MADISON STREETCAR PRELIMINARY FEASIBILITY STUDY

Final Report

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October 2007
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1.0 Introduction

Across America, great downtowns and urban neighborhoods were shaped by streetcars. The walkable, compact pattern of development seen in the Central Isthmus was a product of this era. Madison was once well-served by a system of streetcar lines that supported a lively downtown, served major employers like the Oscar Mayer plant, and connected the University of Wisconsin to the larger community.

Streetcars in Madison supported the development of high-density residential neighborhoods like Elmside, University Heights and Wingra Park beyond the downtown core. In 1935, however, after some years of decline, streetcars in Madison were phased out in favor of buses.

In recent years, cities have rediscovered the virtues of streetcars, as urban circulators and place-makers, once again shaping the pattern of city development and supporting a level of pedestrian activity downtown that is simply not feasible if all of those pedestrians arrive by automobile. Portland, Oregon, Little Rock, Arkansas, Tampa, Florida and, here in Wisconsin, Kenosha are among the growing number of cities that have demonstrated the powerful positive effects of these “pedestrian accelerators.” These projects have demonstrated that the certainty and “readability” of a fixed-route rail transit line, along with other factors, makes them attractive to “riders by choice” and support a vital urban environment.

A single street corner can tell this story: in 2000, the intersection of 11th and Couch Streets behind Powell’s Bookstore in Portland was a tired and empty place on the industrial edge of downtown Portland. An official count logged 3 pedestrians there in a one-hour period. In 2005, after the Portland Streetcar arrived at a stop at 11th and Couch, and after the adjacent blocks were redeveloped with transit-oriented development, the pedestrian count total was 938 per hour.

Seeing these successes in other cities, The City of Madison conducted this study to examine whether the needs and opportunities of our community could be served by streetcars. A Streetcar Study Committee, chaired by Mayor David J. Cieslewicz was appointed to guide the effort. City staff was tasked with supporting the process, selecting and managing a consulting team. Over an eighteen-month process, the combined efforts of this committee of community leaders, city and local agency staff, and professional consultants produced this report.
2.0 Project Purpose and Study Process

The streetcar project described and studied in this feasibility analysis is a different form of transit than light rail, commuter rail or commuter buses. It is an urban circulator and a pedestrian accelerator, intended to support the many short trips inherent in the “walkable urbanism” of downtowns and existing urban neighborhoods. Further, streetcar transit reinforces the expansion of a truly urban environment through redevelopment.

2.1 The Streetcar Purpose

The typical streetcar trip is not strictly the trip to work - although many of the thousands of new Downtown residents will use it for that purpose. Most of the nine trips per day generated by the typical household are not related to the trip from home to work. These are the trips this urban circulator type of transit is designed to capture. These more typical urban circulation trips include:

♦ Lunch or dinner trips by workers who have commuted downtown by transit or who “park once” and then walk or use the streetcar for other trips;

♦ Downtown workers to go to retail, restaurant, office, and other destinations in the Central Isthmus;

♦ Trips between business locations for mid-day meetings;

♦ Visitors circulating between the hotels and destinations like Monona Terrace Community and Convention Center, State Street, the University and its public venues, the Overture Center and the downtown Farmer’s Market;

♦ Trips to and from major medical facilities located adjacent to downtown, but not at a walkable distance.

2.2 The Study Process

The study’s key tasks and activities included:

♦ Considering the planning context for the study and crafting a Purpose and Function statement as the basis for the analysis;

♦ Soliciting community input to the process throughout, particularly through large public forums, but also at each of the Streetcar Study Committee’s meetings (summaries of the public input received at the large public meetings are provided below as Appendix D);
Identifying and analyzing potential corridors to understand the implications of a streetcar project in each, in light of existing land uses and destinations, development and redevelopment impacts, traffic, utilities, parking and other functional issues;

Subjecting the candidate corridors and alignments to an engineering review, seeking to identify any potential fatal flaws and flagging engineering issues which could have a significant effect on project cost and feasibility;

Reviewing vehicle options and determining the appropriate type of vehicle for use in Madison;

If streetcar service is found to be feasible and desirable, recommending options for a potential Phase I project. That proposed streetcar project will be where a “best first” segment should be built (first segment of what could ultimately be a larger system of streetcar service);

Preparing conceptual costs estimates for each potential Phase I alignment;

Outlining financing options and implementation steps so that a clear path to the future realization of the project is laid out.
3.0 Executive Summary

**Madison is a good fit for streetcars** - This study concludes that streetcar transit, functioning in its now-well-proven role as an urban circulator, would serve Madison very well. Madison’s compact urban form, its citizens’ environmental values, and its concentration of key destinations in the Central Isthmus make it an ideal candidate for such a “pedestrian accelerator.”

Like a number of cities across the country, Madison has recently experienced a wave of higher-density downtown development. This development capitalizes on the livability of the downtown and on national demographic trends – a large “bubble” of Baby Boomers seeking an urban lifestyle and a cohort of young Creative Class professionals who strongly prefer urban life. Without good non-auto circulation, this wave diminishes in most cities once the most proximate close-in sites are developed. Madison has plans, however, to, in effect extrapolate these positive trends by creating an environment for transit- and pedestrian oriented redevelopment in key areas adjacent to and extending out from downtown, such as the East Washington and Park Street corridors. An upcoming redesign of Madison’s zoning code will provide the opportunity to support these general plans in specific standards for development. A streetcar circulator would give Madison the opportunity to accomplish and accelerate these plans for truly sustainable development over a larger area than the half-mile circle that encompasses most walking trips.

**Streetcars would complement the existing bus system and planned regional rail connector** - the existing Madison Metro bus system does an excellent job of connecting a large part of the metropolitan area to the Central Isthmus. The planned Transport 2020 system vision carries this regional connectivity to the next level, especially as it advances a regional east-west commuter rail spine. A high-quality downtown circulator is a compatible complement to the regional line, allowing passengers to complete a trip to a larger area and connecting neighborhoods, like those along the Park Street corridor, to the regional mainline.

**Ridership would start at a respectably strong level** - and would build as redevelopment added population and trips in the area served by the project.
Table 1. Travel Market, Estimated Ridership, and Annual Growth

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Total Travel Market (Daily Person Trips)</th>
<th>Streetcar Ridership (Daily Person Trips)</th>
<th>Annual Growth of Ridership (compared to Base Year 2000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Year 2000</td>
<td>555,900</td>
<td>2,820</td>
<td>-</td>
</tr>
<tr>
<td>Year 2030</td>
<td>575,600</td>
<td>3,380</td>
<td>0.6%/year</td>
</tr>
<tr>
<td>Year 2030 with Additional</td>
<td>614,200</td>
<td>4,430</td>
<td>1.5%/year</td>
</tr>
<tr>
<td>Development</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There are several options for affordable initial phase projects – in considering the feasibility of streetcar transit, a critical question is whether there is an initial phase that is small enough to be affordable, but large enough to reach a good number of key destinations as well as tapping a reasonable portion of redevelopment potential. Three possible initial phases pass this test:

♦ An East Isthmus to UW Campus alignment (shown in gold in the two maps below) that serves much of the existing downtown, accesses the large amount of redevelopment potential in the East Washington Corridor, and connects all this to the University of Wisconsin;

Figure 1. East Isthmus to UW Campus Alignment
A Park Street alignment (shown in purple in the map below) that connects the Madison Metro South Transfer Point and the rest of the Park Street Corridor to the Transport 2020 commuter rail alignment, the University and the State Street/Overture Center area immediately adjacent to Capitol Square; and
♦ A smaller Downtown Loop (shown in blue in Figure 3 below), comprising the central portions of each of the other two alignments and designed as a least-cost initial phase. This option would run from Meriter Hospital on Park Street to Butler Street on the east, easily expanding via whichever extension is first poised for significant redevelopment, and later, to the second one.

Figure 3. Downtown Loop

The $61.2 million cost for this initial Downtown Loop initial phase could be capitalized with a combination of local funding sources.

**Economic impact would be significant** – making the substantial investment in the project worthwhile. A $15 million per track mile investment could yield $25-50 million per track mile in increased property value over the next five years and an additional $100 million per track mile of new investment over the next 20 years.
4.0 Planning Context

Madison’s lively downtown, the dense, diverse Greater Isthmus area, and its established historic neighborhoods are already high-quality urban environments. Providing a streetcar link could enhance these qualities and provide ready access for visitors and citizens of the community. The streetcar could provide a user friendly link to Madison’s primary civic venues and, perhaps more importantly, shape the character of development and support a vibrant urban environment along its corridor and adjacent areas. The streetcar could compliment current regional and local planning initiatives, particularly the City’s Comprehensive Plan, and could serve as both a practical means of transportation for local trips and an amenity that will assist in the retention and attraction of residents, businesses, employees, and visitors.

Recent and ongoing development projects in Central Madison have resulted in new commercial space and thousands of new residential units. This development will increase the need for mobility in an area that is physically constrained by geography and existing neighborhoods/business areas. The University of Wisconsin-Madison continues to grow as do employment centers, such as the upper Park Street corridor (where Meriter and St. Mary’s Hospitals are located), the Mineral Point Road corridor and East Washington Avenue corridor. These trends are expected to continue. Providing access and mobility for downtown/UW employees, new residents and visitors could help sustain local businesses and encourage special events.
The City has other initiatives that are improving the quality of Madison’s streets and public spaces. For example, significant streetscape improvements and revitalization initiatives are currently underway along the State Street, East Washington Avenue, and Park Street corridors. Additionally, the City has identified future needs for parks and open space as well as the pedestrian and bicycle routes that will connect them, and provide accessibility to existing and future transit systems.

Transit projects – and this is especially true of streetcar projects as they have been implemented in recent years in other U.S. cities – are “place-makers” at least as much as they are “people-movers.” That is, they have a powerful effect on the form and intensity of development. So, their grounding, their policy basis, should be in the place-focused planning of city and district-level land use plans. To the extent that these local plans are keyed to state planning goals (and this is the case in Wisconsin), state policy guidance should be part of the planning framework for the project as well.

The planning context for this study includes both the physical reality of the existing built environment, as well as the various plans and policies which have been adopted and now affect the study area.

The area of interest for this study was the Greater Isthmus and its adjacent urban neighborhoods (see Figure 4 below).
4.1 The State Planning Goals

Madison’s Comprehensive Plan was drafted to comply with the 14 statutory state planning goals, the “Local Comprehensive Planning Goals”. These are found in Section 16.965 of the Wisconsin Statutes. Several of these state goals could be directly applicable to the consideration of a potential streetcar project in Madison, especially:

- Promote the redevelopment of lands with existing infrastructure and public services and the maintenance and rehabilitation of existing residential, commercial and industrial structures;
Encourage neighborhood designs that support a range of transportation choices;

Encourage land uses, densities, and regulations that promote efficient development patterns and relatively low municipal, state governmental and utility costs;

Promote the expansion or stabilization of the current economic base and the creation of a range of employment opportunities at the state, regional and local levels;

Provide an integrated, efficient and economical transportation system that affords mobility, convenience and safety and that meets the needs of all citizens, including transit-dependent and disabled citizens.

4.2 Madison Comprehensive Plan Policies

In the Comprehensive Plan itself, a number of themes and policies are oriented in ways that would support the implementation of streetcar service in Madison. These are best summarized in the plan’s Key Recommendations. Virtually every one of these policy statements has some relevance to, and support for, the concept of a streetcar project in Madison.

- Balance redevelopment and infill development with the preservation of the unique character of Madison’s existing neighborhoods, focusing on such issues as requiring that the size and scale of new development enhances and is compatible with the established and planned neighborhood character and density;

- Create neighborhoods that include compact, mixed-use development patterns; high quality architecture and urban design features; protection of significant natural areas and features and provision of high-quality recreational facilities; a highly-interconnected pattern of pedestrian and bicycle-oriented streets; and provision of mass transit service;

- Develop affordable housing and other support facilities and programs necessary to ensure that Madison remains a place of opportunity for individuals and families with a variety of income and personal resources;

- Develop Madison as a community where housing, employment, transportation, recreation, and entertainment are accessible to persons with disabilities;

- Maintain and enhance Downtown Madison as the predominant community and regional center for government, employment, health care, educational, cultural, entertainment activities, and as a vibrant urban residential community characterized by diverse and engaging neighborhoods;

- Preserve and enhance Madison’s unique beauty and character by implementing architectural, urban design and natural resource policies that will promote and
protect a sustainable, high-quality built environment and preserve the area’s important natural resources and open spaces;

♦ Develop and maintain a coordinated and balanced transportation system that provides accessible, multi-modal travel opportunities, including automobile, public transit, pedestrian and bicycle choices within the community, and convenient highway, rail, and air linkages to the region and beyond;

♦ Create new mixed, transit-oriented developments, and encourage appropriately-scaled mixed-use redevelopment and infill development, at strategic locations within the City identified in the Comprehensive Plan as one means of creating a more complete and engaging urban environment and reducing the reliance on automobile transportation;

♦ Maintain and strengthen a healthy regional economy that builds upon the Madison area’s high quality of life, highly-skilled work force, world class educational facilities and established enterprises in key employment sectors, including government, health care services, technology-based businesses, and research and development;

♦ Generally, create a development pattern and service infrastructure that supports and encourages energy-efficient lifestyles and promotes long-term conservation of natural resources and the health of our environment. Encourage sustainable development by promoting urban infill and redevelopment, and high-performance green building;

♦ Help Madison residents live fulfilling lives by providing access to high quality housing and employment, a healthy natural environment, nutritious food, and clean air and water.
5.0 Supporting Conditions

The following information is a description of the study area’s existing conditions, including land use, demographics, physical barriers and features, and transportation facilities and services. These conditions support the Purpose and Function Statement which follows as noted in each case.

5.1 Land Use

Existing land use in Madison is characterized by a compact dense core area in the Central Isthmus, including major activity centers, such as the State Capitol and associated office buildings, the Monona Terrace Community and Convention Center, State Street, the Overture Arts Center, and the University of Wisconsin campus, as well as local business districts, historic neighborhoods, and corridors of activity such as Park Street, University Avenue, and Washington Avenue. An existing land use map is included as Figure 5. Proposed Future Land Use, as described in the Comprehensive Plan, is included as Figure 6. Current population and development densities, planned land use, and neighborhood and developer readiness for transit-oriented development make Madison a favorable environment for high-quality, high-capacity transit service.
Figure 5. Existing Land Use

Figure 6. Generalized Future Land Use
5.2 University of Wisconsin

The University of Wisconsin (UW) is located northwest of downtown Madison and includes a planning area of approximately 933 acres (see Figure 7 below). Fall 2004 student enrollment was about 41,000. UW also employs over 16,000 people. Unlike many other universities of its size, UW remains one contiguous campus, rather than spawning satellite campuses (like Michigan or Minnesota, for example).

