation bill have been initiated within Washington DC, including the Administration's recently proposed GROW AMERICA Act; however there is no timeline for passage of a long term transportation bill. For the purposes of this analysis, it is assumed the funding programs included in MAP-21 will continue in the next transportation bill.

- FTA Capital Investment Program (New Starts / Small Starts Program): This is FTA primary discretionary/competitive program for supporting locally planned, implemented, and operated transit "guideway" capital investments, including streetcar projects. If the decision is made to pursue this grant program, given the current capital cost estimate $137.1 million (2019 YoE $) the Grand Rapids Streetcar would apply for funds under the Small Starts category. This category is for projects with a capital cost of less than $250 million that are requesting less than $75 million in Capital Investment Grant funds. Projects applying for Small Starts funds are evaluated and rated based on a set of defined justification criteria (mobility improvements, environmental benefits, cost effectiveness, economic development effects, and land use, and congestion relief) as well as local financial commitment criteria.

  As shown in the table, four streetcar projects have included Small Starts funding as part of their financial strategy. The Portland Eastside Loop Project was able to obtain the largest Small Starts Construction Grant Agreement of $75.0 million, which was approximately 50 percent of total project costs.

- FHWA Programs: Eight streetcar projects took advantage of FHWA programs that are eligible to fund transit projects. As described in more detail below, three programs: Congestion Mitigation and Air Quality Improvement (CMAQ) Program, Surface Transportation Program (STP), and Transportation Alternatives Program (TAP) could potentially provide funding to support specific project elements the benefit both the streetcar line and enhance existing roadways and/or pedestrian and bicycle connections.

- US DOT Competitive Grants: In recent years, two USDOT competitive grant programs provided federal funding for ten streetcar projects. The Transportation Investment Generating Economic Recovery (TIGER) Program provided grants ranging between $11.0 million and $63.0 million, including $25 million for Detroit's M1-Rail Project. M1-Rail partnered with the Michigan Department of Transportation (MDOT) and Southeast Michigan Council of Governments (SEMCOG) in successfully applying for the TIGER grant to use the funds for costs associated with resurfacing a State roadway where the streetcar will operate, streetscape improvements, and vehicles

  The second program, Urban Circulator Grant Program, provided $25.0 million each for three streetcar lines. However, this grant program has been inactive for the last four years.

- **State Funding:** Four projects shown in Table 7-1 received funding support from their respective state governments. As described in more detail below, historically for transit capital projects MDOT has provided the 20 percent local match for all transit capital projects.

- **Regional / Local Funding:** While the Portland Streetcar program used a large variety of local sources, most streetcar projects received regional and local funding from a limited number of programs. The largest levels of funding were provided through dedicated sales taxes, general fund contribution and bond proceeds.

  Three projects were able to take advantage of the value of property as a local match, either through the sale of existing agency owned property or through the donation of property. The two projects that were able to leverage the value of donated property (Salt Lake City and Fort Lauderdale) were able to use the right-of-way value as local match because federal funds were not used to purchase these properties.

  Other examples reflect local funding through regional partnerships including excess toll revenue for the Dallas Oak Cliff Project and funding support from the Port and Development Commission for the Portland Eastside Loop Project.

Table 7-1: Streetcar Funding Strategies

	Portland Phase 1-4 (4.0 mi, 2001 - 2007)	Portland Eastside Loop (3.3 mi, opens 2012)	Seattle South Lake Union (1.3 mi, 2007)	Salt Lake City Sugar Hill Streetcar (2.0 mi, 2013)	Seattle First Hill Line (2.2 mi., opens 2014)	Tucson Modern Streetcar (3.9 mi, opens 2014)	Cincinnati Streetcar (1.5 mi, opens 201X)	Charlotte Streetcar (1.5 mi, opens 2015)	Atlanta Streetcar (1.5 mi, opens 2014)	Detroit M-1 Rail Streetcar (3.3 mi, opens 2016)	St. Louis Loop Trolley (2.2 mi, opens 2016)	Ft. Lauderdale Wave (2.7 mi, opens 2016)	Dallas Oak Cliff Streetcar (1.6 mi, opens 201x)	Tempe Streetcar (2.7 miles, , 2016)	Los Angeles Streetcar (4 miles, , 2016)	Kansas City Streetcar (4.1 miles, 2015)
Total Costs	**$103.2**	**$148.3**	**$52.1**	**$55.5**	**$140.0**	**$187.8**	**$110.4**	**$37.0**	**$69.2**	**$137.0**	**$39.5**	**$142.6**	**$61.8**	**$129.3**	**$125.0**	**$102.0**
Federal	**$7.0**	**$75.4**	**$14.9**	**$26.0**	**$0.0**	**$69.0**	**$35.9**	**$25.0**	**$47.6**	**$25.0**	**$25.0**	**$67.7**	**$26.0**	**$88.1**	**$62.5**	**$18.0**
FTA Small Starts		$75.0										$49.7		**$56.0**	**$62.5**	
FTA Small Starts Exempt						$6.0										
FHWA Funds	$5.0		$14.9			$14.0	$4.0				$6.0	$3.5		$32.1		$18.0
USDOT – TIGER Grants	$2.0			$26.0		$63.0	$10.9		$47.6	$25.0		$18.0	$26.0			
USDOT - Urban Circulator Grant							$25.0	$25.0			$25.0					
USDOT – Stimulus Funds		$0.4														
State	**$2.1**	**$20.0**	**$3.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$0.0**	**$35.7**	**$0.0**	**$0.0**	**$0.0**	**$0.0**
Connect Oregon	$2.1															
State lottery funds		$20.0														
Florida DOT												$35.7				
State General Funds			$3.0													
Regional	**$10.0**	**$3.6**	**$0.0**	**$18.3**	**$0.0**	**$14.0**	**$4.0**	**$0.0**	**$0.0**	**$0.0**	**$6.0**	**$0.0**	**$15.8**	**$0.0**	**$0.0**	**$0.0**
Regional Transportation Funds	$10.0	$3.6														
Toll Road Revenue													$15.8			
UTA Vehicles & ROW Donation				$18.3												
Local	**$64.7**	**$33.8**	**$8.5**	**$11.2**	**$140.0**	**$101.6**	**$64.0**	**$12.0**	**$15.6**	**$0.0**	**$3.5**	**$15.1**	**$20.0**	**$41.2**	**$0.0**	**$4.5**
Local Sales Tax					$140.0	$75.0							$20.0	$41.2		
General Funds	$1.8	$6.1		$11.2				$12.0	$15.6			$4.6				
Parking Bond	$28.6															
Parking Fund	$2.0															
Transportation Fund	$2.3															
Bond Proceeds						$26.6	$64.0									
Tax Increment Finance District	$21.5										$3.5					
Portland Development Commission		$27.7														
Sale of Property	$3.1		$8.5													
Land Donation												$10.5				
Savings from other capital projects	$0.7															
Tram Transfer	$0.2															
Transportation Systems Development	$2.5															
Misc.	$2.1															
Water Utility Contribution																$4.5
Private	**$19.4**	**$15.5**	**$25.7**	**$0.0**	**$0.0**	**$3.2**	**$6.5**	**$0.0**	**$6.0**	**$112.0**	**$5.0**	**$20.6**	**$0.0**	**$0.0**	**$62.5**	$79.5
Improvement/Assessment District	$19.4	$15.5	$25.7						$6.0			$20.6			**$62.5**	**$79.5**
Private Donations						$3.2	$6.5			$96.0	$5.0					
New Market Tax Credits										$16.0						

- **Private Participation:** Eleven (11) of the 16 financial strategies included private sector participation. Seven of the projects included revenue from improvement or assessment districts and four projects, including the M1-Rail Project, included contributions/donations from private companies or foundations as part of their financial strategies. Additional details are provided below.

Potential Federal Sources

- **Small Starts Program:** The following summarizes the financial planning requirements (local financial commitment) a project sponsor must follow to receive funding through the Small Starts Program (Small Starts Construction Grant). A two step evaluation process must be completed prior to receiving a Small Starts Construction Grant: 1) Project Development and 2) Construction Grant Agreement

  - Project Development: The Project sponsor must submit a letter to the FTA requesting entry into the Project Development phase. Upon FTA's approval of this request, the sponsor has two-years to complete sufficient engineering to prepare the appropriate environmental documentation and develop the project's final capital cost estimate. Sponsors can seek an extension from FTA if the completion of the environmental document requires more than two years.

  - Construction Grant Agreement: The Project sponsor must finalize any remaining environmental documentation, document that the fixed guideway project has been adopted in the region's Long Range Transportation Plan (LRTP) and Transportation Improvement Program (TIP), and negotiate the terms and conditions of the Construction Grant Agreement with the FTA.

    It is important to note the local financial commitment represents 50 percent of the FTA's Small Starts evaluation. In addition to the local financial commitment measures and criteria, the project must meet the measures and criteria for Project Justification (mobility improvements, economic development effects, environmental benefits, cost-effectiveness, and transit supportive land use) prior to initiating the Small Starts application process. The Project Justification measures account for the remaining 50 percent of the Small Starts evaluation.

    If the decision is to pursue Small Starts funding, the project partners will need to finalize the streetcar line's governance structure prior to submitting the letter requesting entry into Project Development. Specifically this requires that the project partners decide which agency or agencies will be responsible for implementing and operating the streetcar line. As part of the Small Starts process, FTA will evaluate the technical and financial capacity of the agency/agencies pursuing a Construction Grant Agreement to construct the project, but also to demonstrate there is a reasonable plan to fund O&M and capital costs for both the project and existing transit services for a 20-year period. The financial planning

requirements to address the local financial commitment evaluation criteria reflect the following:

- Request to Enter Project Development: The Project Sponsor(s) will need to provide documentation that there is a reasonable approach to fund activities during the Project Development phase. The reasonable approach should include identification of funding available and committed to conduct the Project Development work as well as documentation demonstrating commitment of funds for the activities. To date, projects that have requested entry into Project Development have not been required to submit a full financial plan. A brief description of the reasonable funding approach is all that has been required.

- Project Development: While not specified in MAP-21, during this step FTA has required Project Sponsors to submit a financial plan that addresses the evaluation measures and criteria summarized in Table 7-2. This has allowed Project Sponsors the ability to address FTA evaluation comments and concerns prior to completing engineering and requesting a Small Starts Construction Grant. Two key evaluation criteria that will need to be addressed in the financial plan are: 1) status on addressing the legislative and/or administrative actions required to commit non-Small Starts funds to the Project; and 2) documenting a reasonable plan to address two financial risk scenarios – the Project's capital cost increasing by 25 percent and system-wide O&M costs increasing by 12 percent.

- Request for Small Starts Construction Grant: A revised financial plan and documentation that all capital and operating funds are committed ("in the bank") will be required. Additionally the agency will need to document the mechanisms available (line of credit, bond proceeds, reserves, etc) to address 15 percent capital cost increase and 12 percent system-wide operating cost increases risk scenarios.

Table 7-2 provides a summary of FTA's local financial commitment evaluation measures and criteria. For each criterion, the third and fourth columns indicate what is required to achieve a Medium rating and a High rating respectively. A project must achieve a Medium rating for the Local Financial Commitment measures and criteria in order to be eligible for a Small Starts Construction Grant.

Finally, it is important to note that under MAP 21, if an agency's financial plan includes local overmatch (i.e. Small Starts funding represents less than 50 percent of total funds), the Local Financial Commitment summary rating is automatically increased one level. For example, if an agency received a Medium rating based on the measures and criteria in Table 7-2 and the Small Starts share was 49 percent of total funding, the Local Financial Commitment rating would increase to a Medium-High.

Table 7-2: FTA Local Financial Commitment Evaluation Measures and Criteria

Measure / Share of Summary Rating	Criteria: Rated 1 (Low) to 5 (High)	Medium Rating Requirements	High Rating Requirements
Current Capital and Operating Condition (25 Percent)	Average bus fleet age Bond ratings less than 2 years old Historical and actual positive cash flow Current ratio (current assets/current liabilities) Recent service levels	Bus fleet age < 8 years A- (Fitch/S&P) or A3 (Moody's) No historic cash flow shortfalls Current ratio exceeds 1.2 No service cutbacks in recent years	Bus fleet age < 6 years AAA (Fitch/S&P) or Aaa (Moody's) Historical positive cash flow. No cash flow shortfalls. Current ratio exceeds 2.0 No service cutbacks in recent years
Commitment of Capital and Operating Funds *(25 Percent)*	Commitment of non-Small Starts funds Commitment of operating funds	At least 25% of non-Small Starts funds committed or budgeted At least 25% of system-wide O&M funds are committed or budgeted	At least 75% of non-Small Starts funds committed or budgeted At least 75% of system-wide O&M funds are committed or budgeted
Reasonableness of Capital and Operating Cost Estimates and Planning Assumptions / Capital Funding Capacity *(50 Percent)*	Cost estimate assumptions Ability to address capital cost overruns Ability to address system-wide O&M cost overruns	Cost projections are in line with historic experience Agency has access to funds to cover potential funding shortfalls of 15% of the project's capital costs Agency has access to funds to cover potential funding shortfalls of 12% of annual system-wide O&M costs	Financial plan contains very conservative planning assumptions and cost estimates when compared with recent historical experience. Agency has access to funds to cover potential funding shortfalls of 50% of the project's capital costs Agency has access to funds to cover potential funding shortfalls of 50% of annual system-wide O&M costs

- **Flexible FHWA Funds:** The three FHWA programs described below are eligible to be "flexed" (transferred) to the FTA for use on transit projects. For streetcar projects, flexible FHWA programs include the Congestion Mitigation and Air Quality Improvement Program, Surface Transportation Program, and Transportation Alternatives Program.

- Congestion Mitigation and Air Quality Improvement Program (CMAQ): The CMAQ Program provides a flexible funding source to state and local governments for transportation projects and programs to help meet the requirements of the Clean Air Act. Funding is available to reduce congestion and improve air quality for areas that do not meet the National Ambient Air Quality Standards (NAAQS) for ozone, carbon monoxide, or particulate matter-nonattainment areas-and for areas that were out of compliance but have now met the standards-maintenance areas. The CMAQ program supports two important goals of the USDOT: improving air quality and relieving congestion. Additionally, MAP-21 puts an increased focus on addressing PM-2.5.

  The following activities related to elements of a streetcar project are eligible for funding under the CMAQ Program, typically at an 80 percent federal share:

  - Projects that improve traffic flow, including efforts to provide signal systemization, streamline intersections, add turning lanes, improve transportation systems management and operations that mitigate congestion and improve air quality, and implement ITS, and improvements that enhance incident and emergency response or improve mobility, such as through real time traffic, transit and multimodal traveler information.

  - Projects that shift travel demand to nonpeak hours or other transportation modes, increase vehicle occupancy rates, or otherwise reduce demand.

  - Transit investments, including transit vehicle acquisitions and construction of new facilities or improvements to facilities that increase transit capacity.

  - Non-recreational bicycle transportation and pedestrian improvements that provide a reduction in single-occupant vehicle travel.

- Surface Transportation Program (STP): This program has very broad eligibility criteria including transit capital projects and non-motorized paths.

  Specifically related to streetcar projects, the following types of transit and non-motorized project elements are eligible under STP with a typical maximum 80 percent federal funding share:

  - Fringe and corridor parking facilities, bicycle transportation and pedestrian walkways, and the modification of public sidewalks to comply with the Americans with Disabilities Act of 1990 (ADA Act);

  - Capital and operating costs for traffic monitoring, management, and control facilities and programs; and

  - Infrastructure-based intelligent transportation systems capital improvements.