The UW has an 80,000 person football stadium (Camp Randall) and a 17,500 person basketball and hockey arena (Kohl Center), both on campus. The UW is also home to the State’s premier research and treatment hospital (UW Hospitals).

Growth and change on the UW Campus has been guided by the Campus Master Plan, most recently updated in 2005. The UW is undergoing a remarkable period of building and intensification, which includes the conversion of many surface parking lots. The UW is committed to maintaining the existing number of parking spaces while increasing the building space.

*University of Wisconsin and Meriter Hospital Buildings along Park Street*

This concentration of students, faculty, staff and visitors, on a single campus immediately adjacent to the downtown core, provides a major impetus to a potential transit circulator like the streetcar concept considered in this study.
Source: UW Campus master Plan, 2005.

Figure 7. University of Wisconsin Campus Master Plan
5.3 Historic Neighborhoods

Madison contains a number of historic neighborhoods, with a concentration in the Central Isthmus that includes the neighborhoods of Mansion Hill, First Settlement, Third Lake Ridge, University Heights and Marquette. These areas (illustrated in Figure 8) represent the vitality and continued strength of central city neighborhoods.

Providing enhanced transit service to historic neighborhoods, districts and buildings, at an appropriate scale, can improve their long-term viability by restoring the rail-based transit connection that shaped them in the first place. These areas are what we now describe as “transit-oriented development;” growing along streetcar lines, they were designed with most access being by foot and streetcar and with little area given over to parking. Today’s typical level of transit service is paltry compared to what they were, in effect, designed for. “Underparked” older buildings along rail transit lines in other cities have enjoyed a new vitality, and similar results can be anticipated here.

Source: City of Madison, 2006.

Figure 8. Historic Districts
5.4 Opportunity Areas

Beyond the areas of historic character, various city, neighborhood, and privately sponsored planning efforts have set the framework for transit-oriented development, neighborhood revitalization, and enhancements to transit service. These include unique but interrelated efforts for the downtown and Capitol Neighborhoods, the East Isthmus, the Park Street corridor, and west side neighborhoods and activity centers. This study will weave together the opportunities identified through these efforts—and explore new opportunities—to uncover the best potential routes and phasing for streetcar service. Streetcars may, in turn, help lift these areas and corridors by catalyzing and focusing new development and community-supporting reinvestment.

5.5 Transit-Dependent Populations

Madison is noted for its high levels of transit use. Students, the elderly, and lower income populations are concentrated within the areas of primary analysis for this streetcar project. Streetcar transit, as an addition to and enhancement of the existing Madison metro bus network, can improve transit options for transit-dependent populations.

5.6 Physical Barriers and Features

The natural and built environment in the central core includes a number of physical barriers and features, as seen in Figure 9 below. Foremost among these are Lakes Monona and Mendota, which have shaped and focused development in the Central Isthmus into a compact and interesting urban environment. These same factors severely limit expansions to roadways in this area, creating the need for other transportation solutions to maintain the viability of central Madison. Providing high quality transit service in the concentrated areas of the Central Isthmus could help utilize the “barrier” or “constraint” of limited transportation access as an asset for the livability of this area by allowing access and circulation by means other than cars.
5.7 Transportation Facilities and Services

The following sections describe existing transportation facilities and services in the central core, including roadways, transit, and parking.

5.7.1 Roadway Facilities

The roadway facilities in study area range from local streets to major arterials (see Figure 10 below). Several key roadways—from both a transportation movement and symbolic standpoint—are undergoing enhancements. These include complete reconstructions of State Street and East Washington Avenue. Major streetscape enhancements along Park Street are also underway. However, particularly in the Greater Isthmus area, the era of capacity expansions for more automobile traffic are essentially over. This limitation is due to geographic, development, and neighborhood preservation constraints. Analysis conducted in this study has concluded that
sufficient roadway capacity exists to allow the consideration of a number of possible corridors for streetcar service.

Figure 10. Street Classification Map

5.7.2 Bike and Pedestrian Facilities

Madison is frequently named among the most bicycle and pedestrian friendly cities in the country. It features an impressive grid of sidewalks and generous on- and off-street bicycling facilities. These are important features in enhancing the potential service areas for streetcars. All transit trips begin and end as pedestrian trips, so a public realm (streets and public spaces) designed to favor the pedestrian and the bicycle instead of displacing these modes in favor of automobile capacity creates an environment conducive to transit.
5.8 Transit

Existing transit service is provided by Madison Metro (see Figure 11 below). Madison Metro is both the city and the regional transit provider and offers a variety of services ranging from fixed local and express bus service to paratransit. Madison Metro’s service is characterized by local bus service operating on the arterial street network and express bus service operating to and from downtown. Metro also operates from a set of four satellite transfer stations on the north, south, east and west sides of the City. *A streetcar line or system could provide a higher-capacity system integrating function in the overall Madison Metro network.*

*Source: Madison Metro, 2005.*

*Figure 11. Madison Metro Route Map*
That network is envisioned to be enhanced over time by a regional system of rail corridors, express bus lines and in-street streetcar service. Dane County, the City of Madison and the Madison Area Metropolitan Planning Organization cooperated in crafting this “Transport 2020” vision and have adopted it to guide the development of a high-capacity transit system for the larger urban and suburban areas of greater Madison. *The key function in this vision of an “urban circulator” in the Central Isthmus is, as shown in Figure 12, planned to be provided through a streetcar line or system.*

![Figure 12. Transport 2020 Full System Vision](image-url)
5.9 Parking

Parking restrictions can be found throughout the central core, with most restrictions centered on downtown and the UW. Daily and monthly parking is very expensive in Downtown Madison relative to other cities of its size. A system of city-owned parking ramps has been developed in the downtown core, mainly to serve daytime office uses (see Figure 13 below). On-street parking that is metered or subject to time limits is available throughout the downtown area. The UW, through its Campus Master Plan, has a policy of not increasing parking spaces beyond current levels, even with additional building projects. Parking within central Madison neighborhoods is also limited. Further from the center of Madison, parking becomes more plentiful and fees for parking are rare.

Providing better access and circulation to these parking-constrained areas would have positive effects, including providing a lower-cost alternative to driving to paid parking, more efficient utilization of the existing parking inventory, and avoiding the need for some additional parking spaces as further redevelopment occurs.

Source: City of Madison

Figure 13. Downtown Parking Ramps Map
6.0 Statement of Project Purpose and Function

The purpose of a Madison Streetcar project is to implement the goals of the City’s Comprehensive Plan through the use of a transit investment. Its function would be to:

- Provide non-automobile circulation in an era of increasing traffic congestion, enhancing workforce mobility and connecting people with key destinations;
- Support Madison’s business environment, downtown and neighborhood business districts, and economic and tourism development;
- Support energy-efficient, transit-oriented development patterns and projects, including urban redevelopment and reinvestment in key corridors, districts, and neighborhoods;
- Focus population and employment growth in sustainable areas and forms;
- Improve transit service and attractiveness to “choice” riders (riders who have ready access to automobiles and are not transit-dependent);
- Address parking constraints, particularly as they may otherwise inhibit reinvestment or, if addressed through more parking, use up valuable real estate;
- Contribute to an economy focused on attracting and retaining creative people;
- Preserve and enhance Madison’s extraordinary quality of life and comfort.

Achieving the Planning Goals and the project’s Purpose can be further detailed in specific Functional Goals and Objectives:

6.1 Project Goals and Objectives

**Goal 1: Improve mobility and connectivity.**

**Objectives:**

- Provide convenient access and circulation for major employment, commercial, recreational, and cultural activity centers;
- Provide better connectivity between the University of Wisconsin (and key destinations within the campus) and other areas in the Central Isthmus;
- Provide better connectivity between neighborhoods and activity centers;
- Provide an attractive means of transportation for visitors and convention attendees; and
- Improve access and opportunities for students and transit-dependent populations.
Goal 2: Maximize the efficiency and effectiveness of the transit investment.

Objectives:

♦ Attract new riders to the transit system;
♦ Ensure compatibility with the functional and design characteristics of streets;
♦ Ensure compatibility with existing and other future transit services, including Madison Metro bus routes;
♦ Integrate the planned streetcar line or lines with the overall transportation system, both existing and planned;
♦ Provide multi-modal (pedestrian, bicycle, bus, and automobile) access to the system; and
♦ Develop safe, comfortable, and convenient transit facilities, such as stations and stops.

Goal 3: Provide a sustainable transit investment that is compatible with the built environment.

Objectives:

♦ Implement a project that supports the existing and planned built environment and which minimizes adverse impacts;
♦ Utilize transit to help shape urban form through reinvestment along selected corridors and neighborhoods;
♦ Maximize energy efficiency and minimize fossil-fuel dependence in project operation; and
♦ Minimize negative impacts on historic, archaeological, traditional cultural places, parklands, and other public recreation areas.

Goal 4: Provide a transit investment that is affordable, in terms of both capital and operating expenses.

Objectives:

♦ Minimize capital costs in a manner consistent with providing service to areas that will generate ridership and redevelopment opportunities;
♦ Minimize net operating and maintenance costs;
♦ Leverage other public and private funding; and
♦ Maximize public-private partnership opportunities.
7.0 Redevelopment Analysis

The City of Madison, its neighborhoods, the University, and other stakeholders support the revitalization and redevelopment of numerous corridors, districts, and sites within the Greater Isthmus. This policy objective has been articulated through several adopted plans, both the general ones reviewed in the previous section of this report, as well as more neighborhood-specific strategies for focused redevelopment. These redevelopment areas largely coincide with the streetcar study area. In fact, the proposed alignments for streetcar routes were selected, in part, to serve planned redevelopment areas and stimulate reinvestment in those areas.

While reinvestment in the downtown, UW campus area, and a few corridors (e.g., Williamson Street, University Avenue) has been strong, redevelopment of other key corridors, such as the Park Street corridor and most of the Central East Isthmus (including the East Washington corridor) has been slower. Several other communities that have introduced modern streetcar systems in recent years have observed the “streetcar effect” sparking redevelopment in similar areas. This “streetcar effect” may be the combined result of several factors, including developer confidence following such a public investment, reduced parking demand associated with streetcar access, and increased attractiveness of areas served by streetcars for living, shopping, and working.

The land use goals of this study—and those of the possible introduction of streetcars to Madison—are to spur and increase reinvestment, economic growth, and neighborhood vitality in Greater Isthmus neighborhoods and corridors—particularly in those areas where such investment has been slower than hoped. Per adopted local plans, this new development should be transit-oriented and human-scale, with streetcar service contributing to this character and helping build great places. In fact, adopted City plans encourage the introduction of higher capacity transit service to achieve the desired character of development in key areas such as the Central East Isthmus.

This land use analysis projects the development impact associated with the introduction of streetcars to Madison. Specifically, within the streetcar study area, redevelopment/infill opportunity areas have been identified; the planned or ideal character, mix, and density of future redevelopment within these areas has been analyzed; and the value and timing of redevelopment has been projected assuming the introduction of streetcar service along a preferred route(s). These development value projections were important to describe, in financial terms, the benefits that might accrue from streetcars.

In addition to revitalizing central city areas and contributing to the tax base, the value created from new development in the study area may help pay for the construction of the streetcar system, through allocation of some of the additional property taxes generated. The land use analysis provides general projections of how much of this “tax increment” would be available within the study area over the next twenty years. A portion of this increment can be directed to help fund the system. Therefore, the results of the land use analysis are combined with other financing options later in this report.
7.1 Preliminary Redevelopment/Infill Opportunity Analysis

The consultant team identified conceptual redevelopment/infill opportunity areas within the streetcar study area. These opportunity areas were identified based on several factors:

- Inclusion in adopted or pending city, corridor, district, campus, or neighborhood plans;
- Locations of existing tax increment financing and redevelopment districts;
- Pending development projects in various stages of discussion and review;
- Analysis of underutilized parcels in areas that enjoy superior locational attributes, such as a location along a major road or proximity to the downtown.

The following Conceptual Development Opportunity Area maps depict redevelopment/infill opportunity areas within the east, west, south and central corridors of the streetcar study area. Also depicted on the maps are areas of existing transit oriented development patterns and populations—in other words, locations of higher-density and urban mixed use development and high populations of residents currently using transit. Major current activity centers—primarily destinations—are also presented on the maps.
Figure 15. Redevelopment Map, East
Figure 16. Redevelopment Map, South
Finally, within each of the corridors, sub-areas of relatively homogenous characteristics were identified for further preliminary analysis:

- Central East Isthmus, extending east to Schenk’s Corners & Union Corners (in East Corridor);
• Hill Farms/Hilldale Area, West Campus Area (in West Corridor):

• Meriter/St. Mary’s Area, Villager/Wingra Creek Area (in South Corridor);
Each of these sub-areas was rated on five factors:

- Its current destination value;
- The current orientation of its development and population to transit;
- Its current and future development market potential;
- Its potential for that development to have a transit-oriented form; and
- The predicted ability of streetcar service to positively influence development opportunities.

This preliminary analysis of conceptual development opportunities suggests that the greatest opportunities for redevelopment and infill are within the Central East Isthmus and Villager/Wingra Creek sub-areas. The introduction streetcar service has significant potential to influence the pace, intensity, form of development in those sub-areas.

Within other parts of the streetcar study area, redevelopment opportunities are not quite as widespread, or urban redevelopment has become fairly prevalent without rail transit service. However, because of their past and present development activity, in many cases these other parts of the study area already have a high transit-orientation and destination value. The Central Business District, UW Campus area, and hospitals are key examples of this type of area. Serving these types of areas is also important for a successful streetcar system.

The Conceptual Development Opportunity Area maps and analysis provided an important foundation for the selection of the preliminary Streetcar Route Options, presented elsewhere in this report. The criteria for locating and rating different route options included factors such as
how well the route serves planned urban, higher-density, mixed-use redevelopment/infill opportunity sites, and whether the route had the potential to spark or accelerate redevelopment of those sites. Next, both the Conceptual Development Opportunity Area and Streetcar Route Options maps and analysis were subject to Streetcar Study Committee, City staff, and public review and revisions during the latter half of 2006.
8.0 Detailed Redevelopment Analysis

A more detailed analysis of redevelopment and infill development opportunities within the streetcar study area was conducted in order to understand the likely intensity, form, mix, type, timing, and value of future development in identified opportunity areas.

8.1 Overview

With the identification of a preferred streetcar route, the “streetcar effect” – the demonstrated propensity of streetcar projects to increase the intensity and pace of development in the area within walking distance of the line - can then be incorporated in projections of future development. Based on past experience in other communities that have introduced newer streetcar systems, the “streetcar effect” equates to increased development density and faster redevelopment rates close to the streetcar routes. For example, a 2005 study of the Portland Streetcar system indicated that:

♦ Sites within one block of that City’s streetcar route achieved a considerably higher percentage of their maximum permitted development density than that pattern of development that existed in the same area before the streetcar was approved;

♦ Sites within one block of the streetcar route captured 55% of the district’s total development after the streetcar was approved for that route, compared to 19% before; and

♦ The “streetcar effect” on new development largely dissipated three or more blocks away from the streetcar route.

Some of the additional property value (or more specifically, “tax increment”) realized from the projected additional new development close to the selected streetcar routes may help fund construction of the streetcar system. This can make the streetcar system more fiscally viable, in addition to helping spark, accelerate, and/or increase the density of development along the corridor. This will help fulfill the ultimate goal of creating more livable, attractive, and viable central city neighborhoods and districts.

8.2 Methodology

The consultant team used the following approach to complete the detailed redevelopment analysis within the streetcar study area.

8.2.1 Identification of Current Development Character and Values

The team first worked to understand the current mix, age, form, quality, and value of development within each of the redevelopment/infill opportunity areas identified in the Preliminary Redevelopment/Infill Opportunity Analysis stage. Several of the larger Redevelopment Opportunity Areas were divided into sub-areas where their current and/or projected future development character, type, or density differed from surrounding lands.
8.2.2 Identification of Projection Year

The future development projections were made with a target year of 2030. This represents a 20+ year time horizon, and equates to the projection/planning periods for both the Madison Area MPO’s traffic modeling and the City of Madison’s Comprehensive Plan.

8.2.3 Review of Recent and Projected Development Trends

Before projecting how much development to expect within each Redevelopment Opportunity area, the consultant team explored demographic and development trends and expectations in the Greater Isthmus Area, Madison as a whole, and the region. This is important to assure that the redevelopment projections were grounded in market reality and reasonable expectations for absorption. The consultant team did not, however, complete an independent market analysis for future development in the streetcar study area.

Particularly relevant background trends and projections are as follows:

♦ In 2005, the citywide total residential property tax base was $13.7 billion dollars. The citywide commercial tax base (not including manufacturing) was $6.1 billion. Real estate values citywide have been increasing between five and 15 percent annually for the past several years.

♦ Between 1990 and 2000, employment in the City of Madison grew by 20,200 jobs—a 12 percent increase over that period. Through its Comprehensive Plan, the City of Madison projects the number of jobs to increase by another 59,500 between 2000 and 2030—a 32 percent increase. Other recent forecasts prepared as part of the Transport 2020 Environmental Impact Statement/New Starts process have suggested that this City-wide increase may be closer to 90,000 jobs.

♦ Between 1990 and 2000, the number of housing units in the City of Madison grew by 12,300—a 15 percent increase over that period. Through its Comprehensive Plan, the City projects the number of housing units to increase by another 29,900 between 2000 and 2030—a 32 percent increase.

♦ For the area bounded by Blount Street and Mills Street (north of Regent Street), the City between 2001 and 2005 issued building permits for 1,069 housing units in 5 years (about 200 units per year) and 575,000 square feet of office space (about 115,000 square feet per year). This covers the downtown and east campus areas, where most of the better redevelopment sites have already been redeveloped. Activity in the east and south corridor areas was much less, but future redevelopment opportunity areas there are far more available.

♦ Grubb & Ellis/Oakbrook Corporation confirms that, in 2005, office absorption in the downtown area of Madison was 115,000 square feet of the total 329,000 square feet of office space in the Madison area absorbed that year.

♦ Between 2000 and 2030, the Madison Area Metropolitan Planning Organization (MPO) has projected an increase of 4,051 housing units (to 25,021 total units) and 2,490 jobs (to 61,309 total jobs) within roughly one-quarter mile of the two
Phase 1 streetcar construction options. The MPO’s projections appear to be based on continuation of past development trends, but do also reflect the direction and tenor of adopted City plans.

- Between 2005 and 2020, as part of the Transport 2020 study, Valarie S. Kretchmer Associates, Inc. projected construction of an additional 500,000 square feet of non-residential building space within that study’s “East Isthmus” opportunity area and an additional 525,000 square feet of non-residential space with the “Capitol” opportunity area. These areas generally coincide with the East and Central corridor study areas of the Streetcar Feasibility Study.

### 8.2.4 Preparation of Six Different Redevelopment Templates

In order to project redevelopment potential for each Redevelopment Opportunity Area in an efficient yet careful manner, the consultant team then identified and characterized six different redevelopment templates. These templates were based on actual projects built or conceived within central Madison over the past ten years. These templates (or models) represent different types and densities of development projects typifying a wide range of urban residential-focused and urban employment-focused projects. Nearly all of the six templates have at least some mixture of residential and employment components within them.

The approach was that one of these six templates could be scaled based on parcel size differences and applied to each of over 90 individual redevelopment sites ultimately parceled from the general Redevelopment Opportunity Areas identified in the previous stage of analysis. The following table describes the six different templates, the development projects upon which each template was based, and key characteristics of each template.

<table>
<thead>
<tr>
<th>Template/Model Name</th>
<th>Project Examples Used to Form Template</th>
<th>Housing Units Per Acre</th>
<th>Non-residential Building Square Feet Per Acre</th>
<th>Jobs Per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Residential Focus—High Urban Density</td>
<td>Metropolitan Place, Stonehouse (King Street)</td>
<td>173</td>
<td>16,500</td>
<td>20</td>
</tr>
<tr>
<td>2. Residential Focus—Medium Urban Density</td>
<td>Capitol West, Nolen Shore</td>
<td>60</td>
<td>11,200</td>
<td>13</td>
</tr>
<tr>
<td>3. Residential Focus—Low Urban Density</td>
<td>Union Corners, Monroe Commons</td>
<td>25</td>
<td>6,100</td>
<td>7</td>
</tr>
<tr>
<td>4. Employment Focus—High Urban Density</td>
<td>Block 89, University Square</td>
<td>83</td>
<td>204,100</td>
<td>449</td>
</tr>
<tr>
<td>5. Employment Focus—Medium Urban Density</td>
<td>Brayton Lot Concept, Network 222</td>
<td>28</td>
<td>101,100</td>
<td>222</td>
</tr>
<tr>
<td>6. Employment Focus—Low Urban Density</td>
<td>Regent Street (Alexander), 660 John Nolen</td>
<td>0</td>
<td>59,300</td>
<td>46</td>
</tr>
</tbody>
</table>
8.2.5 Projection of “Maximum Development Potential” of Each Redevelopment/Infill Opportunity Area

Next, the consultant team projected the likely type and mix of new development, density (measured in square footage), and future property value (based on average construction costs per square foot) within each of 90+ separate development/infill opportunity area. This was completed by applying and scaling one of the six project templates to each of the redevelopment sites. Deciding which template to apply to which site was achieved by an analysis based on a variety of factors, including:

- Adopted neighborhood and city plans,
- Pending public plans and an assessment of their likelihood of adoption,
- Known developer plans,
- Zoning regulations,
- Capitol and airport height rules, and
- Understanding of market trends, conditions, and tendencies.

The projections that resulted from this tended to be “highest and best use” or “ideal buildout” assessments of development potential, without full consideration of site limitations, related limitations for on-site parking, utility or access constraints, possible neighborhood opposition. These projections were then be modified later in the analysis to reflect these factors.

8.2.6 Projection of Expected Phasing of Development

Once the maximum development potential for each redevelopment/infill opportunity area was identified, the team considered the likely timing for achieving that development. The projections were based on:

- Future development projections for the Greater Isthmus area, such as those prepared as part of the Isthmus 2020 study and City of Madison Comprehensive Plan.
- Whether financial or other incentives for redevelopment—such as tax increment financing—were currently available or soon expected.
- Rates of recent development activity.
- The consultant team’s understanding of future market conditions and opportunities.

Based on this review, projected absorption rates within redevelopment areas that are envisioned for residential-focused projects are expected to exceed absorption of redevelopment areas envisioned for employment-focused projects. The consultant team assumed, with the introduction of streetcar service early in the projection period, all of the projected residential
development and two-thirds of the projected non-residential development would occur by 2030. Full absorption of projected non-residential development in the identified redevelopment areas is not expected until the year 2040. This is generally reflective of current and expected near-future market conditions for new employment-focused uses in the study area.

The team did not assume that the pace of development within the study area would differ if streetcar service is not introduced. This likely results in a slight underestimate of the “streetcar effect” presented later in this section. This is because experiences in other communities suggest that the pace of development, in fact, may quicken with the introduction of streetcar service.

### 8.2.7 Identification of Streetcar Route Placement Relative to Each Redevelopment/Infill Opportunity Area

Once maximum development potential and development phasing were projected without an assumption of streetcar service, the consultant team moved towards projecting the “streetcar effect” on future development. The Phase 1 streetcar route options were laid over a map depicting the 90+ redevelopment sites. Then, each site was classified as being within one block, between one and three blocks, or between three and four blocks from the streetcar route.

### 8.2.8 Estimation of Development Density Changes Associated with Distance from Streetcar Route

For the next step in analyzing the “streetcar effect” on the intensity and rate of redevelopment, the consultant team quantified assumptions that the closer a redevelopment area is to a streetcar line, the denser the development will be. The team reviewed comparable studies and actual experiences in other communities, along with the Federal Transit Administration Guidance Update for Section 5309 New Starts Land Use Assessments. For example, a 2005 study completed by E.D. Hovee & Company for Portland Streetcar Inc. suggested that, within one block of the streetcar line, sites developed to 90% of their maximum build-out potential after the final construction of the line was authorized, with the percentage steadily dropping to 43% at three or more blocks from the alignment.

The following table includes assumptions on development density and rate changes that are projected to be associated with the introduction of streetcar service to Madison.

<table>
<thead>
<tr>
<th>Distance of Redevelopment/Infill Opportunity Area From Streetcar Route</th>
<th>Percent of “Maximum Development Density” within Opportunity Area Projected to be Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within One Block</td>
<td>80% of maximum</td>
</tr>
<tr>
<td>One to Three Blocks</td>
<td>65% of maximum</td>
</tr>
<tr>
<td>Three to Four Blocks</td>
<td>50% of maximum</td>
</tr>
<tr>
<td>Four or More Blocks</td>
<td>40% of maximum</td>
</tr>
</tbody>
</table>

Based on the “four or more block” experience from other communities, the consultant team also assumed that 40% of the 2030 maximum development density for every site would be achievable if streetcar service is not introduced in the study area.
8.2.9 Projections of 2030 Development Based on Distance from Streetcar Route

The percentages presented in the Table 3 were then applied to the “maximum development density” and development phasing results for each redevelopment site, as identified under Tables 4 and 5. The results were projections of housing units, jobs, non-residential building square footage, and property improvement values (in 2007 dollars) in the year 2030. Each of these figures was computed under one assumption that streetcar service was introduced early in the 2007-2030 projection period and a second assumption that streetcar service was not introduced in the projection period. The results of this final step of analysis are presented in section that follows.

Table 4. Project Development within Phase 1 Option Redevelopment Sites, with and without Streetcar Service

<table>
<thead>
<tr>
<th>2007-2030 Projections</th>
<th>Housing Units</th>
<th>Jobs</th>
<th>Non-residential Building Square Footage</th>
<th>Property Improvement Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WITH Streetcar Service*</td>
<td>5,800 to 6,400</td>
<td>10,000 to 11,100</td>
<td>4.8 million to 5.3 million</td>
<td>$2.12 billion to $2.35 billion</td>
</tr>
<tr>
<td>WITHOUT Streetcar Service</td>
<td>3,200 to 3,600</td>
<td>5,400 to 6,000</td>
<td>2.6 million to 2.9 million</td>
<td>$1.17 billion to $1.30 billion</td>
</tr>
<tr>
<td>Increase Associated with Streetcar Service*</td>
<td>+2,600 to +2,800</td>
<td>+4,600 to +5,100</td>
<td>+2.2 million to +2.4 million</td>
<td>+0.95 billion to +1.05 billion</td>
</tr>
</tbody>
</table>

Note: * Except for housing units, projections “with streetcar service” are also based on assumptions related to economic and transit policy that are described further in this report section.

Table 5. Projected Development within Phase 1 Option Redevelopment Sites by Corridor Study Area and with Streetcar Service Assumption

<table>
<thead>
<tr>
<th>2007-2030 Projections WITH Streetcar Service</th>
<th>Housing Units</th>
<th>Jobs</th>
<th>Non-residential Building Square Footage</th>
<th>Property Improvement Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Corridor Area²</td>
<td>2,400 to 2,600</td>
<td>3,600 to 4,000</td>
<td>1.8 million to 1.9 million</td>
<td>$0.89 billion to $0.99 billion</td>
</tr>
<tr>
<td>Central Corridor Area²</td>
<td>1,900 to 2,100</td>
<td>3,300 to 3,700</td>
<td>1.6 million to 1.7 million</td>
<td>$0.65 billion to $0.73 billion</td>
</tr>
<tr>
<td>South Corridor Area²</td>
<td>1,500 to 1,600</td>
<td>3,100 to 3,400</td>
<td>1.5 million to 1.6 million</td>
<td>$0.57 billion to $0.63 billion</td>
</tr>
</tbody>
</table>

Notes:

¹ Except for housing units, projections “with streetcar service” are also based on assumptions related to economic and transit policy that are described further in this report section.

² East Corridor Area bounded by Blair Street and Yahara River. Central Corridor Area bounded by Blair Street and Regent/Proudfit Streets (not including properties abutting Regent Street). South Corridor Area bounded by Regent/Proudfit Streets and the South Beltline Highway.

Key assumptions for jobs and non-residential projections:

♦ Central Madison Economic Emphasis: The community will need to make a concerted effort to focus economic development activities within the Greater Isthmus Area. These include continued redevelopment incentives within the streetcar study area, such as through tax incremental financing (TIF). This is
critical to “level the playing field” with greenfield sites near the metropolitan area’s edges, where issues such as building demolition, site contamination, and neighborhood resistance are rarely encountered. With the current exception of the South Park Street area (south of St. Mary’s), the majority of the Phase 1 study area is within one of eight different TIF districts. This is a step in the right direction, but clearly a concerted strategy emphasizing economic development in central Madison will be required to fully achieve the economic projections outlaid above.