- Transportation Alternatives Program (TAP): TAP provides funding for transportation alternatives programs and projects. Related to the streetcar project, this includes infrastructure projects for improving non-driver access to public transportation.

- **USDOT Competitive Grants:** Over the last several years the USDOT has issued notices of availability for competitive grants applications including six rounds of the Transportation Investment Generating Economic Recovery (TIGER) grants, as well as Urban Circulator Grants, Bus and Bus Livability Grants, and State of Good Repair Grants. While MAP 21 only includes one competitive grant program (Projects of National and Regional Significance), there are indications that competitive grants will continue in the future. This assumption is based in large part on the number of applications received for these grant programs compared with the funding that was available. For example, since 2009, the USDOT has issued six separate TIGER grant requests, with the most recent (TIGER VI) applications submitted on April 28, 2014. Total grant awards for the six rounds reflect the following:

  - TIGER I $1.5 billion (construction grants);
  - TIGER II: $600 million (construction, financing and planning grants);
  - TIGER III: $527 million (construction grants and loans);
  - TIGER IV: $500 million (construction grants);
  - TIGER V: $473.8 million (construction grants); and
  - TIGER VI: $600 million (construction grants)

  It is important to note that the TIGER program is a highly competitive program. On May 15, 2014, the USDOT announced that demand for TIGER VI grants far surpassed the available funding. Applications for TIGER VI grants totaled $9.5 billion or 15 times the $600 million set aside for this round. Similar demand levels have occurred on all prior TIGER rounds.

  Financial strategies for eleven of the streetcar projects include USDOT competitive grants, with funding levels ranging from $2.0 million to $63.0 million. While the average competitive grant award was approximately $27.0 million, the maximum TIGER grants (for all transportation projects) have been approximately $20 million. Similar to the Small Starts program, one of the key success factors for competitive grants, and consistent with the ability to document the proposed project is "shovel ready", was demonstrating the commitment of matching funds as part of the application process.

Potential State Sources

As stated earlier, only a limited number of streetcar financial strategies have included funding from their respective State governments. However, within the State of Michigan, MDOT has historically been a key funding partner on major capital projects that include federal funding as part of the financial strategy. Specifically, MDOT provides the non-federal share of transit capital project costs (20 percent) through the State's Comprehensive Transportation Fund (CTF) Program. This funding split includes the 20 percent share for The Rapid's recently completed Silver Line Bus Rapid Transit Project.

A potential second component of a financial strategy could include short term (bridge) financing from the State. The M1-Rail Project intends to use financing from the State as part of its overall financial strategy. Specifically, through the Michigan Economic Development Corporation's Michigan Strategic Fund, M1-Rail will received a $10.0 million low interest loan to address cash flow needs while awaiting receipt of funds from the three revenue sources. M1-Rail's loan has a 10 year term with a 2 percent interest rate.

Potential Local Sources

A summary of the local funding approach used for the M1-Rail Project is provided below. Following this summary and based on the review of financial strategies for other streetcar projects and discussions with the SAC, an overview of other potential local funding sources that could support implementation of the streetcar line is provided.

- **M1-Rail Local Funding Approach:** M-1 Rail is a 501(c)(3) nonprofit corporation formed by private sector and philanthropic leaders in 2008. From the start, M1-Rail's business plan included an assumption that it could raise significant funding for a streetcar project through donations from corporation and philanthropic institutions. As shown in Table 7-3, to date M1-Rail has obtained approximately $84 million in donations to support implementation of the streetcar project. Based on increases in the project's capital cost estimate, M-1 Rail has developed a plan to raise additional funding from new corporate, foundation and institutional prospects to secure an additional $12 million. According to the April 2012 M1-Rail Streetcar Business Plan, potential prospects include several organizations that have indicated a potential willingness to donate $1 million to $3 million, and others that would be willing to donate in the $10,000 to $500,000 range. Potential prospects include:

  - Major colleges/universities within the project corridor;
  - Civic organization and their members;
  - Property developers within the corridor;
  - Additional Detroit based foundations; and
  - Additional banks and automotive supplier companies active in Southeast Michigan.

  M-1 Rail also plans to use a leveraged New Market Tax Credits (NMTC) project financing structure as a supplementary source of funding. According to the April 2012 M1-Rail Streetcar Business Plan, to meet FTA requirements on the uses of TIGER funds, the typical leveraged NMTC structure was adapted in coordination with FTA legal staff to include a master project lease with the TIGER grantee, SEMCOG. The following provides an overview of the NMTC approach to be used by M1-Rail. Further details can be fund on the M1-Rail website (http://m-1rail.com/about-m-1-rail/history-of-m-1-rail/)

  In exchange for federal NMTCs, a first round of equity investment totaling $9.3 million from corporations was expected in 2012, followed by an anticipated second round of investment totaling $6.7million in 2013. An affiliate of M-1 Rail (a Qualified Low-Income Community

Business, or QALICB, referred to as M-2) was created in order to construct and acquire the project facilities and equipment. M-2 will own all project assets for tax purposes.

Some of the donations received by M-1 Rail (about $31 million) will be collected and loaned to one or more Investor Limited Liability Entities (Investment Fund), in addition to the equity investments of $9.3 million in 2012. The funds will then be invested in one or more Community Development Entities (CDEs) which receive an allocation of New Markets Tax Credits totaling approximately $40 million in 2012.

M-2 will enter into a master project lease with SEMCOG in exchange for an upfront payment of project costs of $25 million (funded by the TIGER grant described previously) in addition to funding from the NMTC transaction. The agreement will be a capital lease for FASB purposes to meet FTA requirements. The agreement will be a "true" lease for tax purposes so that M-2 will be the owner of the project for NMTC purposes. The agreement will provide SEMCOG with a leasable interest in the complete and functional streetcar project worth more than $130 million in exchange for the initial $25 million support of project costs from the TIGER grant and a series of relatively modest lease payments during the operations period funded by M-1 Rail's payment of subrent.

M-2 borrowed approximately $40 million from the CDEs in 2012. M-2 anticipates borrowing sufficient funds in 2013 to raise $6.7 million in additional investor equity, subject to Treasury allocation next year. These Qualified Low Income Community Investments (QLICI's) by the CDEs in M-2 will be interest-only for seven years, with payments deferred or paid from reserves during the construction period. As owner of the assets, M-2 will have the right to offer the project assets as collateral to the lenders (CDEs). In the TIGER grant agreement and M-2 lease, FTA and SEMCOG subordinated their claims to the assets, but maintain continuing control through a non-disturbance provision.

M-2 will receive funds from M-1 Rail to cover the remaining construction costs of the project. Total revenues from SEMCOG, the CDEs and M-1 Rail amount to about $137 million, which corresponds to the total project cost in YOE dollars.

M-1 Rail will enter into a sublease and a service agreement with SEMCOG under which M-1 Rail will operate the project and make lease payments during the operations period to SEMCOG for the right to use the assets. SEMCOG will pass the lease payments through to M-2 and M-2 will use the lease payments to cover debt service on its loan from the CDEs. The lease and sublease are structured to show a profit motive for SEMCOG and M-2.

The exit from the NMTC transaction will occur after a seven-year compliance period expires. At that time, put/call provisions of the Investment Entity(s) and CDE(s) will trigger their exit, and debts M-1 Rail owes to itself (through M-2) will be eliminated. M-2 will transfer the rail assets to M-1 Rail. The equity investments made in the Investment Entity(s) will not be repaid except to a nominal amount and the investors will exit.

The NMTC transaction has the effect of reducing construction expenditures made directly by M-1 Rail.

The potential second NMTC transaction in 2013 will further offset project costs. The Capital Financial Plan reflects $16 million of net proceeds for the benefit of the M-1 Rail Project from the NMTC transactions. The precise value of the transactions will be identified following further discussions with NMTC tax credit allocatees during the next phase of project development.

Table 7-3: M1-Rail Donations

ORGANIZATION	TOTAL COMMITMENT ($, IN MILLIONS)
Kresge Foundation	$35
Detroit Development Authority (DDA)	$9
Compuware	$3
Detroit Medical Center	$3
Henry Ford Health System	$3
Ilitch Holdings	$3
Quicken Loans	$3
Penske Corporation	$3
Wayne State University	$3
Chevrolet	$3
Ford Foundation	$3
Kellogg Foundation	$3
Blue Cross Blue Shield	$3
Wayne County	$3
Hudson Webber Foundation	$1
Kresge Additional Backstop Grant	$3
Additional Organizations TBD	$12
Total	**$96**

- **Assessment District Revenue:** Revenue from an Assessment District is generated from a fee on properties in a specified area that is used to pay a portion of the capital improvements made within and specifically benefiting that area. In an assessment district, a connection between benefit received and cost charged is essential, in that assessments charged in these districts must be proportional to and no greater than the benefit to the assessed property.

  Three examples of recently established assessment districts to support implementation of a planned streetcar lines are in Los Angeles, Kansas City, and Fort Lauderdale. It's important to note that in each case property owners were required to pass a referendum and start collection of the assessment revenue prior to the streetcar beginning operations.

- Los Angeles Streetcar: On December 2, 2012, private property owners along the proposed Los Angeles Streetcar alignment voted in favor of creating a form of a benefit assessment district called a Communities Facility District (CFD). According to Los Angeles Streetcar, Inc., (LASI), the streetcar CFD will place a special tax on land owned by all Downtown private property owners located within the district, including condominium owners, with tax amounts tiered based on a property's proximity to the proposed route. At an estimated 5 percent bond rate, a 10,000 square foot parcel will be taxed $4,490 if located directly on the proposed streetcar line; $3,640 if located one to two blocks away from the streetcar; and $1,730 if located approximately three blocks away. Condominium units will be charged their unit's proportional share of the underlying land, similar to the structure of most home owner association fees. The majority of condominium units within the streetcar CFD will be charged $100 or less per year, with a median cost of $60 annually. The CFD is projected to cover half of the streetcar's capital costs (approximately $62.5 million). LASI intends to pursue FTA Small Starts funding for the remaining $62.5 million.

- Kansas City Streetcar: On December 12, 2012, property owners in downtown Kansas City approved the creation of a Transportation Development District (TDD) to support implementation of the proposed streetcar line. The TDD will provide funding through the following special assessments:

  - 1 percent sales tax on sales within the TDD boundary;

  - Special assessment on real estate within the TDD boundary, with the following maximum annual rates :

    - ✓ $0.48 for each $100 of assessed value for commercial property ($1,536 for each $1,000,000 of market value)
    - ✓ $0.70 for each $100 of assessed value for residential property ($133 for each $100,000 of market value)
    - ✓ $1.04 for each $100 of assessed value for property owned by the City (approximately $810,000 annually)

  - A supplemental special assessment on surface pay parking lots within the TDD boundary (this does not include private lots or lots dedicated to residences and businesses). The rate is 15¢ per pay parking space.

  - A $0.40 cost for each $100 of assessed value for property with non-profit uses. However, because the first $300,000 of market value is excluded, most non-profits will have no streetcar costs. There is also no streetcar assessment on market value greater than $50,000,000 for non-profit uses.

- Fort Lauderdale (The Wave) Streetcar: On June 5, 2013 Broward County Commissioners unanimously approved the proposed boundaries of an assessment zone and the charges

that will be assessed annually for the next 25 years to support implementation of The Wave Streetcar Project. Properties within the assessment zone will pay the following:

- Residential: Property owners will pay a flat $99 per year;
- Commercial: Owners will be billed at 9-cents per square foot; and
- Vacant: Property owners will pay 3-cents per square foot.

The assessment zone is projected to generate $20.6 million in support of the streetcar project.

- **Local Developer Contribution Agreements:** One additional private sector funding approach is through use of Local Developer Contribution Agreement. A variation of value capture, this approach is focused on getting early capture of future the land value lift resulting from the transportation project. While not used to date in the United States, this approach has been used in other countries, notably in England. The first step in this process is to estimate the potential development impact/property value increase that a proposed transportation project will have along a corridor. The results of this assessment are shared with individual property owners and the project sponsor enters into negotiations with property owners to secure early commitment their respective levels of funding to support implementation of the project. The resulting Contribution Agreement (CA) defines how much funding each property owner will provide and the term over which the funding will be provided (i.e. 5 to 10 years or up to 20 years). While the CA is executed prior to construction, payment to the Project Sponsor is not received until the project has received all approvals. The CA attempts to reduce the uncertainty of the property owner's commitment to provide funding during the project development and approval process. Finally, the CA approach could provide an early indication of the level of commitment of the private sector.

- **Bond Proceeds/General Fund Revenue:** If the City of Grand Rapids is a financial partner in implementing the streetcar project, funding could be provided either through existing general funds or through bond proceeds. Bond proceeds could reflect the streetcar project as either a stand alone project or as part of a larger package of infrastructure projects to be implemented throughout the City.

- **Donation of Property and/or Right-of-Way:** The value of property purchased for the fixed guideway project could potentially be used as local match for federal grants. The value of the property would be eligible for match as long as no federal funds were used to acquire the property, as was the case for the Salt Lake City and Fort Lauderdale streetcar lines. The assessed value of potential donations could include property for the maintenance/storage facility, station areas, or the acquisition of rail corridor.

Conceptual Capital Funding Strategies

Tables 7-4 through **7-8** provide conceptual strategies to initiate the discussion on potential realistic approaches to fund construction of the streetcar project. Two strategies reflect scenarios where no federal funds would be targeted and three strategies reflect increasing levels of federal funding.

- Scenario 1: Maximum Private Funding Participation
- Scenario 2: Moderate Private Funding Participation
- Scenario 3: Minimal Federal Funding Participation
- Scenario 4: Moderate Federal Funding Participation
- Scenario 5: Maximum Federal Funding Participation

Scenario 1: Maximum Private Funding Participation

Table 7-4 represents a scenario in which the Project Partners are successful in working with the private sector to provide funding for 100 percent of the total project costs. Based on the prior descriptions of funding strategies for planned streetcar projects in Detroit, Los Angeles, Kansas City and Fort Lauderdale, private sector partipation could be provided in through a combination of three forms

- Similar to the M-1 Rail (Detroit) example, the Project Partners would be successful in obtaining private donations from local businesses, organizations, institutions and individuals to support implementation of the project;

- Similar to the examples in Los Angeles, Kansas City and Fort Lauderdale, local property owners along the planned streetcar alignment would agree to create an assessment district to provide an on-going revenue stream for the project; and/or

- Similar to the international examples which have used a Contribution Agreement based on the potential property value impact of implementing the transportation project.

If the Private Sector approach is pursued, the Project Partners should work with FTA to determine if these funds could be counted as local match for future streetcar extensions that might pursue federal funding including Small Starts funds. An initial step in this process would be to "federalize" the project by completing the required National Environmental Policy Act (NEPA) document which would likely be an Environmental Impact Statement (EIS) or Environmental Assessment (EA). FTA would need to provide additional guidance on other actions required to ensure private funds could be counted as local match for a future project.

Table 7-4: Scenario 1 Maximum Private Participation

	Conceptual Costs (2019$)
Total Capital Costs	**$137.10**
Conceptual Funding Approach	
Private Funding	$137.10

Scenario 2: Moderate Private Funding Participation

Table 7-5 represents a scenario in which the Project Partners are successful in developing a funding partnership of the private sector (80 percent) and the State (20 percent). Private sector funding ($109.7 million) would reflect one or a combination of the approaches described in Scenario 1. State funding ($27.4 million) reflects an assumption that the Project Partners could successfully negotiate with MDOT that funds used near term to implement the streetcar project could be counted as local match to federal funds for future extensions.

Similar to Scenario 1, if this approach is pursued, FTA would need to provide additional guidance on other actions required to ensure that the private funds and State funds could be counted as local match for a future project.

Table 7-5: Scenario 1 Moderate Private Participation

	Conceptual Costs (2019$)
Total Capital Costs	**$137.10**
Conceptual Funding Approach	
Private Funding	$109.68
State Funding	$27.42

Scenario 3: Minimal Federal Funding Participation (No Small Starts Funds)

Table 7-6 represents a scenario in which the Project Partners decide to pursue federal funds outside of FTA Small Starts program. Key assumptions for this scenario include:

- The Project Partners would obtain $16 million in Other Federal Funds (Flexible FHWA funds or USDOT Competitive Grant) for the project;
- The State would provide the 20 percent match ($4 million) to Federal Funds; and
- Local funds and/or Private contributions from a combination of the sources described above would provide $117.1 million.

If the decision is made not to pursue Small Starts funds, the Project Partners should work with FTA to determine if local funds used to implement the streetcar project under this scenario could be counted as local match for a future streetcar extension that might pursue Small Starts funding. Similar to Scenarios 1 and 2, FTA would need to provide additional guidance on other actions required to ensure local funds could be counted as local match for a future project.

Table 7-6: Scenario 1 Minimal Federal Participation

	Conceptual Costs (2019$)
Total Capital Costs	**$137.1**
Conceptual Funding Approach	
Other Federal Funds	$16.0
State Match - FHWA Funds	$4.0
Local Sources	$117.1

Scenario 5: Moderate Federal Funding Participation

Table 7-7 represents a scenario in which the Project Partners successfully pursue Small Starts funding for the Streetcar. Key assumptions under this scenario include:

- The project would receive a Small Starts Construction Grant of $68.6 million (50 percent of total costs);
- The Project Partners would obtain $16 million in Other Federal Funds (Flexible FHWA funds) for the project
- The State would provide 20 percent match for total federal fundsr $23.4 million; and
- Local funds and/or Private contributions from a combination of the sources described above would provide approximately 23 percent of total costs or $31.4 million.

Table 7-7: Scenario 2 Minimal Federal Participation

	Conceptual Costs (2019$)
Total Capital Costs	**$137.10**
Conceptual Funding Approach	
Small Starts	$68.55
Other Federal Funds	$16.00
State Match	$21.14
Local Sources	$31.41

Scenario 5: Maximum Federal Funding Participation

Table 7-8 represents a scenario in which the Project Partners are successful in obtaining the maximum level of federal participation (80 percent of total project costs) Key assumptions under this scenario include:

- The project would receive a Small Starts Construction Grant of $68.6 million (50 percent of total costs);
- The Project Partners would obtain $41.1 million in Other Federal Funds (30 percent of total costs); and
- The State would provide the 20 percent local match for total federal funds or approximately $27.4 million.

Table 7-8: Scenario 3 Maximum Federal Participation

	Conceptual Costs (2019$)
Total Capital Costs	**$137.10**
Conceptual Funding Approach	
Small Starts	$68.55
Other Federal Funds	$41.13
State Match	$27.42

Operating Costs and Potential Revenues

As described in Section 6, the conceptual annual operating and maintenance costs for the streetcar project vary by option. Long term funding for operations will likely reflect a combination of multiple sources. At this stage of project development, operating funding sources are typically less defined than capital revenue sources. As such, a preliminary operating funding strategy is not provided at this time. However, it is critical to initiate the discussions among the public and private partners that would benefit from the proposed service to identify which potential sources have the most political support to carry forward for further evaluation.

Additionally, if operating funding will be sought from multiple agencies, institutions, and/or the private sector, the Project Partners will need to define an approach to ensure the commitment of funds is received prior to starting construction. A potential issue is the "last one in" scenario. Across the country, similar fixed guideway projects with several funding partners (bus rapid transit, streetcar, and light rail), there have been situations where multiple agencies/institutions/businesses would not fully commit their proposed level of annual funding until all other partners had executed their commitments. During the engineering phase, the Project Partners should identify the most realistic funding sources and

annual contributions. While these sources will not need to be committed during engineering, the Project Partners should define the process that will be used to finalize the sources and annual contributions (including all required approvals by governing bodies) to ensure the operating funds are committed prior to construction starting.

To initiate this process, the following is a list of potential operating revenue sources which can be narrowed down as the project implementation process moves forward in order to target the most reasonable sources. Similar to the potential capital funding sources, the summary below begins with a review of the operating sources planned for the M1-Rail Project in Detroit.

- **M1 Rail Operating Funds:** As described in the April 2012 M1 Rail Business Plan, in addition to fare revenue, planned operating revenue sources include:
    - System Generated Revenues: M-1 Rail plans to take advantage of the positive image created by the streetcar to encourage static and electronic advertising on stations, vehicle exteriors, vehicle interiors, website, and promotional materials. Although M-1 Rail will acknowledge some sponsorships (previously described donations) with advertising, much of the space on the system will be sold at market rates. Annual revenue from advertising, short-term naming rights, concessions, or other sources is assumed to be $500,000. This estimate is based on M1-Rail's discussions with potential advertisers and general market intelligence in the Detroit metropolitan market.
    - Street Railway State Operating Assistance / Donor Revenue: The M1 Rail Business Plan combines State operating support, naming gifts and sponsor support under the category "Donor Revenue" which will cover remaining operating costs after accounting for fares and system generated revenues.

      Legislation in 2008 authorized the State of Michigan to provide up to eight percent (8 percent) of the private sector's capital investment in a non-profit street railway as an annual subsidy for operations and maintenance. The legislation did not identify a dedicated funding source for the purpose and any appropriation is subject to the annual appropriation process.

      The Business Plan indicates that through discussions with the Governor's office, some funding is expected to be made available every year in which the service is in operation. M-1 Rail will coordinate with the State of Michigan to secure state operating assistance from a variety of sources, including some that are not subject to annual appropriation. As an alternative, M-1 Rail will seek annual funding through a MDOT budget line item (currently zero) created following the 2008 legislation.

      Additionally M-1 Rail has identified potential sponsors to enter into long-term naming rights for the streetcar line to cover the annual O&M costs of the service that remain after funds from other sources have been applied. Finally, interest earned on any fund balance,

and principal as needed, will be drawn down to cover funding shortfalls. The balance in the fund is assumed to earn interest at an annual rate of 2 percent.

The Operating Financial Plan assumes that M-1 Rail will raise a total of $29.1 million in donations from the State and other sponsors to cover O&M cost in the first ten years of operations through 2024.

- **Fare Revenue:** Passenger fares will be one of the key sources of operating revenue for the streetcar line. The preliminary ridership projections estimate daily ridership will be approximately 900 passenger trips in 2018 (model inputs were available for 2018 only which is closest to opening year of 2019) or approximately 274,500 annual passenger trips (see **Appendix F**). Based on The Rapids' current average fare of $1.50, conceptual annual fare revenue would be approximately $411, 750 million (2014 $).

- **Reallocation of Existing Fixed Route Bus Service Costs within the Corridor:** A key planning component of the project implementation process is the development of an integrated service plan that reflects the incorporation of the proposed streetcar line into the existing bus route network. As the project moves forward an Operations Plan will be developed to integrate the streetcar's service plan with existing bus service, which could result in the elimination or reduction of duplicate fixed route bus service. The operating savings from the reduced fixed route service could be reallocated to pay for a portion of the streetcar O&M costs.

- **State Operating Assistance:** Legislative Act 51, P.A. 1951, provides for State transit operating assistance to urban areas with populations greater than 100,000 to an amount up to 50 percent of their eligible expenses, as defined by the Michigan Department of Transportation. It's important to note that the historic trend for this source to provide approximately 30 percent of eligible expenses.

- **CMAQ Program:** In addition to supporting implementation of capital projects, CMAQ funding is also eligible to support the first five years of operation of a new transit service. The Project Partners would have to work with the regional partners on the MPO to identify realistic annual levels of CMAQ funding that could provide assistance during the first five years of streetcar service.

- **City General Funds:** Once the streetcar operating plan and annual O&M costs are finalized, the City could provide an annual operating subsidy for the project. This could be a specified annual amount or annual percent share of O&M costs.

- **Contributions from Private Partners:** For major employers and/or other activity centers served directly by the streetcar line, a revenue structure could be established where the employer / activity center purchases a set number of tickets per year or pays an agreed upon share of operating costs relative to the benefits the streetcar line provides.

- **Assessment Districts / Tax Increment Financing Districts:** These Districts provide a funding mechanism whereby benefits accruing to privately owned land from a public capital improvement, such as station areas, are recouped in order to assist in paying for the on-going maintenance of the improvement. As such, these districts provide a form of value capture finance whereby a portion of the privately accruing monetary value is captured to support long-term operating costs.

  In addition to being a potential capital revenue source, a Benefit Assessment could also be established to assist in paying a portion of the operating costs for the capital improvements made within and specifically benefiting that area. Examples of private property owners establishing benefit assessment districts to support on-going operations can be found in San Diego and Denver.

  A TIF District uses property tax revenues generated beyond an established baseline that are then pledged specifically for infrastructure-related improvements within an area or district. The ability of a TIF district to generate revenue for the streetcar will depend in large part on the development potential along the streetcar corridor. Results from the land use/development potential analysis completed in another task will assist in the viability of these districts as an operating funding option.

- **Future Voter Approved Local Funding Source**: In addition to potentially supporting construction of the streetcar line, a future voter-approved dedicated transportation funding source could also provide a long-term operating funding source for the streetcar.

- **Parking Fees**: A parking fee is a tax or surcharge levied on paid parking. The fee could be applied within Streetcar corridor or within the City limits for the use of off-street commercial or employer provided parking spaces. If applied within the streetcar corridor, there would be some degree of relationship between traffic and parking within the corridor relative to parking requirements and parking tax. If applied City-wide, the relationship between the parking fee and operating costs within the corridor would be less direct. More likely, a City-wide parking fee would be used to fund a variety of improvements, and would not be used solely to fund operating costs for the streetcar.

Section 8 |

Vehicle Storage & Maintenance Facility

Portland Streetcar Maintenance Facility Underneath Freeway Bridge

(Facility Size: 12,700 square feet; Vehicle Capacity: 10 streetcars; # Vehicle Maintenance Employees: 4)

Vehicle Maintenance and Storage Facility

Several potential vehicle maintenance and storage facility (VMSF) sites were identified during the alignment alternatives evaluation to support the Grand Rapids streetcar operations. The VMSF will provide for midday/overnight storage, vehicle maintenance, routine cleaning, and servicing. Planning the location and design of the VMSF is an integral component of ensuring optimal system operations and efficiency. For preliminary planning purposes, candidate areas to accommodate one or more maintenance facilities were examined relative to the following site requirements:

- **System Connectivity & Proximity:** The maintenance facilities should be in proximity to (less than one mile) the streetcar alignment to minimize construction of additional track for non-revenue deadhead operations. A location close to an endpoint of the alignment can help minimize the operational costs associated with deadhead movements.

- **Sufficient Facility Size:** Operational requirements include a potential fleet size of 4 streetcar vehicles which includes 3 operating plus one spare to account for service interruptions and maintenance of vehicles. The general industry rule of thumb for VMSF size requirements is 0.2 – 0.3 acres per vehicle; approximately 0.8-1.2 acres minimum is needed to support the initial Grand Rapids Streetcar system. Additional space may be needed to account for site configuration, vehicle storage tracks, material storage, and possible expansion. In general, sites identified in this analysis were 2 acres or larger.

- **Land Use Compatibility:** Regular maintenance activities and vehicle repairs that occur during the day, late night and early morning hours are generally incompatible with residential areas.

Industrial areas are typically preferred and more suited for this type of facility. Thus, land use compatibility is very important in finalizing the location of the VMSF.

However, while industrial locations are an obvious choice, in some cities, streetcar maintenance facilities are being planned and located in non-traditional areas due to the limited availability of industrial properties Further, maintenance facilities are being developed with smaller footprints to be less intrusive.

Non-traditional locations for maintenance facilities include under transportation infrastructures, such as highway overpasses and bridges. Joint development opportunities are also being considered to help fund construction of these facilities, which may include placing the streetcar maintenance facility on the ground floor of a parking garage, or adjacent to public schools, parks and athletic fields.

Seattle Streetcar Maintenance Facility Adjacent to Residential Neighborhood

(Facility Size: 9,200 square feet; Vehicle Capacity: 3 streetcars; Vehicle Maintenance Employees: 3)

The images above provide examples of streetcar maintenance facilities in Seattle, Washington and Portland, Oregon. Seattle's relatively small facility is adjacent to a mid-rise apartment development, with room for development and/or expansion of the facility. While typically maintenance facilities and living environments have not been good neighbors, changes in the scale and technology of more recent facilities may mitigate some of the compatibility issues.Similar to what is planned for the Downtown Streetcar, Portland's maintenance facility is located underneath a freeway overpass, utilizing land previously occupied by parking that was considered unsuitable for development for other uses.

More detailed site selection and location analysis in future study efforts should include the consideration of existing maintenance facilities, functional layouts and topography for candidate sites, environmental justice issues, capital cost estimates for site development, property acquisition and environmental impacts.

Section 9 |

Next Steps for Implementation

The City of Grand Rapids is uniquely positioned to advance streetcar transit planning and implementation that will connect neighborhoods, employment and activity centers throughout the City and the region. The next steps for implementation of the Grand Rapids Streetcar include proceeding with environmental documentation, preliminary engineering of the alignment, and defining local transit capital and operational funding sources that can attract private and federal support.

It is anticipated that these tasks can be completed within a 1 to 2-year timeframe, allowing the City to compete for federal grants and advance local funding initiatives, as needed. Projects will then advance to final engineering, construction documentation and specifications. It is anticipated that federal funding and financing will be sought for the recommended streetcar projects. A program management plan (PMP) will have to be developed to serve as a management tool to guide the project sponsors through the implementation of the streetcar project(s).

Environmental Analysis & Design Engineering

Environmental documentation will include refinements of ridership potential and evaluation of capital costs, land use, economic development, and environmental impacts. Public and stakeholder input during the project implementation process will continue to be a priority.

In consultation with the Region V office of the FTA, a determination will be made regarding the preferred level of environmental documentation required for the project. A Documented Categorical Exclusion (DCE) will take 6-12 months to complete while Environmental Assessment (EA) is expected to take 18-24 months to complete.

Design Engineering will be conducted in two phases: Preliminary Engineering (PE, estimated at between 30 to 60 percent design documentation) and Final Design. The PE will include sufficient conceptual engineering, schematic drawings, urban design and architectural concepts for the project sufficient to support the environmental review analysis for determining areas of potential impacts and to provide reliable cost estimates for construction. The Final Design phase will not commence until the environmental documentation and the PE phase have been concluded and approved.

Community Engagement

To move forward with implementation of the project, public input is critical to the overall process. Engaging the community is expected to take place throughout the environmental, engineering design and construction phases of the project. At that time, the appropriate level and frequency of community meetings will be determined. A public involvement plan will be developed which lays out overall strategies for obtaining and incorporating community input into the project process.

Transit Funding

As described in Section 7, capital and operating funding strategies need to be defined to support building and operating the system into the future. Currently, there are no dedicated funding sources for the project's capital and operational expenses. However, there are a long list of realistic potential funding sources that can serve as the starting point for developing capital and operating funding strategies.