♦ **Linking New Jobs to Housing in Streetcar Study Area**: To achieve full employment growth projections, the early phase streetcar lines will need to link where people live (and new places where more people will live) to the places where they may work. Employment projections (and non-residential square footage projections) will likely not be realized unless substantial additional workforce housing matching the needs of employers are also developed near the streetcar line. Likely employers will require ready access to an office-based, medical, service, and technology-based workforce to thrive. Opportunity areas for additional workforce housing are particularly promising in the Wingra Creek area near Park Street, the Bassett Neighborhood, and the East Mifflin-East Washington Avenue and East Wilson-Williamson Street corridors.

♦ **Linking New Jobs to Regional Housing Stock**: The introduction of a streetcar circulator will be a central contributor to achieving projected development in the Streetcar Study Area. However, the consultant team believes that the employment and non-residential space projections presented in this section can only be fully achieved if the region also invests in enhanced transit options to bring people from the edges of the metropolitan area into the streetcar study area. Despite the recent housing development in the Greater Isthmus Area, the vast majority of new housing is still occurring at and beyond the City’s edges. Most employers not already in the Streetcar Study Area will want to be assured of this regional mobility before making major investments within that area. This regional transit service will need to be a clean, frequent, reliable, and competitive alternative to the motor vehicle.

Other caveats and assumptions that need to be explained:

♦ For projects involving University of Wisconsin buildings, future housing and employment projections were calculated. However, some of this housing and jobs will simply be shifts from other buildings or parts of campus—in general, the University does not project significant increases in either students or employees. Additionally, the consultant team carefully analyzed and considered which projects would be taxable and which would not (and in some cases, what percentages of mixed-use projects would be taxable).

♦ The housing unit, job, non-residential, and property value projections yielded from the redevelopment analysis were total future figures, not incremental numbers. Many sites identified for redevelopment presently have development
on them—albeit at much lower densities than that anticipated with future redevelopment.

♦ The redevelopment analysis did not consider added values that will no doubt be realized in areas not envisioned for redevelopment (i.e., not proposed to be demolished or structurally altered and converted). There will no doubt be rehabilitations, renovations, and revaluations of properties beyond the Redevelopment Opportunity Areas. Further, by the year 2030, there will likely be redevelopment projects in areas that cannot be envisioned today. These, too, were not factored into the analysis.
9.0 Corridor Analysis and Alignment Options

9.1 Initial Scan and Assessment

In the study’s stages, a large number of streets in the study area were examined as potentially serving to carry part of the route.

![Central Route Options](image)

Figure 18. Central Route Options
Figure 19. East Route Options
Figure 20 South Route Options
9.2 Applying the Screening Criteria and devising Provisional Alignments

From this large field of potential streetcar streets, some provisional routes were devised and subjected to a series of criteria based on the project’s intended Purpose and Function and on pragmatic concerns about traffic, utilities, grades, and conflicts with freight rail operations. These criteria included:

♦ **Current Ridership Potential** - How well does route serve existing neighborhoods and key activity centers (i.e., community services, employment, retail, entertainment, special events)?

♦ **Future Ridership Potential** - How well does route serve planned urban, higher-density, mixed-use development areas?

♦ **Pedestrian Accelerator** - How well does route serve areas of high pedestrian traffic?

♦ **Economic Development** - How well does route serve redevelopment opportunity sites? Does route have potential to spark redevelopment?
◆ **Relationship to Commuter Rail** - Does route complement or duplicate commuter rail service?

◆ **Relationship to Bus Service** - Does route complement or duplicate bus service?

◆ **Compatibility with Other Traffic/Activities within the Same Right-of-Way**
  - Automobile traffic/on-street parking
  - Bicycle traffic
  - Pedestrian movement
  - Special events (State Street, Capitol Square, Regent Street/UW Campus)

◆ **Directness of Route**
  - Does route provide efficient connections between key origins and destinations?
  - Does route facilitate a viable start-up or “Phase 1” project?

◆ **Maintenance Facility Access**
  - Does route include a viable maintenance facility site?

◆ **Special Engineering Issues**
  - Bridges
  - Grades
  - Cross-slopes
  - Freight rail crossings
  - Utilities within the right-of-way (e.g., sewer, water, MGE, telecommunications)

### 9.3 Selecting the Preferred Initial Alignments

Three possible initial phases emerged from the screening and review process:

#### 9.3.1 East Isthmus to University

An East Isthmus to Campus alignment (Figure 22 below) could serve much of the existing downtown, accessing the large amount of redevelopment potential in the East Washington Corridor, and connecting all this to the University of Wisconsin;
9.3.2 Park Street - A Park Street alignment

A Park Street alignment (figure 23) that connects the South Transfer Point and the rest of the Park Street Corridor to the Transport 2020 commuter rail alignment, the University and the State Street/Overture Center area immediately adjacent to Capitol Square.
Figure 23. Park Street Alignment
Downtown Loop - A smaller Downtown Loop (Figure 24) could be configured comprising the central portions of each of the other two alignments and designed as a least-cost initial phase. This option would run from Meriter Hospital on Park Street to Butler Street on the east, easily expanding via whichever extension is first poised for significant redevelopment, and later, to the second one.

Figure 24. Downtown Loop
10.0 Engineering Issues

10.1 Methodology

After the provisional routes were devised, some key engineering issues were analyzed which included: acceptable street profile grades and cross-slopes, impacts to traffic, bicycles, pedestrians, parking, and utilities; interactions with freight rail operations. If one of these routes had an engineering issue that could not be resolved - a fatal flaw - then that route was eliminated. The engineering impacts were also taken into consideration when the routes were further refined.

Existing street profile grades and cross-slopes were visually inspected. Several potential segments were eliminated from consideration due to exceedingly steep grades and/or cross-slopes.

An inventory of existing intersection types (signalized vs. non-signalized), motor vehicle/bicycle lanes and parking facilities along the routes was completed. Based on the scope of the project, impacts were identified based on engineering judgment and input from City Engineering, not on traffic modeling scenarios.

Contact with local utilities was initiated to obtain mapping or descriptions of existing facilities within the study area. There may be other utility owners within the routes that were not identified in this initial screening. Maps were provided by the City of Madison and Madison Gas & Electric (MG&E). A meeting was held with MG&E officials to discuss general concerns they had with the project.

Freight rail locations were visually identified. An analysis of impacts to track interactions was completed.

Traffic, utility, parking and freight rail impacts on the segments of the three preferred routes are discussed in the following section and summarized in the ultimate impacts table in Appendix C.

10.2 Traffic, Utility, Parking and Freight Rail Impacts

The streetcar would generally operate in a traffic lane, flowing with general traffic and stopping in that same travel lane for a typical stop. The streetcar vehicle is not much larger than a large bus, its multiple doors allow for shorter dwell times than a bus at stops, and its electric propulsion motors and dynamic braking allow it to accelerate and brake more swiftly than a bus. The combination of these factors serves to minimize the streetcar’s impact on traffic operations. Some particulars issues and needed adjustments are noteworthy; they are identified in the segment-by-segment review and are reflected in the ultimate impacts table which appears in Appendix C. There were no fatal flaws in the engineering impacts.

Similarly, utility impacts are a manageable issue in general. Although there are locations, such as where a large number of major utility lines are concentrated under East Main Street, where these impacts become significant and could have a noticeable impact on project costs or even make routing on a particular street segment infeasible.

Utility impacts were considered on streetcar route mapping dated 1-24-07 and revised east routes on 1-30-07. Mapping of existing utilities were obtained from the City of Madison and MG&E. A meeting was held with MG&E officials to discuss general concerns they had with the project.
Specific details for each street are included in separate documents for both the south and east sections (Appendices A and B).

Utility impacts can be generally described as affecting the following facilities:

- Water, storm sewer and sanitary sewer, street lights, traffic signals (City of Madison)
- Gas and electric lines (MG&E)
- Communication lines (multiple carriers)

The ultimate level of impact will vary depending on the proximity of the actual utility (field located) and the final streetcar trackway location in the street cross-section, as would be determined in Preliminary Engineering. Parallel utility lines, located within driving or parking lanes, were assumed to create the greatest impacts; since these lines, manholes, valves, etc. would have a higher potential for the need to be adjusted and/or relocated.

Regarding freight rail impacts, the only location that the proposed streetcar alignments cross a freight rail line is on Park Street. The rail line is a spur that dead-ends north of the Madison beltline highway, approximately 1.2 miles southwest of the Park Street crossing. One or two trains per week cross Park Street to serve one customer. The track is in relatively poor condition.

The estimated cost to cross the track is approximately $1 million - $1.5 million for special track, catenary wires, electrical isolation, and upgrading the crossing to modern gates and lights.

The review which is in Appendix C identifies potential engineering impacts by segment; these issues would be addressed at the Preliminary Engineering phase when and if the project moves forward.
11.0 Vehicle Options

Determining the alignment for a Madison Streetcar is a key task; the preceding review makes it clear that there are several viable options for an initial project phase. A similar key decision is the choice of the vehicle type and supplier for a project here. A review of existing streetcar projects and vehicles, and the choices which Madison would face in proceeding with a project was conducted. A recommended vehicle type for Madison was determined.

11.1 Vehicle Technology Review

There are a number of existing streetcar projects in the United States, with a spectrum of variations in these projects. These existing projects serve a variety of purposes, many of which are consistent with the stated Purpose and Function of a Madison project. This spectrum of projects can be divided into four categories:

- “Legacy” systems – streetcar type rail transit systems that are still in operation, having survived the massive national termination of most U.S. streetcar systems in the 1950s;

- “Historic Trolleys” that use restored historic streetcars or replicas, typically on old trackways repaired enough to allow resumed use;

- “Heritage Streetcar” lines – new streetcar projects using restored or replica “historic-looking” vehicles on new tracks; and

- “Modern Streetcar” projects – new lines using new vehicles.

There are a number of “Legacy” urban street rail systems in North America (Boston, Cleveland, Newark, New Orleans, Philadelphia, Pittsburgh, San Francisco, and Toronto) that have been operating continuously for over a century. All of these systems would have been considered streetcar systems at one time but have been modified to varying degrees. For example, the systems in Boston, Cleveland, Newark and Pittsburgh have been completely upgraded to light rail standards and no longer contain any significant lengths of mixed traffic operation. The downtown segments of the systems in Philadelphia, San Francisco and, to a lesser degree, Toronto have been depressed in subways but still operate extensively outside of the downtown core in mixed traffic environments. The New Orleans system is probably the “purest” example, operating traditional vehicles both in mixed traffic and in the “neutral ground” (median) of public streets.
Inspired in part by the continued presence of these “Legacy” examples, there are now a substantial number of “Historic Trolley” projects in operation. These enterprises have often been sponsored by dedicated volunteers, and are usually intended to both resume service in areas formerly served by streetcars and to restore and showcase old vehicles. Their focus is on restoring streetcar service as a community amenity and as an historical asset. They have often been low-budget projects, relying on the combination of existing trackways, inexpensive (in terms of initial purchase cost) historic vehicles, and a large amount of volunteer labor to restore the vehicles, repair the trackways, and operate the projects. Tucson’s Old Pueblo Trolley project is a successful example of this category. Other examples in this category can be found in Lowell, Massachusetts, Astoria, Oregon, and Seattle’s Waterfront Line.

In general, these are projects that restore streetcar service using restored trolley vehicles on a route using some original trackway or a conveniently-located old freight rail track. They are often located in a historic district or along a historic waterfront. The vehicles used for these projects are historic streetcar vehicles, salvaged or stored from streetcar lines in the U.S. or overseas, which in many cases ceased operation decades ago. A market has developed for the purchase and restoration of these “antiques,” relying on a network of museums, volunteers, and train enthusiasts.
These trolleys serve as tourist amenities and “living history,” as well as having limited transit function for local residents. The transit function is minimal, due to the characteristics of vintage trolley vehicles and the operations of these projects as more “transportainment” than transit:

- Service hours are usually limited, due to their focus on tourism and heavy reliance on volunteers for operation;
- Alignment location and adjacent uses are often not at the most intense nodes of population and employment density or pedestrian activity due to the reuse of existing tracks;
- These projects are often not compliant with the Americans with Disabilities Act;
- Ride quality is inferior, especially if original trucks (wheel and propulsion units) or original tracks are used;
- Heating, ventilating, and air conditioning (HVAC) systems have usually not been added to these vehicles, so warm weather rides can be uncomfortable.

Moving toward the transit function, there are a number of “Heritage Streetcar” projects, in which restored streetcar vehicles or new “replica” vehicles are used to provide local circulation, tourist use, and have some relationship to land use or development strategies. Wisconsin supplies one of the best-known projects in this category. The Kenosha Streetcar connects the city’s downtown, a METRA commuter rail station, and the Harborpark redevelopment area, using restored historic vehicles on a new trackway. Another very successful example of this approach is the “F” Line in San Francisco, now carrying a staggering 20,000 passengers per day on restored historic vehicles.

Kenosha Streetcar

The other variation of this approach employs replica streetcars, built using a combination of salvaged mechanical parts from historic vehicles and a new bodyshell and other components. The principal supplier of this vehicle type is the Gomaco Trolley Company, located in Ida Grove, Iowa. Signature projects using these vehicles are the TECO Streetcar line in Tampa and the River Rail Streetcar line in Little Rock.

These streetcar projects are generally conceived as a combination of a local transit circulator and an economic and downtown development strategy. They generally have restored good streetcar service to lively urban areas where it once existed (although not necessarily on the original tracks.
or alignment), and where it once again serves well. These projects achieve a higher level of transit function than the Historic Trolley projects described above.

In several cases, this higher level of transit function is facilitated by offsetting the disadvantages of historic vehicles with the advantages of an exclusive guideway. Several operate in a separate trackway occupying part of the street right-of-way; Memphis’s Main Street Trolley runs the length of a street that has been converted to a pedestrian mall and transitway. Rider surveys on the Memphis line have indicated that over 50% of riders are “riding for transportation purposes.” The limitations of these restored or replica vehicles are still, however, significant:

- Passenger capacity is less than modern tram-style vehicles;
- Single doors (often the case with historic or replica vehicles) increase dwell time for loading and unloading;
- High-floor designs complicate compliance with the Americans with Disabilities Act, requiring the use of lifts or high platforms, which increase the project’s impact and cost while slowing operations;
- Ride quality is inferior, especially if original trucks (wheel and propulsion units) or original tracks are used;
- HVAC systems are difficult to retrofit into historic vehicles, so passenger comfort is inconsistent.