For capital funding, it is assumed that the project will explore the possibility of local private funding as well as funding through the federal Small Starts program, which could provide up to $75 million of the project's capital costs. If Small Starts funds are pursued, the remaining funding could be provided through a combination of other federal funds (as long as the total federal share is less than 80 percent of the total costs), State matching funds, and/or local / private funds. For the City of Grand Rapids, identifying and targeting the preferred capital funding stratigy, including the decision on whether or not to pursue Small Starts funds, will need to be a priority as the project advances through the environmental documentation towards final design and engineering.

For operating funding, an early action item will be determining the potential level of State operating assistance that could be provided for the Streetcar. This would include the Street Railway Operating Assistance that was created by the legislature in 2008 for Detroit's M1-Rail Project. Additionally, discussions should be held to determine the Streetcar's potential eligibility for Act 51 State Operating Assistance funds. In addition to fare revenue, other potential sources that should be further evaluated include advertising/naming rights, CMAQ funds (first five years of operations), partnerships with local agencies and/or the private sector, including the Grand Rapids Downtown Improvement District (GRDID), and implementing or expanding existing taxes such as car rental and hotel/motel taxes.

Defining a long term operating funding strategy will help to provide the consistency and reliability the City's future transit customers will be expecting. Identifying and targeting these funding sources for this strategy will be another high priority for the City of Grand Rapids.

Appendix A

Cherry West Bond Alignment Drawings

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CHERRY ALIGNMENT

EXISTING SURFACE PARKING
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PROPOSED SIGNAL
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M MODIFY EXISTING SIGNAL

PROPOSED LANE MARKINGS
PROPOSED STREETCAR STOP
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GRAND RAPIDS STREETCAR CONCEPTUAL LAYOUT

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SHEET NO.: 1 OF 7

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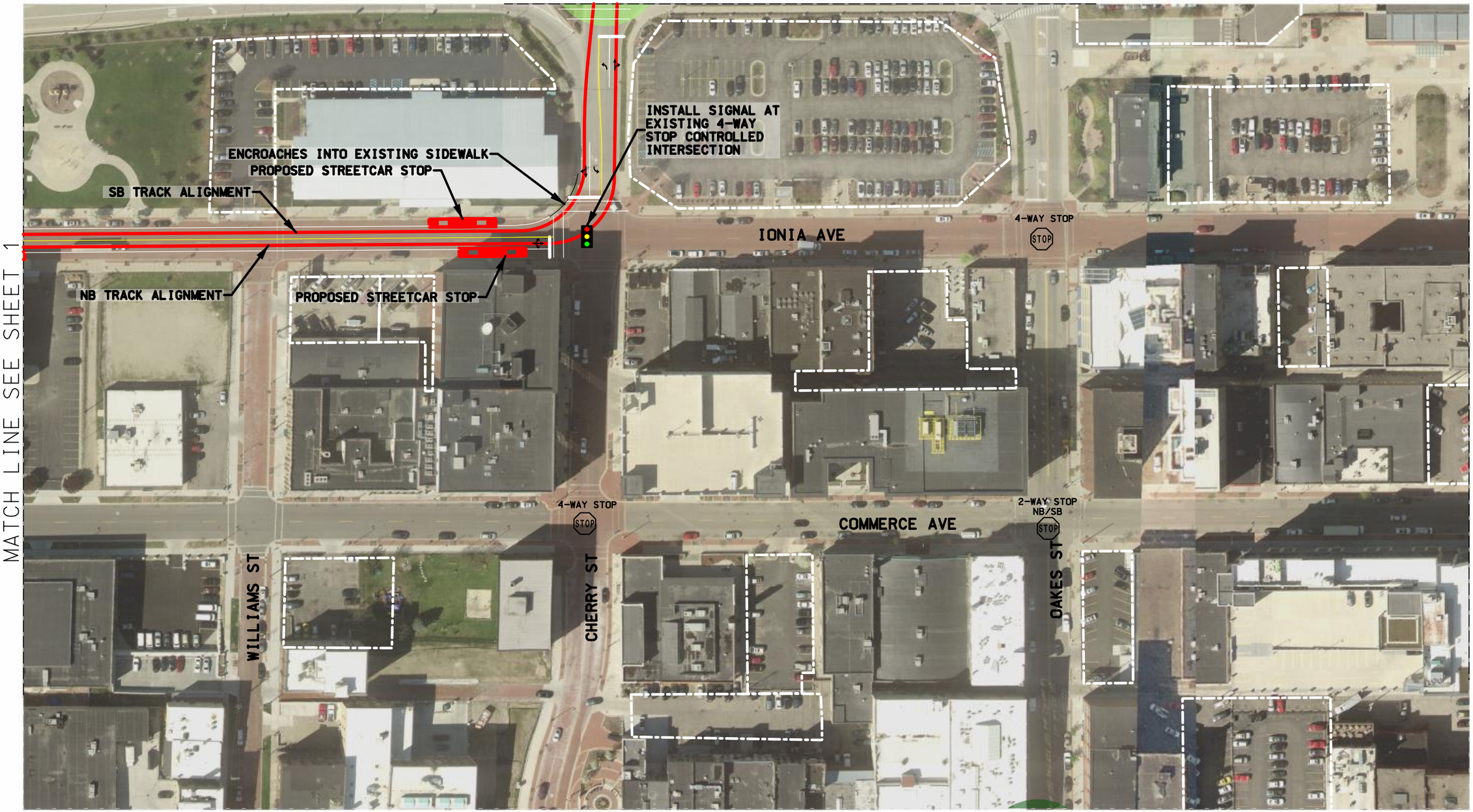

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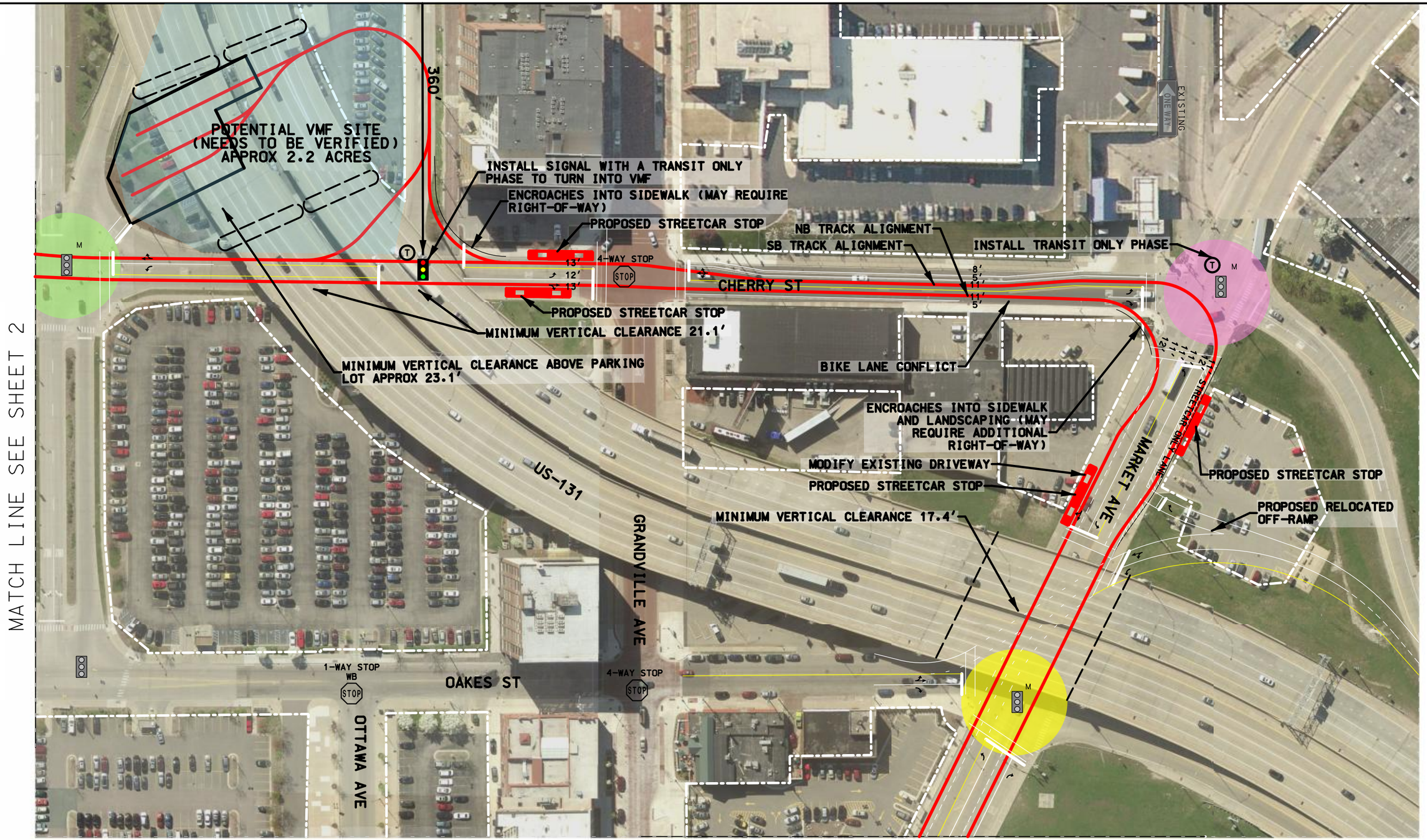

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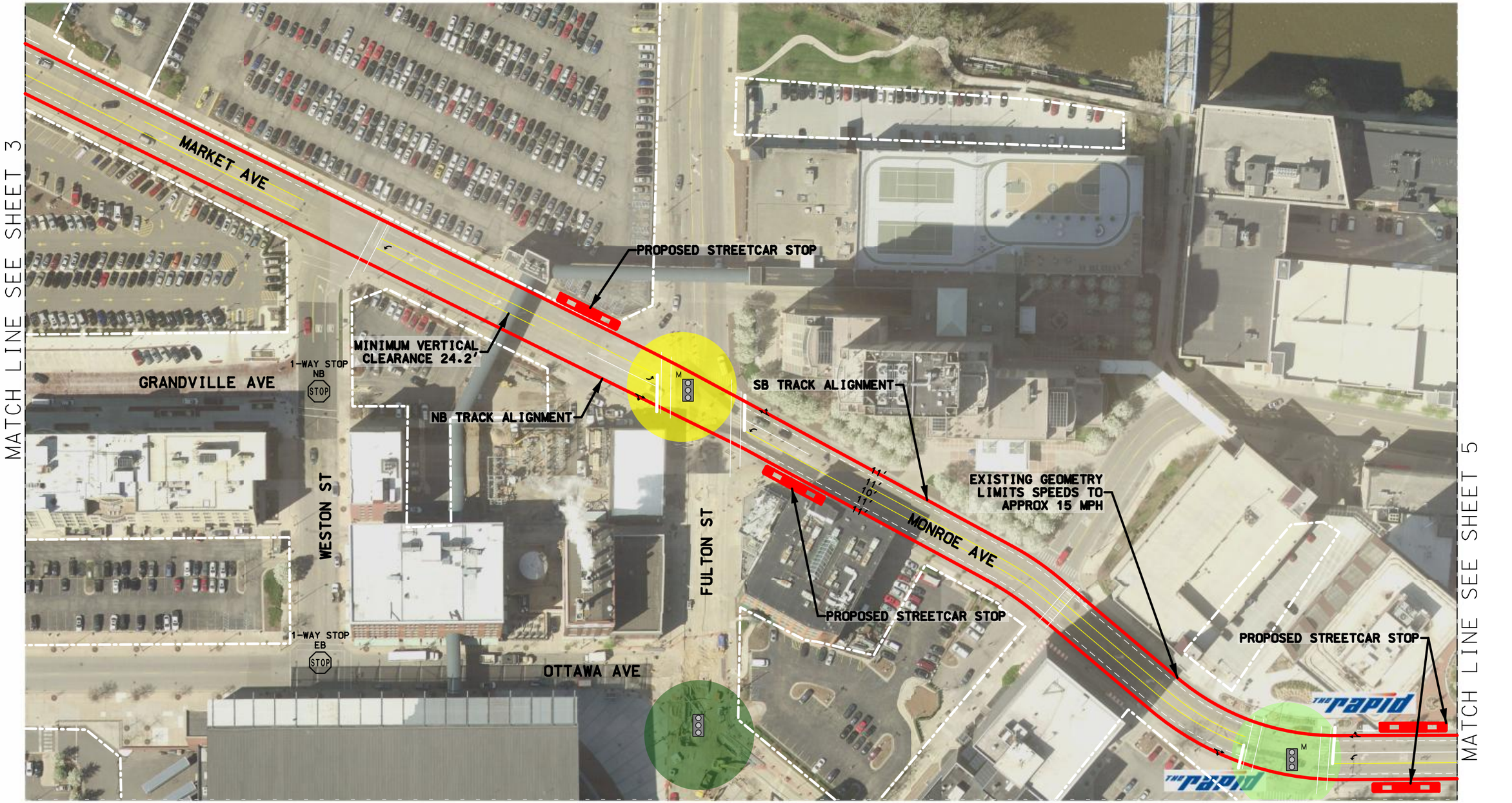

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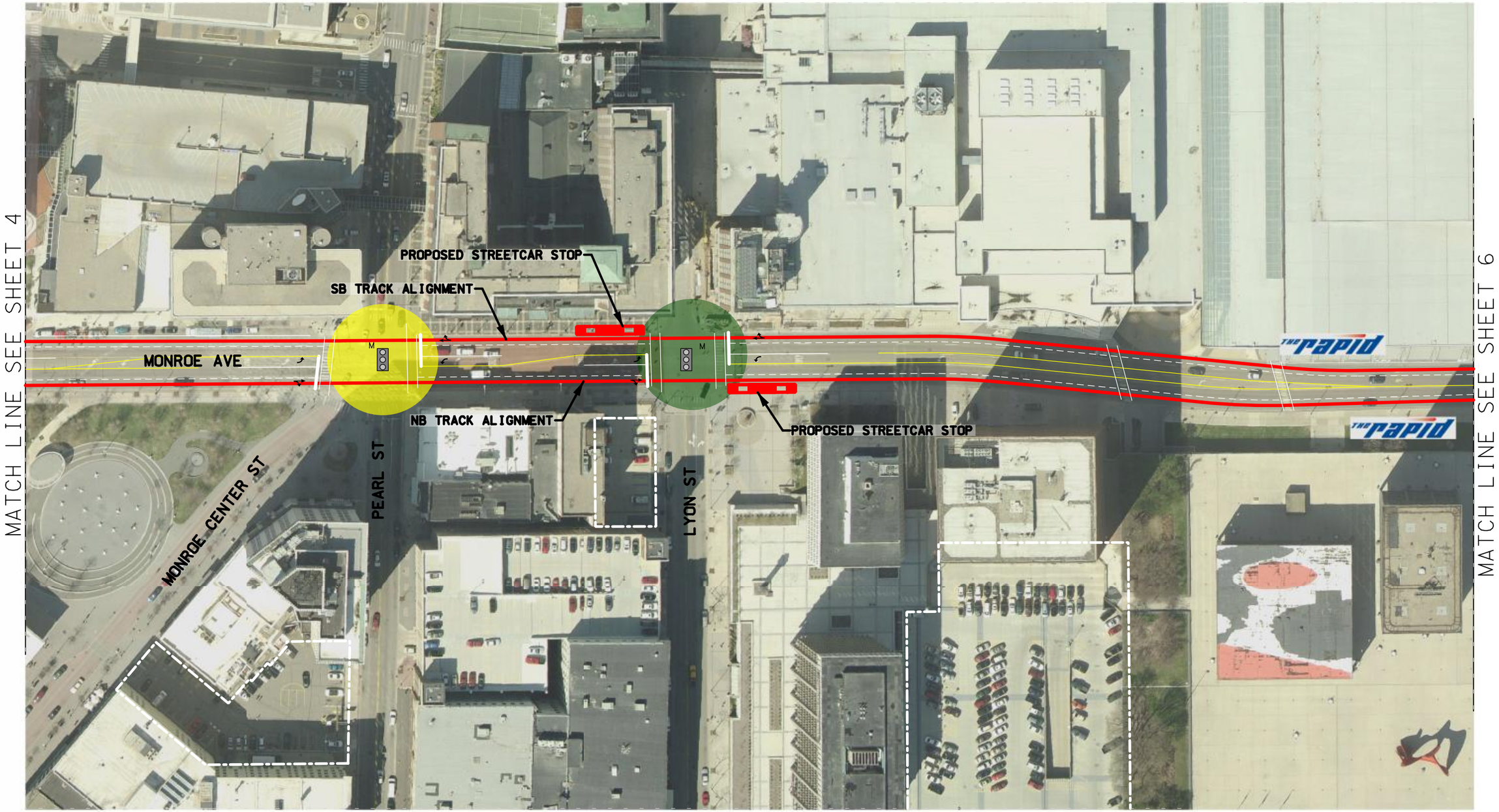