At the end of the spectrum of projects are the “Modern Streetcar” projects, which are intended to serve a substantial transit role through convenient downtown circulation and to act as a significant development or redevelopment catalyst. Portland’s Central City Streetcar and Sound Transit’s Tacoma Link were the beginning of what is now a national movement toward modern, European tram-type streetcar projects. This category of project has seen very high ridership and had the greatest impact on development form and the pace of transit-oriented development and redevelopment within the spectrum of streetcar projects. The vehicles used for these projects have proven highly reliable and popular with riders. A more detailed history of their procurement is included in Section 11.3 below.
Two “offspring” projects from these initial prototypes are now under construction and have ordered the same modern streetcar vehicles: Washington, DC’s Anacostia River Demonstration Project (scheduled to open in late 2007), and Seattle’s South Lake Union Streetcar project (scheduled to open in December of this year). Several streetcar projects that intend to use the modern vehicle technology are now in design and are scheduled to order vehicles and begin track construction and order vehicles in the next two years, specifically:

♦ Miami Streetcar – a 9-mile project that will link the downtown core, the Miami-Dade College main campus, a new performing arts center, a large strip of former industrial land now being redeveloped with new condominiums, a major medical complex, and an existing arts district.

♦ Albuquerque’s Central Avenue Streetcar project – a 4-mile initial segment will connect the downtown core and its regional commuter rail station with the historic Old Town district, the University of New Mexico Campus, and redeveloping areas; a second phase is planned to connect to the airport.

♦ Charlotte’s Trade Street Streetcar line – a 4-mile initial segment connects two college campuses, a number of redevelopment sites, and a hospital complex with the downtown core, as well as connecting two separate transit centers at opposite ends of the downtown core.

♦ Tucson – voters recently approved funding for this project, which will run through both the main campus and the medical campus of the University of Arizona, as well as through the downtown core, terminating at the Rio Nuevo redevelopment site.
Many more projects are being studied or planned. Currently, modern streetcar projects are also being actively considered in:

- Omaha, NE
- Ft. Lauderdale, FL
- Atlanta, GA
- Albuquerque, NM
- Birmingham, AL
- Grand Rapids, MI
- Minneapolis, MN
- Columbus, OH
- Irvine, CA
- Glendale, CA
- Baltimore, MD
- Lake Oswego, OR
- Arlington, VA
- Winston Salem, NC
- Sacramento, CA
- Cincinnati, OH
- Fresno, CA
- Vancouver, WA

### 11.2 Recommended Vehicle Type for Madison

Considering the Purpose and Function of a streetcar project in Madison, the record of the other variations of streetcar projects in the U.S. as described above, and the trends now underway, it is clear that Madison should specify a modern tram type vehicle. Several factors make this vehicle type especially appropriate for Madison:

- Madison’s project is intended to attract a wide spectrum of riders, in terms of demographic diversity, physical ability, and frequency of transit use. For example, college students and a young, creative workforce are not motivated by nostalgia in their transportation choices. A modern, low-floor, vehicle maximizes the project’s practicality and attractiveness, and sends a message of “serious transit” to potential riders.

- Compliance with the Americans with Disabilities Act is easily achieved with modern streetcar vehicles and difficult with historic or replica vehicles. True accessibility and efficient operation are best achieved with this vehicle type.

- Focusing redevelopment and having that redevelopment be highly transit-oriented and sustainable are key goals in Madison. Although some Heritage Streetcar projects have demonstrated impressive development impacts, the projects that have used modern streetcar vehicles have proven the most catalytic in their effect on redevelopment.
Madison is a bicycle-friendly environment; the city has made a major effort to increase the use of this transportation mode. Modern streetcar vehicles, with their typical twin sets of double doors boarding a low-floor center section, make it easy to roll a bicycle onto the vehicle and hang it on an overhead hook.

Maximizing ridership will be a priority both for Madison as the project’s sponsor and for other potential funding sources such as the Federal Transit Administration. The larger passenger capacity of the modern streetcar vehicles will allow a larger ridership to be accommodated.

11.3 The Development of a Modern Streetcar Prototype

The modern streetcar “movement” in the U.S. is less than a decade old. As it was developing the project that ultimately became the prototype for others (now possibly including Madison), Portland also pioneered the procurement of a small number of new streetcar vehicles. In both the size of the vehicles and the size of the order, obtaining new streetcars was a particular challenge for the project. Portland’s MAX light rail vehicles, 92 feet long, weighing over 110,000 pounds, and designed for high performance, were clearly out of scale with the environment and operating needs of the streetcar line. Running in mixed traffic at low speeds, stopping at platforms every few blocks, and traversing residential areas with tree-lined streets in which even buses are barely welcome, called for a smaller, more neighborhood-friendly means of transportation—a streetcar.

With the need initially for only four cars, and a very limited budget, the project had neither the buying power nor the justification to support a new design for Portland. Procurement of the vehicles was managed by Portland Streetcar, Inc. (PSI), a nonprofit corporation formed to manage the project (the Portland Streetcar project is owned by the City of Portland, and managed by PSI). In spring 1998, PSI advertised for expressions of interest for the purchase of from four to six streetcars of an off-the-shelf design that would meet its 10-page description of basic dimensions and performance requirements, which themselves were drafted around known sources of supply. Only one manufacturer responded, with a proposal that was deemed non-responsive and with a purchase price far exceeding the budget. This was a critical juncture in the project, because without a viable streetcar vehicle option, there would be no project.

Project staff began doing missionary work, calling suppliers to try to generate interest and convince them that the project was real, that they genuinely wanted an off-the-shelf design, and that they had cash in hand. This effort even included contacting suppliers overseas and working with them to review what they could offer and how well a given design would fit. Project staff also pursued other potential buyers to see if the purchase quantity could be increased to help stimulate interest.

While off-the-shelf design was stressed, the issues of crashworthiness/energy management, smoke and toxicity in the event of fire, and safe circuit design had to be addressed with the prospective suppliers, because U.S. practice has typically been more rigid in these areas than that overseas. Meetings were held with interested suppliers to discuss these issues relative to their designs, and it was acknowledged that some modifications would be required. During this process, the suppliers themselves acknowledged that they did not necessarily have pure off-the-shelf designs, but rather families of vehicles planned around a variety of standard modules, some of which were still on the drawing boards.
In the end, a set of documents for a negotiated procurement was prepared with more precise technical details than the initial request for interest, along with complete contract terms. The tender called for a base quantity of four cars, with options for up to 22, which could be exercised by PSI or assigned to third parties. Three quality proposals were received. Ultimately, a small delegation of project staff and PSI leaders met with these prospective suppliers in Europe and reviewed vehicles in regular service on city streets there. Following review, Inekon/Skoda, a major producer of railcars for clients mostly in former Eastern Bloc countries, was deemed as offering the best price for the best product. Inekon/Skoda offered an adaptation of its new “Astra” design, then being built in small quantities for Plzen and several other cities in the Czech Republic. This was Inekon/Skoda’s first venture into the North American market.

Subsequent to the completion of the initial phase of the Portland project, the Cities of Tacoma and Seattle, Washington, as well as Washington, DC have exercised an option in the Portland Streetcar, Inc. contract to purchase vehicles from Inekon under the PSI terms and specifications. A similar option provision has now been included in the Seattle contract with Inekon, so this option is in place for Madison and other cities wishing to purchase similar vehicles.

11.4 Current Manufacturers and Vehicles

There are several viable suppliers of modern streetcar vehicles, based in Europe or Japan. Most of these manufacturers are also configured with U.S. facilities or partnerships that could allow them to comply with the “Buy America” requirements that accompany the use of federal funds (see Section 11.5 below). The vehicles come from a very strong continuous base of manufacturing expertise; these companies have been building tram type vehicles for many years and the designs are evolutionary, not new products. The reliability and durability of these vehicles is thus very impressive. For example, the Inekon vehicles operated by Portland Streetcar, Inc. have maintained a service availability of over 99%. The manufacturing operations often perform refurbishment of older vehicles, as well as assembly of new ones, so the base of knowledge in the workforce is deep. When Madison is ready to acquire streetcar vehicles, there will be a number of good choices.
The design of these vehicles is fundamentally similar. The vehicles are made up of front and rear sections, which are placed over the wheel and drive assemblies (called the “trucks”). The front and rear sections in double-ended vehicles are essentially identical. In between, and articulated to allow the vehicle to bend through turns, is a low-floor passenger compartment which is suspended from the front and rear sections. The designs are modular, allowing the production of “streetcar-length” versions and longer models, with multiple articulations. Modular design allows for different uses and capacities; the first three shown in Figure 25, below, are in the size range of a typical streetcar application.

The streetcars that Inekon developed for Portland, Tacoma, Seattle, and Washington, DC are 67 feet long and 8 feet wide. They are double-ended, and double-sided; that is, they have an operator compartment at both ends of the vehicle and a full set of doors on each side. This allows the vehicle to travel in either direction and be accessed by platforms on either, or both, sides of the vehicle. With split articulation, the car has three distinct compartments, two end sections with a floor 31 inches above the top of the rail, and a center section suspended between the articulated joints, with a low floor 14 inches above the top of the rail. The low floor section represents approximately 60 percent of the total floor area of the car. The car is configured with 35 seats and space for up to 80 standing passengers.
Figure 25. Streetcar Passenger Capacities
There are three entryways on each side of the car: a 28-inch-wide single-panel door opening opposite the operator’s position, with two steps of approximately 8.5 inches up into the high floor area, and two double-panel door openings 51 inches wide in the low floor center section allowing level entry. One center door on each side is equipped with a movable bridge plate to accommodate wheelchairs and passengers who otherwise need assistance to traverse the gap at platforms. Similar to those found in the front door area, there are two steps in the interior at each articulation connecting the center low floor section.

Propulsion is supplied by a single overhead electric wire, fed through inverters to the AC traction motors that drive each axle. Rated at 85 kW each, these motors support acceleration rates of 1.5 meters per second squared and a maximum speed of 40 mph. Braking is provided in three ways: dynamic braking, friction braking through hydraulically applied disc brakes, and track brakes for emergency stopping. Power for heating, ventilating, and air conditioning (HVAC), lighting, and other auxiliaries is provided by two inverters producing a three-phase, 400 VAC supply, typical in Europe. Most of the equipment (propulsion controls, inverters, static converter, resistor grids, and HVAC) is mounted on the roof of the center section, whereas the pantograph is positioned over one of the end sections.

In all U.S. projects so far, this system of propulsion has been used, relying on the proven technology of an overhead wire as the power source. Due to aesthetic concerns about the visual impact of the overhead wire, there has been episodic interest in a ground-level power supply system. In one recent European project – in Bordeaux, France, this approach was actually
implemented, using a phased, segmented power system in which short sections of a “third rail” in the street surface are activated only when the tram vehicle is directly over that segment.

As one would expect, this approach is much more expensive than the conventional overhead wire – about three times as expensive. This system, while now operational, suffered significant startup problems, and still has operational problems during times of heavy rain. Whether it would be practicable in a climate where snow and ice are common is unknown. Experience in the U.S. systems has shown that the visual impact of the overhead wire can be kept to a minimum through the use of building attachments (instead of some of the poles) and shared-use poles which double as streetlight poles. The use of street trees is also very effective in camouflaging the wire, and given Madison’s generous use of street trees and favorable climate, this stratagem should be particularly effective here.

In each project, both here and abroad, much attention has been paid to the appearance of the streetcar vehicles. Portland chose an alternating pattern from a palette of five bold colors; Tacoma’s vehicles sport the distinctive wave pattern of Sound Transit vehicles. The color scheme for the Seattle and Washington, DC vehicles is under development. The interiors are bright and welcoming through a combination of large windows, lighting, and the patterns and colors selected for the various interior appointments.

There are at least five viable vehicle options on the market today. The companies and their streetcar type vehicles are described below.
Alstom

Alstom (formerly GEC-Alsthom) is a large French company whose businesses are power generation and manufacturing trains (e.g., the TGV and Eurostar as well as Citadis trams) and ships (e.g., the Queen Mary 2). Its headquarters are located in Levallois-Perret, in the vicinity of Paris. Their “Citadis” trams are in operation in a number of cities in Europe and Australia, including Lyon, Montpelier, Bordeaux, Rotterdam, Dublin, Melbourne, and Katowice.
**Ansaldobreda**

Based in Naples, Italy, Ansaldobreda SPA designs and manufactures railway and mass transit vehicles. The company was formed by the merger of the Ansaldo Trasporti unit with Breda Costruzioni Ferroviarie. Breda’s presence in the United States began with their manufacturing of light rail vehicles for Cleveland’s RTA Rapid Transit in 1982-83. Other projects the company made for the U.S. market include vehicles for the Washington Metro system, the San Francisco Municipal Railway, and Boston’s MBTA.

Breda’s “Sirio” tram is a streetcar type vehicle, now being utilized in a number of projects internationally, although none have yet been ordered in North America.

**Ansaldobreda’s “Sirio” vehicle**

**Interior view**

**A variety of design options**
BOMBARDIER

Bombardier

Bombardier Inc, whose headquarters are in Montreal, Quebec, Canada, is a large manufacturer of aircraft, rail transportation equipment, recreational equipment, and other business lines. Bombardier also produces a product line of light rail and tram type vehicles. In particular, the “Flexity” vehicle is of a type and size suitable for streetcar projects.

Interior view

Level boarding

The Bombardier “Flexity” vehicle in operation in Lodz, Poland
Based in Prague and with manufacturing facilities at Dopravni Podnik Ostrava (previously at Skoda in Plzen), the Inekon Group has supplied all of the modern vehicles used thus far in the modern streetcar “movement” in the United States. Inekon’s Trio vehicle is currently in production for Portland, Seattle and Washington, DC. This vehicle can be procured for other streetcar projects using the option within Portland Streetcar, Inc.’s contract with Inekon, enabling subsequent purchasers to have the benefit of the specifications and other technical work already completed and thus reducing the risk and costs associated with a new procurement.

Inekon vehicle in operation in Portland

Interior view

Most recent iteration of Inekon Trio vehicle
Kinlisharyo

Kinlisharyo-Mitsui is a joint venture between Kinki Sharyo International LLC and Mitsui & Co. (USA) Inc. that specializes in manufacturing public transit vehicles.

Kinlisharyo has manufactured transit vehicles in Japan since 1920, and in the 1980s expanded into the U.S. market, with sales to transit systems in New Jersey, Massachusetts, Texas, and California. Mitsui, an international firm with operations in transportation, telecommunications, and other industries, contributes financing, insuring, and shipping of transit vehicles.

Current Kinkisharyo U.S. customers include Valley Metro Rail in the Phoenix metropolitan area and Sound Transit in the Seattle-Tacoma metropolitan area. The company is now marketing a streetcar type vehicle, called the “J Tram,” shown below.

Kinkisharyo “J Tram” operating in Hiroshima
11.5 “Buy America” Compliance

Capital construction projects or purchases of capital equipment utilizing Federal Transit Administration ("FTA") funds are subject to a “Buy America” requirement (49 U.S.C. §5323(j); 49 C.F.R. §661) which specifies that the cost of components produced in the United States must be more than 60 percent of the cost of all components, and final assembly must take place in the United States. This requirement will apply to purchases of streetcar vehicles to be used in projects funded in part by the Federal Transit Administration under its “New Starts” and “Small Starts” programs.

There are exceptions built into the law and regulations (49 C.F.R. 661.7) which apply this policy. If no equivalent U.S. product is available, or if the cost of producing the equivalent product is more than 25% greater than the cost of available domestic products, the FTA Administrator may waive the requirement.

The Portland and Seattle streetcar projects obtained waivers of this requirement, because no modern streetcar vehicle was yet being manufactured in the U.S. Tacoma’s project and the Washington, DC, Miami, and Albuquerque projects capitalized their projects without the use of federal funds and will similarly not be subject to this mandate.

There is, nevertheless, a growing interest in producing a “Buy America”-compliant vehicle in the United States. It is expected that a growing number of projects will seek FTA funding and thus focus more attention to this market and to the possibility of an American-made vehicle. Although it remains to be seen whether it is possible to produce a vehicle below the 125% cost threshold, there are efforts underway that will address the question:

- In the 2005 transportation reauthorization bill, Congress authorized an expenditure of $4 million to develop a prototype of a “Buy America”-compliant modern streetcar vehicle. These funds were earmarked for administration by Tri-Met, the transit agency in Portland. Tri-Met and Portland Streetcar, Inc. have entered into an agreement with Oregon Iron Works (OIW), a manufacturing company in Clackamas, Oregon, to build this prototype. Oregon Iron Works has purchased plans from Skoda and is now constructing this prototype vehicle, intended for completion and delivery to Portland Streetcar, Inc. in 2008. In addition, the Oregon State Legislature has appropriated $20 million to fund additional vehicles to be built by OIW for an upcoming expansion of the Portland Streetcar system.

- Similarly, Inekon, the supplier of the Portland vehicles, and Siemens, a major manufacturer of light rail vehicles at its Sacramento plant, have formed a partnership for the supply of a “Buy America” version of the Portland type vehicle. Bombardier, Kinkisharyo, and AnsaldoBreda, like Siemens, have U.S. plants that supply “Buy America”-compliant light rail vehicles, and are capable of using this capacity to produce vehicles in the U.S. when market demand allows.

- Other streetcar projects now in Alternatives Analysis or otherwise in the “pipeline” of project development under the FTA’s requirements (Charlotte,
Tucson plans to make significant vehicle purchases using federal funds. These procurements will likely precede Madison’s and will probably accelerate the development of compliant vehicles.

The net result of these developments is that by the time Madison is ready to procure vehicles for its streetcar project, there will either be a clear determination that it is not possible to keep costs below the 125% threshold (thus leaving Madison free to purchase the European- and Japanese-built vehicles described above), or there will be a developing market in “Buy America”–compliant versions of the vehicles described above.
12.0 Estimated Capital and Operating Costs

12.1 Methodology

The following methodology and assumptions were used for the calculations for the Cost Estimates proposed for the Madison Streetcar Feasibility Study. The following is a list of those assumptions:

♦ **Trackwork - Track Slab (single)** The entire mainline alignment was assumed to be ‘T’ rail in a poured concrete track slab. Unit costs were derived from similar streetcar systems within the United States.

♦ **Special Trackwork- (Turns and Track Crossing Installations)** The quantity was calculated as the number of ‘T’ rail crossings and turnouts for the mainline alignment. Unit costs were derived from similar streetcar systems within the United States.

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<th>East Isthmus - Campus</th>
<th>Park - Campus</th>
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<td>South Transfer Point</td>
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<td>Broom St. &amp; State St.</td>
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<td>Broom St. &amp; Johnson St.</td>
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<td>Meriter Hospital</td>
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♦ **Catenary Poles and Overhead Wire.** Item 3 includes the overhead contact wire, poles and conduit connections for the entire length of the mainline alignment. The costs have been estimated using a per linear foot (LF) basis since the exact number of poles and conduit haven not been determined at this time. Unit costs were derived from similar streetcar systems within the United States.

♦ **Traffic Signals- New (or Full Replacement).** The following table is a list of additional traffic signals which are required to be added along alignment. For cost estimating purposes, one additional traffic signal was added beyond those listed in the table below for each of the proposed alignments with the specific location to be determined during the preliminary engineering phase. Unit costs were derived from similar streetcar systems within the United States.

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**Traffic Signals- Modified.** The signalized intersections along the alignment which will require modifications are listed below. It has been assumed that one-half of the traffic signal poles at each intersection will require modifications to accommodate the catenary wire crossing through intersection. The number of signals was provided per a field visit on March 13, 2007. Unit costs were derived from similar streetcar systems within the United States.

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<tr>
<th>East Isthmus - Campus</th>
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<td>Johnson St. &amp; Henry Mall</td>
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<td>Washington St. &amp; Blair St.</td>
<td>Johnson St. &amp; Lake St.</td>
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<td>Butler St. &amp; Wilson St. &amp; King St.</td>
<td>Johnson St. &amp; Frances St.</td>
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<td>Wilson St. &amp; Hamilton St. &amp; Henry St.</td>
<td>Johnson St. &amp; Bassett St.</td>
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<td>Wilson St. &amp; Broom St.</td>
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<td>Park St. &amp; University St.</td>
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<td>Park St. &amp; University St.</td>
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<td>Park St. &amp; W. Johnson St.</td>
<td>Park St. &amp; W. Washington St.</td>
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<td>Johnson St. &amp; Henry Mall St.</td>
<td>Park St. &amp; Erin St.</td>
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<tr>
<td>Johnson St. &amp; Lake St.</td>
<td>Park St. &amp; Fish Hatchery Rd.</td>
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<td>Johnson St. &amp; Frances St.</td>
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<tr>
<td>State St. &amp; Fairchild St.</td>
<td>Park St. &amp; Buick St.</td>
</tr>
<tr>
<td>Fairchild St. &amp; W. Washington St.</td>
<td>Park St. &amp; Badger St.</td>
</tr>
<tr>
<td>Main St. &amp; Carroll St.</td>
<td></td>
</tr>
<tr>
<td>Main St. &amp; Martin Luther King St.</td>
<td></td>
</tr>
<tr>
<td>Main St. &amp; Pinckney St.</td>
<td></td>
</tr>
</tbody>
</table>

**Central Loop**

| Butler Street & King St.          | Johnson St. & Henry Mall St. |
| Wilson St. & Hamilton St. & Henry St. | Johnson St. & Lake St.       |
| Wilson St. & Broom St.            | Johnson St. & Frances St.    |
| Broom St. & Doty St.              | Johnson St. & Bassett St.    |
| Broom St. & Washington St.        | Johnson St. & State St.      |
| Broom St. & Johnson St.           | State St. & Fairchild St.    |
| Broom St. & University St.        | Fairchild St. & W. Washington St. |
| Park St. & University St.         | Main St. & Carroll St.       |
| Park St. & Dayton St.             | Main St. & Martin Luther King St. |
| Park St. & Regent St.             | Main St. & Pinckney St.      |
| Park St. & Braxton St.            |                             |
Civil/Roadway - Asphalt Pavement Overlay. The quantity of asphalt pavement overlay was calculated based on the overbuilding of one travel lane with a width of twelve feet for the entire length of the alignment located on asphalt roadways. The limits of the roadway pavement type were provided from field review. The overbuilding of on-street parking was also included as identified on the field visit. The unit cost was derived from the Wisconsin Department of Transportation – Average Unit Price List for items associated with the proposed improvements.

Civil/Roadway - Concrete Pavement Reconstruction. The quantity was calculated based on the reconstruction and/or modification of one travel lane with a width of twelve feet for the entire length of the alignment located on concrete roadways.

Civil/Roadway – Bridge Reconstruction. The quantity was calculated based on the reconstruction and/or modification of existing bridges which the streetcar would be traveling over. The cost includes modifications to the superstructure and substructure to accommodate the track slab and slope corrections. The Park – Campus alignment crosses a canal north of Plaenert Drive which will require this modification.

Utilities – Allowance. The allowance for utility relocations was divided into three categories (high, medium and low) to help determine an order of magnitude cost estimate. The utility impact analysis conducted for this study (Appendices A and B of this report) was reviewed for the south and east routes to determine the level of impact. The existing water and sanitary utilities were assumed to remain in place. Horizontal and vertical adjustments of valves and meter boxes to these utilities were considered a low impact. Based on the reports, one utility would be completely affected, while others were partially affected based on the location of the specific alignment implemented. It was assumed that this situation would be considered a medium level of impact. In some locations where a higher percentage of multiple utilities such as gas were being affected, it was assumed that a rating of high should be used. Unit costs were derived from similar streetcar systems within the United States.

Drainage Allowance. The drainage allowance, based on the entire length of the alignment, is for potential modifications to the existing stormwater system to accommodate the roadway improvements and potential drainage requirements for the streetcar. The unit cost was derived from the Wisconsin Department of Transportation – Average Unit Price List for items associated with the proposed improvements.

Stop Platforms - Street side. The quantity was based on the preliminary stop locations identified, and represents the locations where no other transit facility is currently located. It includes the cost of a minimal shelter, signage, pedestrian
access, raised platform and benches. Unit costs were derived from similar streetcar systems within the United States.

♦ **Stop Platforms – Median.** The quantity was based on the preliminary stop locations identified and represents the locations where no other transit facility is currently located. It includes the cost of a minimal shelter, signage, pedestrian access, raised platform and benches. Unit costs were derived from similar streetcar systems within the United States.

♦ **Stop Platforms - Upgrade (Share w/ Madison Metro).** The quantity was based on the preliminary stop locations identified and represents the locations where the streetcar stop will also share facilities with an existing Madison Metro stop. It includes the cost of upgrades to signage, pedestrian access and raised platform. Unit costs were derived from similar streetcar systems within the United States.

♦ **Substations.** The quantity was based on typical streetcar power requirements which include one substation per mile of single track for the entire length of the alignment. Unit costs were derived from similar streetcar systems within the United States.

♦ **Train Signaling Systems.** The train signaling item is based on the number of streetcar crossings of existing freight rail lines. The unit price is for each direction of the streetcar, and was derived from similar streetcar systems within the United States.

♦ **Maintenance Facility Allowance.** The cost includes the construction of the building, physical plant, machinery and storage track for the Maintenance and Operations Facility. No costs have been included for the purchase of right-of-way for the facility. Unit costs were derived from similar streetcar systems within the United States.

♦ **Construction Soft Costs.** Construction Soft Costs include mobilization, traffic control and contractor As-Built plans. The item has been estimated as a percentage of the Construction costs (excluding the Maintenance and Operations Facility). The percentage was derived from similar streetcar systems within the United States.

♦ **Construction Contingency Cost.** The contingency has been estimated as a percentage of the Construction subtotal and Construction soft costs. The percentage was derived from similar streetcar systems within the United States.

♦ **Engineering and Administration Cost.** Engineering and Administration cost have been estimated as a percentage of the Total Construction Cost (Line 21.0). The percentage was derived from similar streetcar systems within the United States.
♦ **Vehicles (includes testing, spare parts, etc.).** The quantity was based on one modern streetcar vehicle per mile of track.

♦ **Right-of-way.** Locations where the streetcar will make a right turn have a potential for right-of-way requirements. At this time, no acreage of right-of-way has been assumed for the alignment. The East Isthmus – Campus alignment assumes no right-of-way for the Maintenance and Operations Facility. The facility would be built on publicly owned land at the Madison Metro Maintenance Facility. The Park – Campus alignment would require right-of-way for the Maintenance and Operations Facility. A cost of approximately $1.0 million has been allocated for the acquisition of a site south of Plaenert Drive.

♦ **Operating assumptions.** Operating costs were estimated using a cost-per-revenue-hour of $95, a 122-hour service week and four vehicles typically in service.
12.2 Cost Estimates by Segment

Cost estimates were prepared for each of the segments identified as a possible initial project phase – the East Isthmus-Campus alignment, the Park Street alignment and the Downtown Loop. An additional variation of the Park Street alignment was also estimated: a shorter version terminating near Wingra Drive.

Table 7. East Isthmus - Campus Alignment

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost Category</th>
<th>Unit Price</th>
<th>Units</th>
<th>Quantity</th>
<th>Total Price</th>
</tr>
</thead>
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<tr>
<td>1.0</td>
<td>Trackwork - Track Slab (single)</td>
<td>$425</td>
<td>lf</td>
<td>28,100</td>
<td>$11,942,500</td>
</tr>
<tr>
<td>2.0</td>
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<td>$160,000</td>
<td>ea</td>
<td>2</td>
<td>$320,000</td>
</tr>
<tr>
<td>3.0</td>
<td>Catenary Poles and Overhead Wire</td>
<td>$200</td>
<td>lf</td>
<td>28,100</td>
<td>$5,620,000</td>
</tr>
<tr>
<td>4.0</td>
<td>Traffic Signals- New (or Full Replacement)</td>
<td>$200,000</td>
<td>ea</td>
<td>3</td>
<td>$600,000</td>
</tr>
<tr>
<td>5.0</td>
<td>Traffic Signals- Modified</td>
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<td>ea</td>
<td>21</td>
<td>$2,100,000</td>
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<tr>
<td>6.0</td>
<td>Civil/Roadway - Asphalt Pavement Overlay</td>
<td>$75</td>
<td>lf</td>
<td>35,300</td>
<td>$2,647,500</td>
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<tr>
<td>7.0</td>
<td>Civil/Roadway - Concrete Pavement Reconstruction</td>
<td>$125</td>
<td>lf</td>
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<td>$1,318,750</td>
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<tr>
<td>8.0</td>
<td>Civil/Roadway - Bridge Reconstruction</td>
<td>$150</td>
<td>sf</td>
<td>-</td>
<td>$0</td>
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<tr>
<td>9.1</td>
<td>Utilities - High Allowance</td>
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<td>lf</td>
<td>6,900</td>
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<tr>
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<tr>
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<td>9,900</td>
<td>$1,485,000</td>
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<tr>
<td>10.0</td>
<td>Drainage Allowance</td>
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<td>lf</td>
<td>28,100</td>
<td>$1,405,000</td>
</tr>
<tr>
<td>11.1</td>
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<td>$1,575,000</td>
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<tr>
<td>11.2</td>
<td>Stop Platforms - Median</td>
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<tr>
<td>11.3</td>
<td>Stop Platforms - Upgrade (Share w/ Madison Metro)</td>
<td>$45,000</td>
<td>ea</td>
<td>3</td>
<td>$135,000</td>
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<tr>
<td>12.0</td>
<td>Substations</td>
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<tr>
<td>13.0</td>
<td>Train Signaling Systems</td>
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<td>ea</td>
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<td>Right-of-way</td>
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<td>TOTAL PROJECT COST (2007 DOLLARS)</td>
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### Table 8. Park Street Alignment