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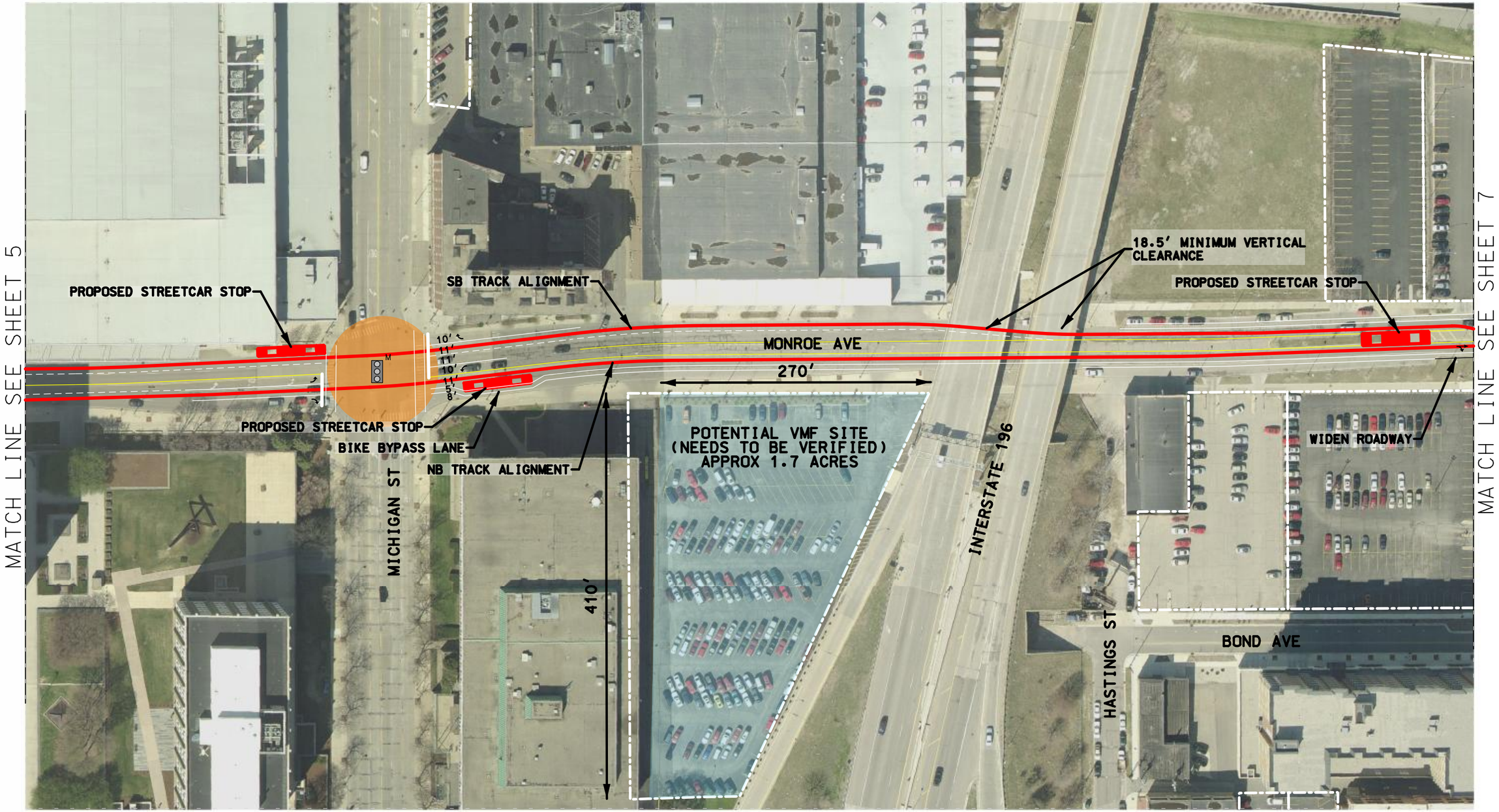

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CHERRY ALIGNMENT

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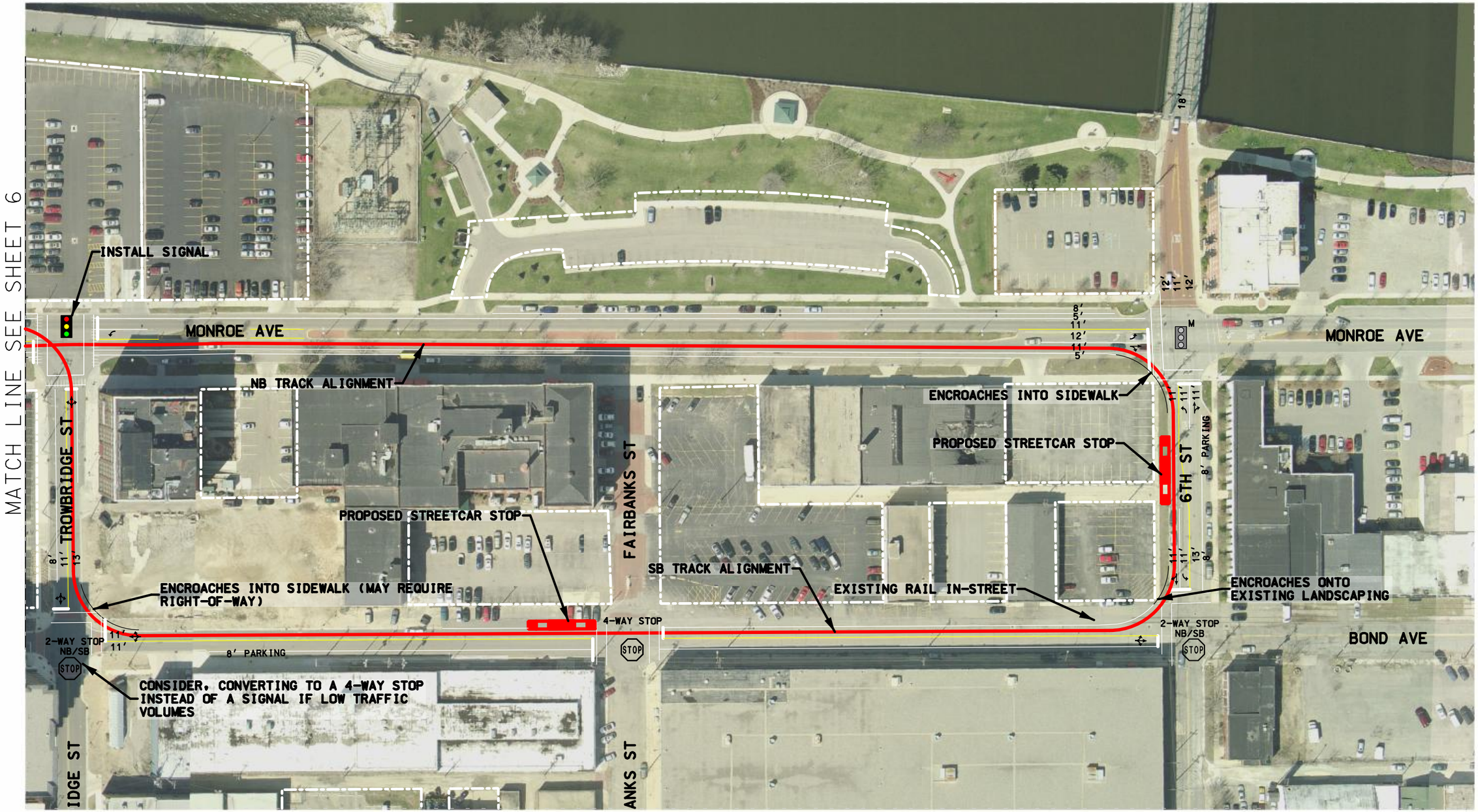

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Appendix B

Cherry Operating Plan

Grand Rapids Streetcar
Cherry Operating Plan

	Cherry		
	Run Time (min)	*Distance (miles)*	*Avg. Speed (mph)*
Round-Trip Total	25.7	3.60	8.4
One-Way Average	12.9	1.80	8.4

			Operating Service Levels				*Operating Plans*			*Operating Requirements*		
	Day of Week	*Annual Days*	*Time Period*	*Span of Service*	*Hours*	*Headway*	*Layover Time*	*Cycle Time*	*One-Way Trips*	*Annual Revenue Miles*	*Annual Revenue Hours*	*Peak Vehicle Requirement*
Cherry	Monday-Friday	254	AM Peak	6:00am - 9:00am	3	10	4.3	30.0	36	16,500	2,290	3
			Midday	9:00am - 3:00pm	6	10	4.3	30.0	72	32,900	4,570	3
			PM Peak	3:00pm - 9:00pm	6	10	4.3	30.0	72	32,900	4,570	3
			Evening	9:00pm - 12:00am	3	15	4.3	30.0	24	11,000	1,520	2
	Saturday	52	Daytime	6:00am - 12:00am	18	15	4.3	30.0	144	65,800	1,870	2
	Sunday & Holidays	59	No Service									
									Total	**159,100**	**14,820**	**3**
											Maintenance Spares	**1**
											Total Vehicle Fleet	**4**
											Annual O&M Cost (2014 dollars)	**$2,964,000**

NOTES:

1. Annual revenue bus-miles and bus-hours include layover time, but do not include report and deadhead time.
2. Minimum layover time assumed for breaks/scheduled recovery = 15%
3. Maintenance spare ratio = 20%
4. Streetcar O&M Cost per Hour= $200

Prepared by HDR Engineering 19-Jun-14

Grand Rapids Streetcar

Cherry with Bond Operating Plan

	Cherry with Bond		
	Run Time (min)	*Distance (miles)*	*Avg. Speed (mph)*
Round-Trip Total	26.5	3.70	8.4
One-Way Average	13.3	1.85	8.4

			Operating Service Levels				*Operating Plans*			*Operating Requirements*		
	Day of Week	*Annual Days*	*Time Period*	*Span of Service*	*Hours*	*Headway*	*Layover Time*	*Cycle Time*	*One-Way Trips*	*Annual Revenue Miles*	*Annual Revenue Hours*	*Peak Vehicle Requirement*
Cherry with Bond	Monday-Friday	254	AM Peak	6:00am - 9:00am	3	11	6.5	33.0	33	15,400	2,290	3
			Midday	9:00am - 3:00pm	6	11	6.5	33.0	65	30,800	4,570	3
			PM Peak	3:00pm - 9:00pm	6	11	6.5	33.0	65	30,800	4,570	3
			Evening	9:00pm - 12:00am	3	15	18.5	45.0	24	11,300	2,290	3
	Saturday	52	Daytime	6:00am - 12:00am	18	15	18.5	45.0	144	67,700	2,810	3
	Sunday & Holidays	59	No Service									
									Total	**156,000**	**16,530**	**3**
											Maintenance Spares	**1**
											Total Vehicle Fleet	**4**
											Annual O&M Cost (2014 dollars)	**$3,306,000**

NOTES:

1. Annual revenue bus-miles and bus-hours include layover time, but do not include report and deadhead time.
2. Minimum layover time assumed for breaks/scheduled recovery = 15%
3. Maintenance spare ratio = 20%
4. Streetcar O&M Cost per Hour= $200

Prepared by HDR Engineering 19-Jun-14

Grand Rapids Streetcar
Oakes Operating Plan

	Oakes		
	Run Time (min)	*Distance (miles)*	*Avg. Speed (mph)*
Round-Trip Total	25.1	3.40	8.1
One-Way Average	12.6	1.70	8.1

			Operating Service Levels				*Operating Plans*			*Operating Requirements*		
	Day of Week	*Annual Days*	*Time Period*	*Span of Service*	*Hours*	*Headway*	*Layover Time*	*Cycle Time*	*One-Way Trips*	*Annual Revenue Miles*	*Annual Revenue Hours*	*Peak Vehicle Requirement*
Oakes	Monday-Friday	254	AM Peak	6:00am - 9:00am	3	10	4.9	30.0	36	15,500	2,290	3
			Midday	9:00am - 3:00pm	6	10	4.9	30.0	72	31,100	4,570	3
			PM Peak	3:00pm - 9:00pm	6	10	4.9	30.0	72	31,100	4,570	3
			Evening	9:00pm - 12:00am	3	15	4.9	30.0	24	10,400	1,520	2
	Saturday	52	Daytime	6:00am - 12:00am	18	15	4.9	30.0	144	62,200	1,870	2
	Sunday & Holidays	59	No Service									
									Total	**150,300**	**14,820**	**3**
											Maintenance Spares	**1**
											Total Vehicle Fleet	**4**
											Annual O&M Cost (2014 dollars)	**$2,964,000**

NOTES:

1. Annual revenue bus-miles and bus-hours include layover time, but do not include report and deadhead time.
2. Minimum layover time assumed for breaks/scheduled recovery = 15%
3. Maintenance spare ratio = 20%
4. Streetcar O&M Cost per Hour= $200

Prepared by HDR Engineering 19-Jun-14

Grand Rapids Streetcar
Oakes with Bond Operating Plan

	Oakes with Bond		
	Run Time (min)	*Distance (miles)*	*Avg. Speed (mph)*
Round-Trip Total	25.9	3.70	8.6
One-Way Average	13.0	1.85	8.6

			Operating Service Levels				*Operating Plans*			*Operating Requirements*		
	Day of Week	*Annual Days*	*Time Period*	*Span of Service*	*Hours*	*Headway*	*Layover Time*	*Cycle Time*	*One-Way Trips*	*Annual Revenue Miles*	*Annual Revenue Hours*	*Peak Vehicle Requirement*
Oakes	Monday-Friday	254	AM Peak	6:00am - 9:00am	3	10	4.1	30.0	36	16,900	2,290	3
			Midday	9:00am - 3:00pm	6	10	4.1	30.0	72	33,800	4,570	3
			PM Peak	3:00pm - 9:00pm	6	10	4.1	30.0	72	33,800	4,570	3
			Evening	9:00pm - 12:00am	3	15	4.1	30.0	24	11,300	1,520	2
	Saturday	52	Daytime	6:00am - 12:00am	18	15	4.1	30.0	144	67,700	1,870	2
	Sunday & Holidays	59	No Service									
									Total	**163,500**	**14,820**	**3**
											Maintenance Spares	**1**
											Total Vehicle Fleet	**4**
											Annual O&M Cost (2014 dollars)	**$2,964,000**

NOTES:

1. Annual revenue bus-miles and bus-hours include layover time, but do not include report and deadhead time.
2. Minimum layover time assumed for breaks/scheduled recovery = 15%
3. Maintenance spare ratio = 20%
4. Streetcar O&M Cost per Hour= $200

Prepared by HDR Engineering 19-Jun-14

Appendix C

Grand Rapids Cost Spreadsheet

		Streetcar Line	Cherry Alignment							Current Year	2019	Inflation Rate
		3.58 Track Mile(s)	Approximately $31 Million Per Track Mile (Current Year)	Approximately $36 Million Per Track Mile (YoE)						2014 (YR)	(YR)	3.00%
SCC	SCC Sub	Item #	Item Description	Unit	Unit Cost	Quantity	Item Cost	A. Cont.	Item Cont.	Subtotal	YoE	Subtotal YoE
10			GUIDEWAY & TRACK ELEMENTS (Track Miles)				$9,050,200		$1,855,040	$10,905,240		$12,642,162
	10.03		Guideway: At-grade in mixed traffic				$8,600,200		$1,720,040	$10,320,240		$11,963,987
		10.03.01	Streetcar Guideway-Single (Embedded)	TM	$2,400,000	3.6	$8,600,200	20%	$1,720,040	$10,320,240	2019	$11,963,987
	10.12		Track: Special (switches, turnouts)				$450,000		$135,000	$585,000		$678,175
		10.12.03	Powered Turnouts	EA	$225,000	2.0	$450,000	30%	$135,000	$585,000	2019	$678,175
		10.12.04	Diamonds	EA	$300,000	0.0	$0	30%	$0	$0	2019	0
20			STATIONS, STOPS, TERMINALS, INTERMODAL (number)				$1,900,000		$570,000	$2,470,000		$2,863,407
	20.01		At-grade station, stop, shelter, mall, terminal, platform				$1,900,000		$570,000	$2,470,000		$2,863,407
		20.01.01	Streetcar Stop (1 Center)	EA	$200,000	1.0	$200,000	30%	$60,000	$260,000	2019	$301,411
		20.01.02	Streetcar Stop (1 Side)	EA	$100,000	17.0	$1,700,000	30%	$510,000	$2,210,000	2019	$2,561,996
30			SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS				$11,000,000		$2,200,000	$13,200,000		$15,302,418
	30.02		Light Maintenance Facility				$11,000,000		$2,200,000	$13,200,000		$15,302,418
		30.02.03	Streetcar MSF Allowance	EA	$11,000,000	1.0	$11,000,000	20%	$2,200,000	$13,200,000	2019	$15,302,418
40			SITEWORK & SPECIAL CONDITIONS				$18,156,360		$1,950,883	$20,107,243		$23,309,806
	40.02		Site Utilities, Utility Relocation				$4,114,000		$1,234,200	$5,348,200		$6,200,030
		40.02.02	Streetcar Utility Relocation Allowance (Dense Urban)	RM	$2,000,000	1.9	$3,740,000	30%	$1,122,000	$4,862,000	2019	$5,636,391
		40.02.04	On-Street Drainage Modification Allowance	RM	$200,000	1.9	$374,000	30%	$112,200	$486,200	2019	$563,639
	40.07		Automobile, bus, van accessways including roads, parking lots				$3,583,417		$716,683	$4,300,100		$4,984,994
		40.07.02	Roadway/Traffic S&S/Street Lighting Allowance	TM	$1,000,000	3.6	$3,583,417	20%	$716,683	$4,300,100	2019	$4,984,994
	40.08		Temporary Facilities and other indirect costs during construction				$10,458,943		$0	$10,458,943		$12,124,781
		40.08.01	Temporary Maintenance of Traffic	LS	5.0%	52294715.0	$2,614,736	0%	$0	$2,614,736	2019	$3,031,195
		40.08.02	Contractor Indirects (Staff, Office, etc.)	LS	15.0%	52294715.0	$7,844,207	0%	$0	$7,844,207	2019	$9,093,586
50			SYSTEMS				$13,224,000		$2,847,175	$16,071,175		$18,630,897
	50.02		Traffic signals and crossing protection				$2,023,750		$607,125	$2,630,875		$3,049,905
		50.02.01	Traffic Signal Modification Allowance (Per Intersection - Modify Existing)	EA	$130,000	8.0	$1,040,000	30%	$312,000	$1,352,000	2019	$1,567,339
		50.02.02	Traffic Signals Allowance (Per Intersection - New Signal)	EA	$250,000	3.0	$750,000	30%	$225,000	$975,000	2019	$1,130,292
		50.02.03	Streetcar Signal Priority Allowance	RM	$125,000	1.9	$233,750	30%	$70,125	$303,875	2019	$352,274
	50.03		Traction power supply: substations				$4,300,100		$860,020	$5,160,120		$5,981,993
		50.03.02	Streetcar TPSS Allowance (1 Per Track Mile)	TM	$1,200,000	3.6	$4,300,100	20%	$860,020	$5,160,120	2019	$5,981,993
	50.04		Traction power distribution: catenary and third rail				$6,450,150		$1,290,030	$7,740,180		$8,972,990
		50.04.01	Streetcar OCS Allowance (Single Track)	TM	$2,000,000	0.0	$0	20%	$0	$0	2019	$0
		50.04.02	Streetcar OCS Allowance (Double Track)	TM	$1,800,000	3.6	$6,450,150	20%	$1,290,030	$7,740,180	2019	$8,972,990
	50.06		Fare collection system and equipment				$450,000		$90,000	$540,000		$626,008
		50.06.02	Streetcar Fare Collection (Assume Simple TVMs at Stops)	EA	$25,000	18.0	$450,000	20%	$90,000	$540,000	2019	$626,008
	Construction Subtotal (10-50)						$53,330,560		$9,423,098	$62,753,658		$72,748,689

		Streetcar Line	Cherry Alignment							Current Year	2019	Inflation Rate
		3.58 Track Mile(s)	Approximately $31 Million Per Track Mile (Current Year)	Approximately $36 Million Per Track Mile (YoE)						2014 (YR)	(YR)	3.00%
SCC	SCC Sub	Item #	Item Description	Unit	Unit Cost	Quantity	Item Cost	A. Cont.	Item Cont.	Subtotal	YoE	Subtotal YoE
60			ROW, LAND, EXISTING IMPROVEMENTS				$1,000,000		$300,000	$1,300,000		$1,507,056
	60.01		Purchase or lease of real estate				$1,000,000		$300,000	$1,300,000		$1,507,056
		60.01.01	Streetcar VMF & Misc. Right of Way Allowance	EA	$1,000,000	1.0	$1,000,000	30%	$300,000	$1,300,000	2019	$1,507,056
70			VEHICLES (number)				$18,000,000		$900,000	$18,900,000		$21,910,280
	70.01		Light Rail				$18,000,000		$900,000	$18,900,000		$21,910,280
		70.01.02	Modern Streetcar Vehicle Allowance (1 Vehicle per Track Mile)	EA	$4,500,000	4.0	$18,000,000	5%	$900,000	$18,900,000	2019	$21,910,280
80			PROFESSIONAL SERVICES (applies to Cats. 10-50)				$18,826,097		$0	$18,826,097		$21,824,607
	80.01		Preliminary Engineering				$1,882,610		$0	$1,882,610		$2,182,461
		80.01.01	Percentage of Direct Costs SCC (10-50)	LS	3%	$62,753,658	$1,882,610	0%	$0	$1,882,610	2019	$2,182,461
	80.02		Final Design				$5,020,293		$0	$5,020,293		$5,819,895
		80.02.01	Percentage of Direct Costs SCC (10-50)	LS	8%	$62,753,658	$5,020,293	0%	$0	$5,020,293	2019	$5,819,895
	80.03		Project Management for Design and Construction				$3,765,219		$0	$3,765,219		$4,364,921
		80.03.01	Percentage of Direct Costs SCC (10-50)	LS	6%	$62,753,658	$3,765,219	0%	$0	$3,765,219	2019	$4,364,921
	80.04		Construction Administration & Management				$3,765,219		$0	$3,765,219		$4,364,921
		80.04.01	Percentage of Direct Costs SCC (10-50)	LS	6%	$62,753,658	$3,765,219	0%	$0	$3,765,219	2019	$4,364,921
	80.05		Professional Liability and other Non-Construction Insurance				$627,537		$0	$627,537		$727,487
		80.05.01	Percentage of Direct Costs SCC (10-50)	LS	1%	$62,753,658	$627,537	0%	$0	$627,537	2019	$727,487
	80.06		Legal; Permits; Review Fees by other agencies, cities, etc.				$1,255,073		$0	$1,255,073		$1,454,974
		80.06.01	Percentage of Direct Costs SCC (10-50)	LS	2%	$62,753,658	$1,255,073	0%	$0	$1,255,073	2019	$1,454,974
	80.07		Surveys, Testing, Investigation, Inspection				$1,255,073		$0	$1,255,073		$1,454,974
		80.07.01	Percentage of Direct Costs SCC (10-50)	LS	2%	$62,753,658	$1,255,073	0%	$0	$1,255,073	2019	$1,454,974
	80.08		Start up				$1,255,073		$0	$1,255,073		$1,454,974
		80.08.01	Percentage of Direct Costs SCC (10-50)	LS	2%	$62,753,658	$1,255,073	0%	$0	$1,255,073	2019	$1,454,974
	Subtotal (10-80)						$91,156,657		$10,623,098	$101,779,755		$117,990,632
90			UNALLOCATED CONTINGENCY	LS	10%	22.8%				$10,177,976		$11,799,063
100			FINANCE CHARGES							Current Year Total		YoE Total
	Segment Totals (10-100)									$111,957,731		$129,789,695

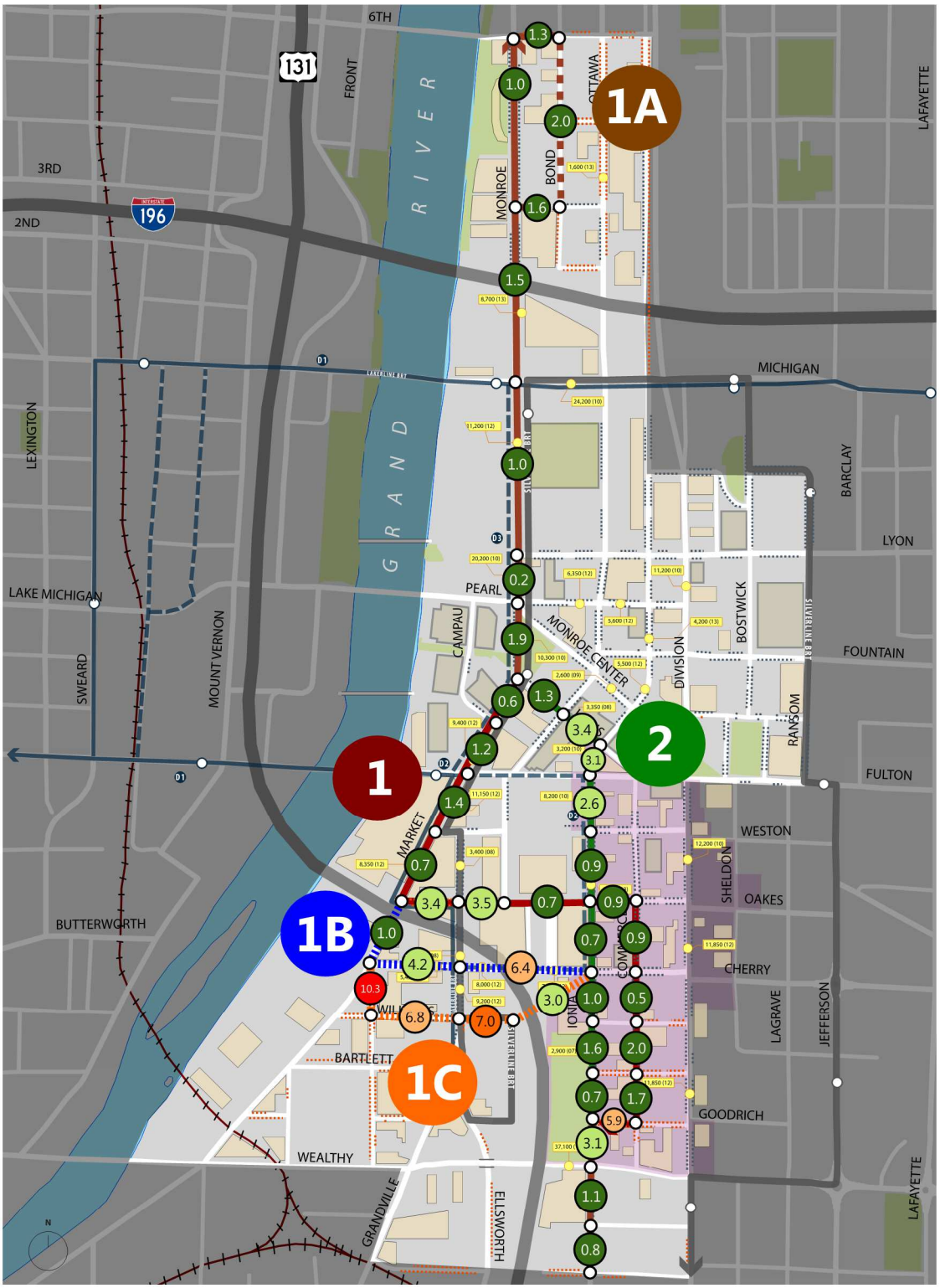
		Streetcar Line	Additional Costs to add Bond							Current Year	2019	Inflation Rate
		0.3 Track Mile(s)	Approximately $25 Million Per Track Mile (Current Year)	Approximately $29 Million Per Track Mile (YoE)						2014 (YR)	(YR)	3.00%
SCC	SCC Sub	Item #	Item Description	Unit	Unit Cost	Quantity	Item Cost	A. Cont.	Item Cont.	Subtotal	YoE	Subtotal YoE
10			GUIDEWAY & TRACK ELEMENTS (Track Miles)				$675,000		$142,500	$817,500		$947,707
	10.03		Guideway: At-grade in mixed traffic			0	$600,000		$120,000	$720,000		$834,677
		10.03.01	Streetcar Guideway-Single (Embedded)	TM	$2,400,000	0.3	$600,000	20%	$120,000	$720,000	2019	$834,677
	10.12		Track: Special (switches, turnouts)			0	$75,000		$22,500	$97,500		$113,029
		10.12.03	Powered Turnouts	EA	$225,000	-1.0	-$225,000	30%	-$67,500	-$292,500	2019	-$339,088
		10.12.04	Diamonds	EA	$300,000	1.0	$300,000	30%	$90,000	$390,000	2019	$452,117
20			STATIONS, STOPS, TERMINALS, INTERMODAL (number)			0.0	$200,000		$60,000	$260,000		$301,411
	20.01		At-grade station, stop, shelter, mall, terminal, platform			0	$200,000		$60,000	$260,000		$301,411
		20.01.01	Streetcar Stop (1 Center)	EA	$200,000	0.0	$0	30%	$0	$0	2019	$0
		20.01.02	Streetcar Stop (1 Side)	EA	$100,000	2.0	$200,000	30%	$60,000	$260,000	2019	$301,411
30			SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS			0.0	$0		$0	$0		$0
	30.02		Light Maintenance Facility			0	$0		$0	$0		$0
		30.02.03	Streetcar MSF Allowance	EA	$11,000,000	0.0	$0	20%	$0	$0	2019	$0
40			SITEWORK & SPECIAL CONDITIONS			0.0	$1,772,920		$287,600	$2,060,520		$2,388,707
	40.02		Site Utilities, Utility Relocation			0	$792,000		$237,600	$1,029,600		$1,193,589
		40.02.02	Streetcar Utility Relocation Allowance (Dense Urban)	RM	$2,000,000	0.4	$720,000	30%	$216,000	$936,000	2019	$1,085,081
		40.02.04	On-Street Drainage Modification Allowance	RM	$200,000	0.4	$72,000	30%	$21,600	$93,600	2019	$108,508
	40.07		Automobile, bus, van accessways including roads, parking lots			0	$250,000		$50,000	$300,000		$347,782
		40.07.02	Roadway/Traffic S&S/Street Lighting Allowance	TM	$1,000,000	0.3	$250,000	20%	$50,000	$300,000	2019	$347,782
	40.08		Temporary Facilities and other indirect costs during construction				$730,920		$0	$730,920		$847,337
		40.08.01	Temporary Maintenance of Traffic	LS	5.0%	$3,654,600	$182,730	0%	$0	$182,730	2019	$211,834
		40.08.02	Contractor Indirects (Staff, Office, etc.)	LS	15.0%	$3,654,600	$548,190	0%	$0	$548,190	2019	$635,502
50			SYSTEMS			0.0	$1,025,000		$222,500	$1,247,500		$1,446,194
	50.02		Traffic signals and crossing protection			0	$175,000		$52,500	$227,500		$263,735
		50.02.01	Traffic Signal Modification Allowance (Per Intersection - Modify Existing)	EA	$130,000	1.0	$130,000	30%	$39,000	$169,000	2019	$195,917
		50.02.02	Traffic Signals Allowance (Per Intersection - New Signal)	EA	$250,000	0.0	$0	30%	$0	$0	2019	$0
		50.02.03	Streetcar Signal Priority Allowance	RM	$125,000	0.4	$45,000	30%	$13,500	$58,500	2019	$67,818
	50.03		Traction power supply: substations			0	$300,000		$60,000	$360,000		$417,339
		50.03.02	Streetcar TPSS Allowance (1 Per Track Mile)	TM	$1,200,000	0.3	$300,000	20%	$60,000	$360,000	2019	$417,339
	50.04		Traction power distribution: catenary and third rail			0	$500,000		$100,000	$600,000		$695,564
		50.04.01	Streetcar OCS Allowance (Single Track)	TM	$2,000,000	0.3	$500,000	20%	$100,000	$600,000	2019	$695,564
		50.04.02	Streetcar OCS Allowance (Double Track)	TM	$1,800,000	0.0	$0	20%	$0	$0	2019	$0
	50.06		Fare collection system and equipment			0	$50,000		$10,000	$60,000		$69,556
		50.06.02	Streetcar Fare Collection (Assume Simple TVMs at Stops)	EA	$25,000	2.0	$50,000	20%	$10,000	$60,000	2019	$69,556
	Construction Subtotal (10-50)					0.0	$3,672,920		$712,600	$4,385,520		$5,084,020