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<th>Total Price</th>
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<tbody>
<tr>
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<td>lf</td>
<td>31,800</td>
<td>$13,515,000</td>
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<tr>
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<td>$160,000</td>
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<td>3.0</td>
<td>Catenary Poles and Overhead Wire</td>
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<td>lf</td>
<td>31,800</td>
<td>$6,360,000</td>
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<tr>
<td>4.0</td>
<td>Traffic Signals- New (or Full Replacement)</td>
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<td>ea</td>
<td>3</td>
<td>$600,000</td>
</tr>
<tr>
<td>5.0</td>
<td>Traffic Signals- Modified</td>
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<td>ea</td>
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<td>$1,800,000</td>
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<tr>
<td>6.0</td>
<td>Civil/Roadway - asphalt pavement overlay</td>
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<td>7.0</td>
<td>Civil/Roadway - concrete pavement reconstruction</td>
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<td>Civil/Roadway - Bridge Reconstruction</td>
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<td>lf</td>
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<td>$300,000</td>
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<td>9.1</td>
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<td>$1,590,000</td>
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<tr>
<td>11.3</td>
<td>Stop Platforms - Upgrade (Share w/ Madison Metro)</td>
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<td>$45,000</td>
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<tr>
<td>12.0</td>
<td>Substations</td>
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<td>6</td>
<td>$3,000,000</td>
</tr>
<tr>
<td>13.0</td>
<td>Train Signaling Systems</td>
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<td>$1,100,000</td>
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<tr>
<td>14.0</td>
<td>Maintenance Facility Allowance</td>
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<td>$5,000,000</td>
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<td>$18,000,000</td>
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<td>TOTAL PROJECT COST (2007 DOLLARS)</td>
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<td><strong>$93,912,252</strong></td>
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### Table 9 Central Loop Alignment

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<thead>
<tr>
<th>Item</th>
<th>Cost Category</th>
<th>Unit Price</th>
<th>Units</th>
<th>Quantity</th>
<th>Total Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Trackwork - Track Slab (single)</td>
<td>$425</td>
<td>lf</td>
<td>19,500</td>
<td>$8,287,500</td>
</tr>
<tr>
<td>2.0</td>
<td>Trackwork-Turn/Track Crossing Installation</td>
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<td>ea</td>
<td>2</td>
<td>$320,000</td>
</tr>
<tr>
<td>3.0</td>
<td>Catenary Poles and Overhead Wire</td>
<td>$200</td>
<td>lf</td>
<td>19,500</td>
<td>$3,900,000</td>
</tr>
<tr>
<td>4.0</td>
<td>Traffic Signals- New (or Full Replacement)</td>
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<td>ea</td>
<td>3</td>
<td>$600,000</td>
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<td>Traffic Signals- Modified</td>
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<td>$1,200,000</td>
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<td>$1,567,500</td>
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<tr>
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<td>lf</td>
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<td>$2,370,000</td>
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<tr>
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<td>lf</td>
<td>4,000</td>
<td>$600,000</td>
</tr>
<tr>
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<td>$110,000</td>
</tr>
<tr>
<td>11.3</td>
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<td>3</td>
<td>$135,000</td>
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<tr>
<td>12.0</td>
<td>Substations</td>
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<tr>
<td>14.0</td>
<td>Maintenance Facility Allowance</td>
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<td>$3,500,000</td>
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</table>

**BASELINE SEGMENT COST** $32,093,750

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<th>Quantity</th>
<th>Total Price</th>
</tr>
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</tr>
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**TOTAL PROJECT COST (2007 DOLLARS)** $61,235,022
13.0 Estimated Operating Cost for Central Loop Alignment

Table 10. Operating Assumptions

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<th>Assumptions</th>
<th>Annual RVH</th>
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<tr>
<td>Number of Vehicles (12 min. headways)</td>
<td>4</td>
</tr>
<tr>
<td>Revenue Service Hours per Week</td>
<td>122</td>
</tr>
<tr>
<td>Revenue Service Hours per Year per Vehicle</td>
<td>6,344</td>
</tr>
<tr>
<td>Total Revenue Vehicle Hours</td>
<td>25,376</td>
</tr>
</tbody>
</table>

Estimated Operating and Maintenance Costs

<table>
<thead>
<tr>
<th>Costs</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>O&amp;M Cost using RVH of $95.00</td>
<td>$2,410,720</td>
</tr>
<tr>
<td>Miscellaneous O&amp;M /Admin Costs</td>
<td>$300,000</td>
</tr>
<tr>
<td>TOTAL ESTIMATED O&amp;M COST</td>
<td>$2,710,720</td>
</tr>
</tbody>
</table>
14.0 Ridership Projections

The ridership forecasts included in this report were developed to determine the relative feasibility of implementing a streetcar system within the City of Madison. Therefore, many of the factors that would heavily influence the daily ridership of such a system are not yet quantifiable. Design level factors including final route alignment, station spacing and station locations would have an obvious impact on system ridership. Operational factors including system headways, fares, hours of service and vehicle capacity would also influence the usefulness of a streetcar system. Streetcar ridership would also be impacted by policy-level factors such as bus system integration, park and ride availability, rezoning and redevelopment along the streetcar routes.

The ridership forecasts for the Madison streetcar system were therefore developed using observed market reaction to the implementation of a streetcar system in other urban areas across the county. The total study area travel market was aggregated from auto-oriented, transit-oriented and walk-oriented person trips as determined using the Madison Area Metropolitan Planning Organization’s travel demand model. Mode shift values observed from other communities that have implemented streetcar systems were then applied to each respective travel market to estimate ridership potential of a Madison streetcar system.

14.1 Methodology

**Sub-area description**

Figure 27 outlines the proposed ultimate routes for the Madison streetcar system. The graphic shows the system which includes both the Park Street corridor and the East Isthmus corridor as dashed lines along Park Street, a tandem along State Street and Johnson Street, around the southwest side of the Capital Square using Fairchild and Broom streets, around the southeast side of the Capital Square using Main and Wilson streets, continuing on Main Street northeast, crossing East Washington Avenue at Ingersoll, then back southwest on Mifflin, accessing East Washington Avenue near Livingston Street, then on Butler Street back to Wilson Street.

Figure 27 also shows the parcels that may experience accelerated redevelopment due to the streetcar system. The redevelopment of these parcels was considered a by-product of a streetcar implementation within the study area. The increased activity was analyzed as a second travel market alternative to the adopted land use plan.

Because the limitations of this type of ridership analysis, it is not feasible to break the alignment down into partial sections; therefore this analysis and its resulting projections includes the full alignment, including both the East Isthmus and Park Street portions, as well as the Central Loop that they share.
Figure 27. Streetcar Routes and Redevelopment Areas
Figure 28 illustrates the travel demand model sub-area where streetcar operations are being considered. The figure shows the Capitol Square and the extent to the East and West side of the Capitol Square that would encompass the operational limits of the proposed streetcar network. In order to estimate the ridership, it is necessary to estimate four types of trips associated with the sub-area:

- Trips into the sub-area (external-internal trips)
- Trips going away from the sub-area (internal-external trips)
- Trips going through the sub-area (external trips)
- Trips with origin and destination completely within the sub-area (internal trips)

In order to estimate these trips, the regional demand model was simulated, and the four trip types were extracted for the sub-area from the model.

Figure 28. Streetcar Travel Market, from Travel Demand Model

Base and Future Year Travel Market Estimation

The travel market was estimated for the base year (year 2000) and two future year (2030) scenarios. The first future year scenario is the existing plus committed (E+C) scenario. In this
scenario, the total number of person trips for the year 2030 is estimated taking into consideration all the committed development that would be in place in the year 2030. The second scenario is the 2030 redevelopment scenario, where the total number of person trips is estimated based on the assumption that additional redevelopment would occur if a streetcar system were indeed functional within the sub-area by the year 2030. The consequence of this redevelopment is an anticipated increase in housing and employment in some traffic analysis zones (TAZ’s) within the Madison Area MPO’s travel demand model. In order to incorporate the effect of redevelopment into the demand model, the estimated increase in housing and employment were input into the demand model.

14.2 Streetcar Land Use Redevelopment

In order to assess the impact of the additional housing units and jobs estimated in 2030 as a consequence of streetcar development, the land use redevelopment data was incorporated into the zonal socio-economic data information for the year 2030 demand model.

14.3 Travel Market Evaluation Results

This section describes the results obtained after running the demand model for the three scenarios mentioned earlier -- i.e. base year (2000), E+C future year (2030) and the streetcar related redevelopment future year (2030).

Table 11 summarizes the total number of person trips estimated to be associated with the sub-area in the year 2000 and the two scenarios for year 2030. Table 12 is simply a representation of the Table 11 in terms of the percent share of the total person trips for each of the corresponding cells. The observations from Tables 11 and 12 are summarized below:

- 66,601 trips internal to the sub-area are estimated to have occurred in the year 2000, which is 14% of the total trips associated with the sub-area.
- 80,236 trips internal to the sub-area are estimated to occur in the year 2030 E+C scenario, which is 14% of the total trips associated with the sub-area.
- 89,707 trips internal to the sub-area are estimated to occur in the year 2030 Redevelopment scenario, which is 15% of the total trips associated with the sub-area.
- 151,676 internal-external trips are estimated to have occurred in the year 2000 for the sub-area, which is 32% of the total trips associated with the sub-area.
- 183,184 internal-external trips are estimated to occur in the year 2030 E+C scenario for the sub-area, which is 32% of the total trips associated with the sub-area.
- 193,647 internal-external trips are estimated to occur in the year 2030 Redevelopment scenario for the sub-area, which is 32% of the total trips associated with the sub-area.
136,401 external-internal trips are estimated to have occurred in the year 2000 for the sub-area, which is 29% of the total trips associated with the sub-area.

164,162 external-internal trips are estimated to occur in the year 2030 E+C scenario for the sub-area, which is 29% of the total trips associated with the sub-area.

174,989 external-internal trips are estimated to occur in the year 2030 Redevelopment scenario for the sub-area, which is 28% of the total trips associated with the sub-area.

Table 11. Total Person Trips

<table>
<thead>
<tr>
<th>Total Person Trips (2000)</th>
<th>Internal</th>
<th>External</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>66,601</td>
<td>151,676</td>
<td>218,276</td>
</tr>
<tr>
<td>External</td>
<td>136,401</td>
<td>119,282</td>
<td>255,683</td>
</tr>
<tr>
<td>Total</td>
<td>203,002</td>
<td>270,958</td>
<td>473,959</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Person Trips (2030 E+C)</th>
<th>Internal</th>
<th>External</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>80,236</td>
<td>183,184</td>
<td>263,420</td>
</tr>
<tr>
<td>External</td>
<td>164,162</td>
<td>148,040</td>
<td>312,202</td>
</tr>
<tr>
<td>Total</td>
<td>244,398</td>
<td>331,224</td>
<td>575,622</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Person Trips (2030 Redevelopment)</th>
<th>Internal</th>
<th>External</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>89,707</td>
<td>193,647</td>
<td>283,354</td>
</tr>
<tr>
<td>External</td>
<td>174,989</td>
<td>155,882</td>
<td>330,870</td>
</tr>
<tr>
<td>Total</td>
<td>264,696</td>
<td>349,529</td>
<td>614,225</td>
</tr>
</tbody>
</table>

Table 12. Percent of Total Person Trips

<table>
<thead>
<tr>
<th>Percent of Total (2000)</th>
<th>Internal</th>
<th>External</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>14%</td>
<td>32%</td>
<td>46%</td>
</tr>
<tr>
<td>External</td>
<td>29%</td>
<td>25%</td>
<td>54%</td>
</tr>
<tr>
<td>Total</td>
<td>43%</td>
<td>57%</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percent of Total (2030 E+C)</th>
<th>Internal</th>
<th>External</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>14%</td>
<td>32%</td>
<td>46%</td>
</tr>
<tr>
<td>External</td>
<td>29%</td>
<td>26%</td>
<td>54%</td>
</tr>
<tr>
<td>Total</td>
<td>42%</td>
<td>58%</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percent of Total (2030 Redevelopment)</th>
<th>Internal</th>
<th>External</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>15%</td>
<td>32%</td>
<td>46%</td>
</tr>
<tr>
<td>External</td>
<td>28%</td>
<td>25%</td>
<td>54%</td>
</tr>
<tr>
<td>Total</td>
<td>43%</td>
<td>57%</td>
<td>100%</td>
</tr>
</tbody>
</table>

The above results are estimates of the total person trips associated with the sub-area. According to the TriMet Marketing Information Department, the two subsets of the total travel market that are most likely to use transit are current walk trips and transit trips. These respective study area
submarkets are summarized in Table 11 and Table 12. Table 13 summarizes the walk trips related to the sub-area for the three scenarios. Comparing the results of Table 11 with Table 12, it is observed that more than 50 percent of the internal trips comprise of walk trips for all three scenarios. In other words, a high number of walk trips were observed within the sub-area for all three scenarios. This is because the sub-area overlaps a section of the University of Wisconsin campus area, and the large student and staff community that walk to the campus presumably contribute to the large number of walk trips observed in Table 13. Additionally, the sub-area also includes State Street, which is a popular pedestrian-oriented shopping and entertainment corridor.

### Table 13. Walk Trips

<table>
<thead>
<tr>
<th>Walk trips- subarea (2000)</th>
<th>Internal</th>
<th>External</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>35,814</td>
<td>17,196</td>
<td>53,010</td>
</tr>
<tr>
<td>External</td>
<td>6,070</td>
<td>1,502</td>
<td>7,572</td>
</tr>
<tr>
<td>Total</td>
<td>41,885</td>
<td>18,698</td>
<td>60,583</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Walk trips- subarea (2030 E+C)</th>
<th>Internal</th>
<th>External</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>44,163</td>
<td>19,173</td>
<td>63,336</td>
</tr>
<tr>
<td>External</td>
<td>6,565</td>
<td>1,517</td>
<td>8,083</td>
</tr>
<tr>
<td>Total</td>
<td>50,729</td>
<td>20,690</td>
<td>71,419</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Walk trips- subarea (2030) Redevelopment</th>
<th>Internal</th>
<th>External</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>47,925</td>
<td>19,672</td>
<td>67,596</td>
</tr>
<tr>
<td>External</td>
<td>7,053</td>
<td>1,557</td>
<td>8,609</td>
</tr>
<tr>
<td>Total</td>
<td>54,977</td>
<td>21,229</td>
<td>76,206</td>
</tr>
</tbody>
</table>

Table 14 summarizes the transit-related trips for the three scenarios, i.e. users that take the bus, either by walking or park and ride access.