		Streetcar Line	Additional Costs to add Bond								Current Year	2019	Inflation Rate
		0.3 Track Mile(s)	Approximately $25 Million Per Track Mile (Current Year)	Approximately $29 Million Per Track Mile (YoE)							2014 (YR)	(YR)	3.00%
SCC	SCC Sub	Item #	Item Description	Unit	Unit Cost	Quantity	Item Cost	A. Cont.	Item Cont.		Subtotal	YoE	Subtotal YoE
60			ROW, LAND, EXISTING IMPROVEMENTS			0.0	$0		$0		$0		$0
	60.01		Purchase or lease of real estate			0	$0		$0		$0		$0
		60.01.01	Streetcar VMF & Misc. Right of Way Allowance	EA	$1,000,000	0.0	$0	30%	$0		$0	2019	$0
70			VEHICLES (number)			0.0	$0		$0		$0		$0
	70.01		Light Rail			0	$0		$0		$0		$0
		70.01.02	Modern Streetcar Vehicle Allowance (1 Vehicle per Track Mile)	EA	$4,500,000	0.0	$0	5%	$0		$0	2019	$0
80			PROFESSIONAL SERVICES (applies to Cats. 10-50)				$1,315,656		$0		$1,315,656		$1,525,206
	80.01		Preliminary Engineering				$131,566		$0		$131,566		$152,521
		80.01.01	Percentage of Direct Costs SCC (10-50)	LS	3%	$4,385,520	$131,566	0%	$0		$131,566	2019	$152,521
	80.02		Final Design				$350,842		$0		$350,842		$406,722
		80.02.01	Percentage of Direct Costs SCC (10-50)	LS	8%	$4,385,520	$350,842	0%	$0		$350,842	2019	$406,722
	80.03		Project Management for Design and Construction				$263,131		$0		$263,131		$305,041
		80.03.01	Percentage of Direct Costs SCC (10-50)	LS	6%	$4,385,520	$263,131	0%	$0		$263,131	2019	$305,041
	80.04		Construction Administration & Management				$263,131		$0		$263,131		$305,041
		80.04.01	Percentage of Direct Costs SCC (10-50)	LS	6%	$4,385,520	$263,131	0%	$0		$263,131	2019	$305,041
	80.05		Professional Liability and other Non-Construction Insurance				$43,855		$0		$43,855		$50,840
		80.05.01	Percentage of Direct Costs SCC (10-50)	LS	1%	$4,385,520	$43,855	0%	$0		$43,855	2019	$50,840
	80.06		Legal; Permits; Review Fees by other agencies, cities, etc.				$87,710		$0		$87,710		$101,680
		80.06.01	Percentage of Direct Costs SCC (10-50)	LS	2%	$4,385,520	$87,710	0%	$0		$87,710	2019	$101,680
	80.07		Surveys, Testing, Investigation, Inspection				$87,710		$0		$87,710		$101,680
		80.07.01	Percentage of Direct Costs SCC (10-50)	LS	2%	$4,385,520	$87,710	0%	$0		$87,710	2019	$101,680
	80.08		Start up				$87,710		$0		$87,710		$101,680
		80.08.01	Percentage of Direct Costs SCC (10-50)	LS	2%	$4,385,520	$87,710	0%	$0		$87,710	2019	$101,680
	Subtotal (10-80)						$4,988,576		$712,600		$5,701,176		$6,609,226
90			UNALLOCATED CONTINGENCY	LS	10%	25.7%					$570,118		$660,923
100			FINANCE CHARGES								Current Year Total		YoE Total
	Segment Totals (10-100)										$6,271,294		$7,270,148

Appendix D

Slope Graphic

TOP ROUTE CHOICES



21 APRIL 2014

LEGEND

- SHARED ROUTE SEGMENTS
- ALTERNATIVE 1 MARKET-OAKES-COMMERCE
- ALTERNATIVE 2 LOUIS-IONIA
- HEARTSIDE HISTORIC DISTRICT
- PLANNED LAKERLINE BRT
- ALTERNATE ROUTE
- PROPOSED BRT STATION
- SILVERLINE BRT
- BRT STATION
- ON-STREET PARKING: METERED, UNMETERED
- OFF-STREET PARKING: SURFACE LOT, STRUCTURE
- TRAFFIC COUNTS

(DASH DENOTES ROUTE VARIATION)

NOTE: THIS MAP ILLUSTRATES ROUTING ALTERNATIVES SUGGESTED BY THE STREETCAR ADVISORY COMMITTEE MEMBERS WHO SUBMITTED A WORKSHEET AT THE JANUARY 26, 2014 MEETING

Appendix E

Street Car Utility Inventory

Street	Street Information					Water						Sanitary Sewer						Storm						Gas					
	Cross Streets/Intersection			Street Slope																									
	Street	to	Street	Score	%	Size (in.)	Score	Type	Loc.	Length (R)	Clearance	Size (in.)	Score	Type	Loc.	Length (ft.)	Clearance	Size (in.)	Score	Type	Loc.	Length (ft.)	Clearance	Size (in.)	Score	Type	Loc.	Length (ft.)	Clearance
Monroe	WB 196																												
	EB 196																												
	6th Street/		Trowbridge	1	1.0	8"		DIP	P - NB - R	439.5		60		Conc	P - SB - C	588		15"		RCP	P - M	270		4			P-NB-CNTR		
	Newberry					24"		DIP	P	309														12					
	Trowbridge		Michigan	1	1.5																								
	Michigan		Lyon	1	1.0																								
	Lyon		Pearl	1	0.2																			8			P		
	Pearl		Louis	1	1.9	12"		DIP	P - SB - SWK	256		0	0	0	0	0	0	18"		RCP	C	52							
																		30		RCP	P-SB-CNTR	344							
	Louis		Campau Ave	1	0.6	6"		DIP	C	72		18"		Conc	P-CL	338				RCP	P-NB-SWK	336							
						8"		DIP	P-CNTR	418																			
	Campau Ave		Fulton	1	1.2	8		?	P-CNTR	265		18		Conc	P-NB-L	639.7		48		RCP	P-SB-CNTR	22							
						16"		?	P-SB-R	333																			
Market	Fulton		Weston	1	1.4	8		DIP	P-SB-R	570		12"		TP	P-CL	364		12"		RCP	P-NB-R	51							
																		12"		?	P-SB-SWK	137							
	Weston		Oakes	1	0.7	8		DIP	P-SB-R	511		12		TP	P-CL	175		24		RCP	P-NB-L	489							
												9		CLAY	P-CL	351													
Oakes	Market		Grandville	2	3.4	6		DIP	P-CNTR	383		0	0	0	0	0	0	12		RCP	P-CNTR	304							
	Grandville		Ottawa	2	3.5	8		DIP	P-EB-CNTR	319		0	0	0	0	0	0	12		RCP	P-CNTR	155							
	Ottawa		Ionia	1	0.7	8		DIP	P-EB-L	593		0	0	0	0	0	0	12		RCP	P	106							
																		24		CONC	C	147							
	Ionia		Commerce	1	0.9	?		DIP	P-WB-CNTR	263		?		?	P/C	279		12		CONC	P-CNTR	298							
Commerce	Oakes		Cherry	1	0.9	?		DIP	P-SB-R	462		48		RCP	P-SE-CNTR	435		15		CONC	P-SE-R	54							
																		18		CONC	P-SE-CNTR	212							
	Cherry		Williams	1	0.5	12		DIP	P-SE-CNTR	325		?		?	P-SE-CNTR	335		15		CONC	P-SE-L	221							
	Williams		Bartlett	1	2.0	12		DIP	P-SE-CNTR	343		12		TP	P-SE-CNTR	335		12		RCP	P	132							
	Bartlett		Goodrich	1	1.7	12		DIP	P-SE-R	196		8		TP	P-SE-CNTR	202		18		RCP	P	32							
Goodrich	Commerce		Ionia	3	5.9	10		DIP	P-WB-L	261		9		CLAY	P-WB-CNTR	168.5		12		CLAY	P	193							
																		18		RCP	P-WB-SWK	67.5							
Ionia	Goodrich		Wealthy	2	3.1	48		DIP	C-SE-SWK	65.5		48		BRICK	P-SE-CNTR	332		84		RCP	P-SE-SWK	337							
						12		DIP	P	142.5		15		?	P	324													
	Wealthy		McConnell	1	1.1	?		?	P	357		15		?	P	367.8		84		RCP	P	403							
												8		?	P-SE-CNTR	286													
	McConnel		Logan	1	0.8	12		DIP	P	126		0	0	0	0	0	0	24		RCP	P-SE-CNTR	248							
Newberry	Monroe		Bond	1	1.3*	12			P-EB-C	114		28		BRICK	P-CNTR	267													
						20			P-EB-C	39.3																			
Bond	Newberry		Trowbridge	1	2.0**	30		DIP	P-CNTR	274.5		0	0	0	0	0	0	0	0	0	0	0	0						
Trowbridge	Bond		Monroe	1	1.6	8			P-CNTR	102		28		BRICK	C	54		12			P-EB-R	135							
						8			P-CNTR	24																			
Market	Oakes		Cherry	1	1.0	6		DIP	P-SB-L	472		9		CLAY	P-CNTR	507		18		RCP	P-NB-CNTR	148							
Cherry	Market/Finney		Grandville	2	4.2	24		DIP	P-WB-L	304		12		CLAY	P-EB-L	27.5		0	0	0	0	0	0						
	Grandville		Ionia	3	6.4	6		?	P-EB-R	53		0	0	0	0	0	0	12		RCP	P-CNTR	303							
						8		?	P-EB-R	156.5																			
	US-131		Ionia			30		DIP	P-CNTR	362								12		RCP	P-CNTR	65.5							
Finney	Market		Williams	5	10.3	6		DIP	P-SB-CNTR	35		0	0	0	0	0	0	0	0	0	0	0	0						
Williams	Finney		Grandville	3	6.8	4		DIP	P-CNTR	547		9		CLAY	P-CNTR	417.7		0	0	0	0	0	0						
	Grandville		US-131	4	7.0							12		CLAY	P-CNTR	268													
Parking Lot	Ionia		Williams	2	3.0																								
Louis	Monroe		Ottawa	1	1.3	12		DIP	P-EB-L	338		0	0	0	0	0	0	72		BRICK	P-EB-CNTR	297							
	Ottawa		Louis	2	3.4	12		DIP	P-EB-L	333		0	0	0	0	0	0	72		BRICK	P-EB-CNTR	342.5							
Ionia	Louis		Fulton	2	3.1	?		?	P-SE-R	?		?		?	P-SE-CNTR	259		0	0	0	0	0							
	Fulton		Weston	2	2.6	12		DIP	P-SE-R	374		?		?	P-SE-CNTR	289		15		CONC	P-SB-CNTR	295							
	Weston		Oakes	1	0.9	12		DIP	P-SE-R	178		0	0	0	0	0	0	48		CONC	P-SB-CNTR	416							
	Oakes		Cherry	1	0.7	12		DIP	P-SE-R	219		8		TP	P-SE-CNTR	491		42		CONC	P-SE-CNTR	457							
	Cherry		Williams	1	1.0	12		?	P-SE-R	193		0	0	0	0	0	0	30		CONC	P-SB-L	251.4							
	Williams		Bartlett	1	1.6	12		?	P-SE-R	275		48		BRICK	P-SE-CNTR	326		24		CONC	P-SE-L	299							
	Bartlett		Goodrich	1	0.7	12		DIP	P-SE-R	202		48		BRICK	P-SE-CNTR	337		18		CONC	P-SE-L	128							

Legends:

Types of Pipes	
Brick	Brick Type
CI	Cast Iron Pipe
CIP	Cast Iron Pipe
CLAY	Clay Pipe
Conc	Concrete
CU	Copper Pipe
DIP	Ductile Iron Pipe
PBS	Protected Bare Steel Pipe
PCCP	Prestressed Concrete Cylinder Pipe
PCS	Protected Coated Steel Pipe
PE	Polyethylene Pipe
RCP	Reinforced Concrete Pipe
TP	Truss Pipe

Location	
C	Crosses street Centerline
CL	Center Line
CNTR	Center of Lane
EB	East Bound
L	Left Side
M	Median
NB	North Bound
P	Parallel to street centerline
Perp	Perpendicular
R	Right Side
SB	South Bound
WB	West Bound

Slope	
Score	Grade
1	Grade < 2
2	2 ≤ grade <5
3	5 ≤ grade < 7
4	7 ≤ grade < 10
5	Grade ≥ 10

Appendix F

Ridership Forecast

Memo

Date:	Friday, July 11, 2014
Project:	Grand Rapids Streetcar Study
To:	Project Team
From:	Vijay Mahal, Nick Karcz
Subject:	Ridership Forecasts using STOPS

The ridership forecasts for the Grand Rapids Streetcar study in Grand Rapids, Michigan, were estimated using a travel modeling software called STOPS (Simplified Trips-on-Project Software). The STOPS model is a stand-alone ridership forecasting software package developed by the Federal Transit Administration (FTA). The software applies a set of travel models to predict detailed travel patterns on fixed guideway systems. STOPS was specifically developed to support New Starts and Small Starts projects. Although the STOPS model is still fairly new and is still being refined by FTA and its contractors, HDR has found that the software is reasonably sensitive to mode type, route lengths, alignments, and demographic and employment projections.

STOPS utilizes a modified four-step (trip generation, trip distribution, mode choice and trip assignment) model structure to quantify total transit ridership by trip type, mode of access and auto ownership. It also computes the change in automobile vehicle miles travelled (VMT) that is attributable to the proposed transit project. The component sub-models in STOPS have been calibrated with local adjustments and compared to rider-survey datasets from locations within six metropolitan areas, and validated against stop-specific counts of trips in nine other metropolitan areas, resulting in 24 total fixed-guideway systems, as presented in **Table 1**.

The STOPS model for the Grand Rapids Streetcar requires the following inputs:

- US Census Transportation Planning Products (CTPP) Journey to Work trip flow data for the study area;
- Current transit system schedules and ridership (provided by The Rapid);
- Local demographic and land use data from the regional travel demand models (provided by GVMC);
- (provided by GVMC); and
- Project specific information, such as station locations and vertical profiles, and operating plans (developed by the Grand Rapids Streetcar Project Team).

Table 1: Fixed-Guideway Systems in STOPS Calibration and Validation

Metropolitan Area	Commuter Rail	Heavy Rail	Light Rail	Streetcar	BRT	Total
Calibration						
Atlanta		1				1
Charlotte			1			1
Denver			1			1
Phoenix			1			1
San Diego	1		2			3
Salt Lake City	1		1		1	3
Subtotal	**2**	**1**	**6**	**0**	**1**	**10**
Validation						
Kansas City					1	1
Houston			1			1
Minneapolis	1		1			2
Nashville	1					1
Norfolk			1			1
Portland	1		1	1		3
San Jose			1			1
Seattle	1		1	1		3
St. Louis			1			1
Subtotal	**4**	**0**	**7**	**2**	**1**	**14**
Total	**6**	**1**	**13**	**2**	**2**	**24**

Source: Federal Transit Administration (FTA), 2014

The application of STOPS model to the Grand Rapids Streetcar study was conducted in three steps as described below.

Step 1: Identify and Compile Model Inputs

The first step in the application of the STOPS model was to identify and compile all the required inputs for the base year (2014) model.

This included the 2014 employment and demographic data and the peak period highway travel times and distances from the MPO's regional travel demand model. The regional travel model only contains daily travel times, so a peak period factor of 1.38 was developed and applied to the daily highway skims. STOPS also requires year 2000 Journey to Work trip flow data and year 2000 socio-economic data which were downloaded from the FTA's website. The base year linked and unlinked transit trips were obtained from The Rapid's website and fed into STOPS for self calibration. The transit level of service data was also obtained directly from The Rapid in the form of GTFS (General Transit Feed System) files. After performing thorough

quality control checks of the inputs, the STOPS model was executed for the base year and the resulting ridership results were analyzed to make sure they compared well with observed data.

Step 2: Run Opening Year No-Build Scenario

In the second step, the base year STOPS model was applied using the opening year (2018) demographic and land use inputs and "No-Build" transit network assumptions. The demographic and employment data for 2018 were obtained from the MPO at the zonal level. The ridership results obtained from this step represented the opening year (2018) No-Build conditions and served as a benchmark against which the ridership results of the Build scenario (with streetcar in place) were compared and evaluated.

Step 3: Run Build Scenarios for the Opening Year

In the third step, the operating plan for each of the four streetcar scenarios was coded in the opening year network (2018) of the STOPS model. This process involved developing GTFS inputs detailing the frequency of the each proposed streetcar service and its operating characteristics such as speed, station locations, access and intermodal connectivity. Four model runs (one for each scenario) were conducted for the Build scenario using the opening year inputs. Each scenario and their operations assumption can be found in **Table 2**.

From the output results of the STOPS model, the streetcar ridership by mode of access (walk, kiss-n-ride, and park-n-ride), trip purpose (work and non-work) and auto ownership category (transit dependent population) was summarized. The STOPS model also produces daily station boardings and alightings.

Table 2: Streetcar Scenario Assumptions

	Cherry	Cherry with Bond	Oakes	Oakes with Bond
Headways (min)				
6 AM to 9 PM	10	10	10	10
9 PM to 12 AM	15	15	15	15
Travel Time (min)				
One-way	9:06	12:24	8:49	12:08

Results

The results of the STOPS model indicate that the proposed streetcar alternatives would carry between 800 and 900 trips a day in the opening year (2018).

Presented in **Table 3** are some key statistics from STOPS model relating to linked and unlinked trips in The Rapid fixed route bus system for the No-Build and Build scenarios. The total unlinked trips in The Rapid system are expected to increase between 800 and 920 trips a day

when the streetcar is in place, with the Cherry alternative having the largest increase with approximately 920 trips a day. The increase in linked trips from the No-Build to Build represents the transit trips that are new to the system. In this case, the STOPS model is projecting between 380 to 450 trips a day, with the Cherry alternative having the greatest increase in linked transit trips at nearly 450 trips a day. These new trips are those that would be diverted from the automobile mode. As a result of this diversion, there would be a reduction of approximately 1,040 auto vehicle miles of travel (VMT).

Table 3: Results for Year 2018

	Cherry			Cherry with Bond		
	No-Build	Build	Change	No-Build	Build	Change
System Unlinked Transit Trips	43,931	44,853	922	43,944	44,762	818
System Linked Transit Trips	33,895	34,341	446	33,905	34,320	415
Change in VMT (Build/No-Build)		-1,043			-1,094	
Streetcar Ridership		890			860	

Table 3 (continued): Results for Year 2018

	Oakes			Oakes with Bond		
	No-Build	Build	Change	No-Build	Build	Change
System Unlinked Transit Trips	43,954	44,757	803	43,956	44,839	882
System Linked Transit Trips	33,914	34,296	381	33,913	34,342	428
Change in VMT (Build/No-Build)		-1,031			-1,152	
Streetcar Ridership		800			890	

Among all of the scenarios, approximately 33 percent of streetcar ridership is comprised of home based work trips, 30 percent home based non-work, and 37 percent non-home based (see **Figure 1**). As forecast by the STOPS model, ridership for each scenario is primarily comprised of walk access (approximately 71 percent), followed by transfers, and then kiss-and-ride. **Figure 2** shows the mode of access by alternative.

Figure 1: Percent of Trips by Trip Purpose and Alternative

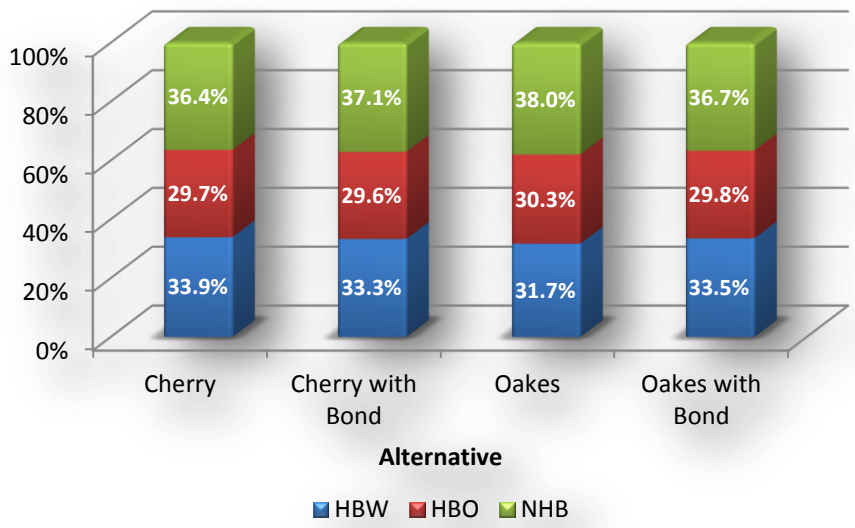
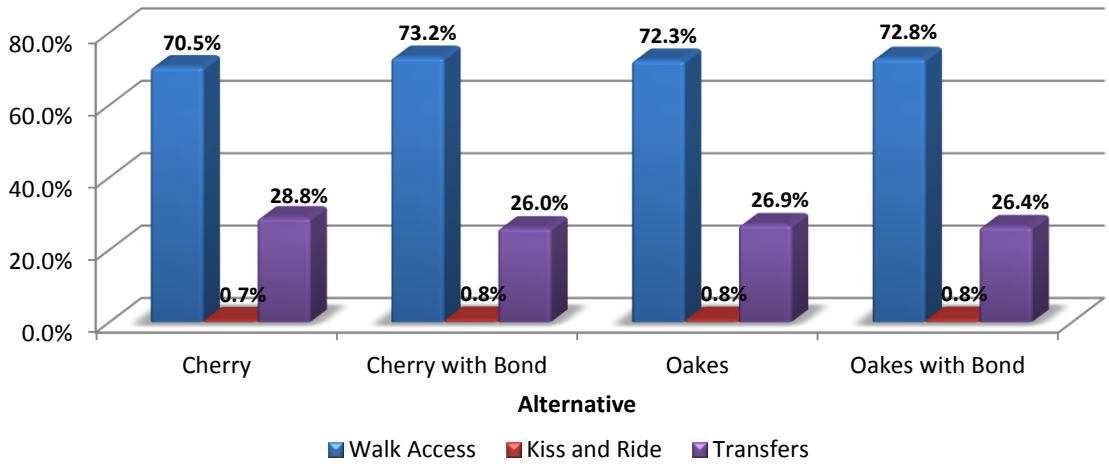
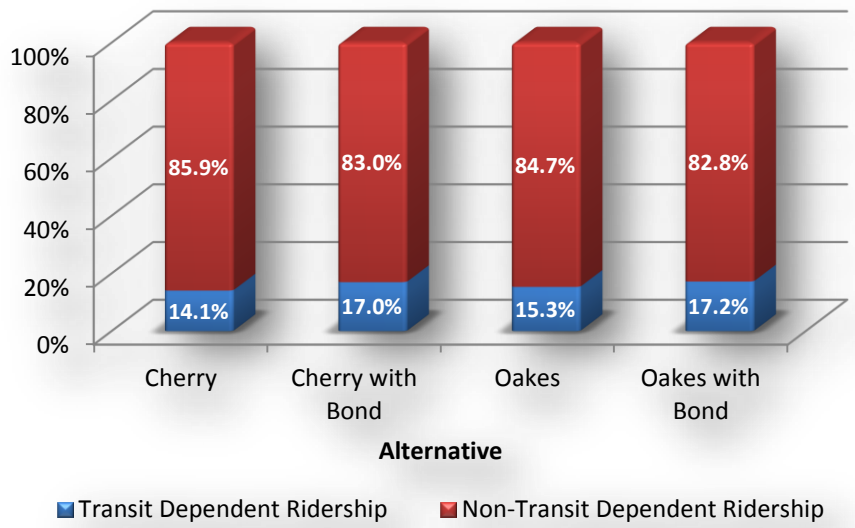


Figure 2: Mode of Access by Alternative



STOPS results indicate that, depending on the alternative, the transit dependent ridership ranges from 14 percent to 17 percent (see **Figure 3**). The transit dependent population, according to STOPS, is defined as those with no cars in their households.

Figure 3: Transit Dependent Ridership by Alternative



Tables 4 through **7** presents detailed station boarding data for each alternative (Cherry, Cherry with Bond, Oakes, and Oakes with Bond). As seen in each figure, some of the highest station boardings would occur at Ionia Avenue/McConnell, Market Avenue/Fulton, and Monroe Avenue/Lyon Street.

Table 4: Estimated Streetcar Ridership for the Cherry Alternative (Year 2018)

Station	Total	Percent
IONIA AVE / McCONNELL	100	11.2%
IONIA AVE / BARTLETT	30	3.4%
IONIA AVE / CHERRY	50	5.6%
CHERRY ST / GRANDVILLE	20	2.2%
MARKET AVE / CHERRY	60	6.7%
MARKET AVE / FULTON	150	16.9%
MONROE AVE / LOUIS	80	9.0%
MONROE AVE / LYON ST	200	22.5%
MONROE AVE / MICHIGAN	40	4.5%
MONROE AVE / FAIRBANKS	160	18.0%
Total	**890**	**100.0%**

Table 5: Estimated Streetcar Ridership for the Cherry with Bond Alternative (Year 2018)

Station	Total	Percent
IONIA AVE / McCONNELL	100	11.6%
IONIA AVE / BARTLETT	30	3.5%
IONIA AVE / CHERRY	50	5.8%
CHERRY ST / GRANDVILLE	20	2.3%
MARKET AVE / CHERRY	60	7.0%
MARKET AVE / FULTON	120	14.0%
MONROE AVE / LOUIS	80	9.3%
MONROE AVE / LYON ST	170	19.8%
MONROE AVE / MICHIGAN	30	3.5%
MONROE AVE / TOWBRIDGE	70	8.1%
6TH ST / MONROE AVE	130	15.1%
BOND AVE / FAIRBANKS	0	0.0%
Total	**860**	**100.0%**

Table 6: Estimated Streetcar Ridership for the Oakes Alternative (Year 2018)

Station	Total	Percent
IONIA AVE / McCONNELL	100	12.5%
IONIA AVE / BARTLETT	30	3.8%
IONIA AVE / CHERRY	50	6.3%
OAKES ST / BUS131	10	1.3%
OAKES ST / GRANDVILLE	40	5.0%
MARKET AVE / FULTON	130	16.3%
MONROE AVE / LOUIS	70	8.8%
MONROE AVE / LYON ST	180	22.5%
MONROE AVE / MICHIGAN	40	5.0%
MONROE AVE / FAIRBANKS	150	18.8%
Total	**800**	**100.0%**

Table 7: Estimated Streetcar Ridership for the Oakes with Bond Alternative (Year 2018)

Station	Total	Percent
IONIA AVE / McCONNELL	110	12.4%
IONIA AVE / BARTLETT	30	3.4%
IONIA AVE / CHERRY	60	6.7%
OAKES ST / BUS131	0	0.0%
OAKES ST / GRANDVILLE	50	5.6%
MARKET AVE / FULTON	150	16.9%
MONROE AVE / LOUIS	60	6.7%
MONROE AVE / LYON ST	180	20.2%
MONROE AVE / MICHIGAN	30	3.4%
MONROE AVE / TOWBRIDGE	80	9.0%
6TH ST / MONROE AVE	140	15.7%
BOND AVE / FAIRBANKS	0	0.0%
Total	**890**	**100.0%**