### Table 14. Transit Trips

<table>
<thead>
<tr>
<th>Transit trips- subarea (2000)- Person trips</th>
<th>Internal</th>
<th>External</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>3,402</td>
<td>10,165</td>
<td>13,567</td>
</tr>
<tr>
<td>External</td>
<td>6,016</td>
<td>1,723</td>
<td>7,739</td>
</tr>
<tr>
<td>Total</td>
<td>9,418</td>
<td>11,888</td>
<td>21,306</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transit trips- subarea (2030 E+C)- Person trips</th>
<th>Internal</th>
<th>External</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>4,259</td>
<td>12,838</td>
<td>17,097</td>
</tr>
<tr>
<td>External</td>
<td>6,424</td>
<td>1,991</td>
<td>8,415</td>
</tr>
<tr>
<td>Total</td>
<td>10,683</td>
<td>14,829</td>
<td>25,512</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transit trips- subarea (2030 Redevelopment)- Person trips</th>
<th>Internal</th>
<th>External</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>5,242</td>
<td>14,063</td>
<td>19,305</td>
</tr>
<tr>
<td>External</td>
<td>8,024</td>
<td>2,334</td>
<td>10,358</td>
</tr>
<tr>
<td>Total</td>
<td>13,266</td>
<td>16,397</td>
<td>29,663</td>
</tr>
</tbody>
</table>

### 14.4 Ridership Projections

The market analysis was generated using travel demand model datasets for the Madison urbanized area and redevelopment analysis specific to streetcar implementation in the study area.
The travel demand model has both walk and bus modes, in addition to the automobile mode of transportation. The travel demand model does not have a streetcar specific mode within the current model framework. Therefore, ridership projections for the proposed streetcar are based on the probability of mode shifts from the three existing modes, (walk, bus and auto) to the streetcar system. These mode shifts were estimated based on similar streetcar projects in other urban areas across the country including Portland, Oregon, Tampa, Florida, Tacoma, Washington and Little Rock, Arkansas.

The automobile carries the greatest number of persons within and through the study area. However, it is difficult to encourage auto users to switch to other modes of transportation. Furthermore, those persons choosing to travel within the study area without the use of an automobile already have two viable options, the existing bus transit system or walking.

Consensus between the study team, the Madison Area Metropolitan Planning Organization and the Madison Metro Transit staff determined that, less than two-tenths of one percent of all person trips that would use automobiles without the presence of a streetcar could be anticipated to switch to the streetcar when available.

The majority of streetcar ridership is anticipated to come from walk trips. A shift of up to 10 percent from walk to streetcar mode has been observed in other communities. However, without knowledge of specific streetcar stations and operating frequencies, lower mode shift values were selected than values observed in other streetcar implementations. The total shift from pedestrian to streetcar could be anticipated to be even greater than the 3 to 4 percent shown in Table 15 below. Due to the increased accessibility to destinations in the study area, existing trips may be lengthened or additional trips may be induced altogether.

The bus transit system in Madison focuses on travel into downtown Madison. Therefore, many of the bus trips are crossing into the study area. Due to the relatively high level of transit service within the study area, the need to transfer from bus to streetcar is relatively low. However, trips that stay within the study area could be anticipated to choose the streetcar rather than the bus if fare structures were competitive.

Table 15 below shows the expected shift in trips from each of the three existing modes to the streetcar system within the Madison study area for the year 2000 travel market.

<table>
<thead>
<tr>
<th>Year 2000 Analysis</th>
<th>Trip Proximity</th>
<th>Total Person Trips</th>
<th>Shift to Streetcar</th>
<th>Streetcar Riders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto Trips</td>
<td>Internal-Internal</td>
<td>27,385</td>
<td>1.5%</td>
<td>410</td>
</tr>
<tr>
<td></td>
<td>Ext-Int/Int-Ext</td>
<td>248,631</td>
<td>0.10%</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>External-External</td>
<td>116,057</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>473,959</td>
<td>0.14%</td>
<td>660</td>
</tr>
<tr>
<td>Walk Trips</td>
<td>Internal-Internal</td>
<td>35,814</td>
<td>4%</td>
<td>1,430</td>
</tr>
<tr>
<td></td>
<td>Ext-Int/Int-Ext</td>
<td>23,266</td>
<td>2%</td>
<td>460</td>
</tr>
<tr>
<td></td>
<td>External-External</td>
<td>1,502</td>
<td>2%</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>60,583</td>
<td>3.2%</td>
<td>1,920</td>
</tr>
<tr>
<td>Bus Trips</td>
<td>Internal-Internal</td>
<td>3,402</td>
<td>3.5%</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>Ext-Int/Int-Ext</td>
<td>16,181</td>
<td>0.75%</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>External-External</td>
<td>1,723</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>21,306</td>
<td>1.1%</td>
<td>240</td>
</tr>
<tr>
<td>System Total</td>
<td></td>
<td>555,848</td>
<td>0.51%</td>
<td>2,820</td>
</tr>
</tbody>
</table>
The year 2030 travel market was analyzed under two conditions as shown in Table 16, without additional redevelopment of property in the study area, and with additional redevelopment of property in the study area. For the first condition, without additional redevelopment, the mode shift shares determined for the year 2000 travel market were applied to each respective mode. For the second condition, with additional redevelopment, the portion of users who would switch to the streetcar was increased for the initial walk and bus markets. This increase is due to the additional redevelopment attracting potential streetcar users at a higher rate due to the proximity of the development to a streetcar route. This increased usage of streetcar, along with a larger total market, results in a 30 percent increase in the ridership potential of the streetcar system.

Table 16. Year 2030 Ridership Projections

<table>
<thead>
<tr>
<th>Year 2030 Without Streetcar Redevelopment Analysis</th>
<th>Trip Proximity</th>
<th>Total Person Trips</th>
<th>Shift to Streetcar</th>
<th>Streetcar Riders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto Trips</td>
<td>Internal-Internal</td>
<td>31,814</td>
<td>1.5%</td>
<td>480</td>
</tr>
<tr>
<td></td>
<td>Ext-Int/Int-Ext</td>
<td>302,346</td>
<td>0.10%</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>External-External</td>
<td>144,532</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>478,692</td>
<td>0.16%</td>
<td>780</td>
</tr>
<tr>
<td>Walk Trips</td>
<td>Internal-Internal</td>
<td>44,163</td>
<td>4%</td>
<td>1,770</td>
</tr>
<tr>
<td></td>
<td>Ext-Int/Int-Ext</td>
<td>25,738</td>
<td>2%</td>
<td>510</td>
</tr>
<tr>
<td></td>
<td>External-External</td>
<td>1,517</td>
<td>2%</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>71,418</td>
<td>3.2%</td>
<td>2,310</td>
</tr>
<tr>
<td>Bus Trips</td>
<td>Internal-Internal</td>
<td>4,259</td>
<td>3.5%</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>Ext-Int/Int-Ext</td>
<td>19,262</td>
<td>0.75%</td>
<td>140</td>
</tr>
<tr>
<td></td>
<td>External-External</td>
<td>1,991</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>25,512</td>
<td>1.1%</td>
<td>290</td>
</tr>
<tr>
<td>System Total</td>
<td></td>
<td>575,622</td>
<td>0.59%</td>
<td>3,380</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year 2030 With Streetcar Redevelopment Analysis</th>
<th>Trip Proximity</th>
<th>Total Person Trips</th>
<th>Shift to Streetcar</th>
<th>Streetcar Riders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auto Trips</td>
<td>Internal-Internal</td>
<td>36,540</td>
<td>1.5%</td>
<td>550</td>
</tr>
<tr>
<td></td>
<td>Ext-Int/Int-Ext</td>
<td>319,824</td>
<td>0.10%</td>
<td>320</td>
</tr>
<tr>
<td></td>
<td>External-External</td>
<td>151,991</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>508,355</td>
<td>0.17%</td>
<td>870</td>
</tr>
<tr>
<td>Walk Trips</td>
<td>Internal-Internal</td>
<td>47,925</td>
<td>5%</td>
<td>2,400</td>
</tr>
<tr>
<td></td>
<td>Ext-Int/Int-Ext</td>
<td>26,725</td>
<td>2.5%</td>
<td>670</td>
</tr>
<tr>
<td></td>
<td>External-External</td>
<td>1,557</td>
<td>2%</td>
<td>30</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>76,207</td>
<td>4.1%</td>
<td>3,100</td>
</tr>
<tr>
<td>Bus Trips</td>
<td>Internal-Internal</td>
<td>5,242</td>
<td>4.5%</td>
<td>240</td>
</tr>
<tr>
<td></td>
<td>Ext-Int/Int-Ext</td>
<td>22,087</td>
<td>1%</td>
<td>220</td>
</tr>
<tr>
<td></td>
<td>External-External</td>
<td>2,334</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>29,663</td>
<td>1.6%</td>
<td>460</td>
</tr>
<tr>
<td>System Total</td>
<td></td>
<td>614,225</td>
<td>0.72%</td>
<td>4,430</td>
</tr>
</tbody>
</table>
14.5 Existing Bus Transit Market

The Madison Metro Transit System operates many buses within the general study area of the proposed Madison streetcar system. Figure 29 shows Route 2 of the Madison Metro bus system. This bus route connects the West Transfer Point with the North Transfer Point via the downtown isthmus and capital area. The inset box highlights the approximate area where the proposed streetcar and Route 2 would overlap.

Route 2 currently carries about 40 passengers per hour of revenue service, according to Madison Metro Transit. This assumes thirty minute headways. The free campus circulator just west of the proposed streetcar study area carries as much as 90 passengers per hour of revenue service. Other bus routes in the study area carry fewer passengers per hour. By comparison, it is estimated the proposed streetcar system would carry approximately 45 passengers per hour of revenue service, assuming fifteen minute headways and 15 hours of daily service.

14.6 Findings

The estimated base ridership of 2,800 riders per day is a conservative one, using these technically-sound standard methods. The resulting ridership is comparable to the existing bus transit routes that currently operate within the proposed streetcar study area. Additional users not considered in the daily travel market, such as conventioneers and tourists, would increase the ridership projections further.
Future land development in downtown Madison is anticipated to attract residents and tenants who view the streetcar as an added service to their community. Many new developments would find increased value by locating near a streetcar route. This observed trend from other communities where streetcar systems were implemented is quantified with a larger total travel market and a higher mode-shift to streetcar for walk and bus trips, as shown in Table 16. As shown in Table 17, the focused development along the streetcar routes leads to the expected increase in ridership of approximately 1.5% per year, compared to the total growth in the travel market of only 0.33% per year.

Table 17 summarizes the ridership analysis conducted for the proposed Madison Streetcar system.

**Table 17. Madison Ridership Analysis**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Total Travel Market (Daily Person Trips)</th>
<th>Streetcar Ridership (Daily Person Trips)</th>
<th>Annual Growth of Ridership (compared to Base Year 2000)</th>
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</thead>
<tbody>
<tr>
<td>Base Year 2000</td>
<td>555,900</td>
<td>2,820</td>
<td>-</td>
</tr>
<tr>
<td>Year 2030</td>
<td>575,600</td>
<td>3,380</td>
<td>0.6%/year</td>
</tr>
<tr>
<td>Year 2030 with Additional Development</td>
<td>614,200</td>
<td>4,430</td>
<td>1.5%/year</td>
</tr>
</tbody>
</table>
15.0 Finance and Implementation

A preliminary review of potential funding sources was conducted to help delineate realistic alternatives for funding the project. Proponents of the streetcar concept have, for some time, been concerned about the complexities and uncertainties involved in seeking Federal and/or State funds for all or a substantial part of the project. They seek to better understand whether local funding is a viable alternative approach. Consequently, the focus of this effort was to assess practicable local resources that might exist to structure one or more sustainable financing schemes using primarily, or entirely, local funding. This chapter presents the results of that analysis.

15.1 Base Assumptions

15.1.1 Extent of System for Financing

The Downtown Loop is the subject of the following funding discussion. This segment is estimated to cost $61 million to build, and $2.5 to 3 million/year to operate. Initially, it had been hoped to include longer system segments (East Isthmus-Campus line east to Ingersoll Street; and/or Park Street line extending south), but early analysis indicates that the increased economic benefits (in terms of added amounts of property development, value and/or ridership) of such extensions would not generate enough added fiscal resources in the near future to cover the added cost burdens. Such extensions can be considered in scenarios if and when other, most likely federal, funds are assumed available to cover part of the system’s cost.

15.1.2 Compact Development Pattern

The best opportunities for developing viable local, property based financing techniques for streetcar systems are where the shortest amount of track has to be built to access a substantial amount of already existing economic activity and developed property value within walking distance of the line; and where adequate redevelopment opportunities (relative to total regional market absorption capacity) exist.

A major strength of the proposed Downtown Loop is that it conveniently accesses a substantial amount of the existing concentration of dense economic and residential activity in the Madison metro area. For example, the assessed value of property within 3 blocks of the Downtown Loop totals approximately $1.6 billion. This not only helps ridership, but also optimizes the amount of existing developed property that can gain in value due to the “streetcar effect”\(^1\) relative to the cost of building track to access it.

\(^1\) Part of the “streetcar effect” is to increase the value of any given property that now has pedestrian proximity to dependable fixed rail transit. Depending on a variety of variables, studies in other cities have shown that residential and commercial real estate with good access to fixed rail transit can command rental premiums of 8 to 20%; the higher end of the range being more typical of heavy rail station areas and the lower end of the range (8 to 15%) being more typical of streetcar. Undeveloped land or underdeveloped sites can increase much more substantially in value due to not only the higher per unit values (e.g. per square foot of office or per residential unit typically commanded, but the greater number of units typically allowed and developed near fixed rail a.k.a. density increases).
As well, undeveloped or underdeveloped sites within this same 3 block distance have the capacity to accommodate over 7 million square feet of new buildings, or about 15 years of absorption, even assuming a 50% acceleration in development pace due to presence of streetcar.

On the other hand, building the Park Street or East Isthmus extensions only increase the amount of assessed value brought under the influence of the streetcar by an amount in the range of $350 million each. Thus, while the project costs for each line extension relative to the Downtown Loop approximately double the total project cost, the amount of added assessed value to support it only increases by about 22%, thereby having a significant dilutive effect on project economics and financing capacity.

While the two additional extensions could substantially increase the amount of redevelopable land brought into play, this is not necessarily a particular advantage. The overall Madison market is relatively small and the development sites served by the Downtown Loop already can accommodate about 15 years of projected absorption. Greatly increasing the range of development opportunities, when the overall market is of limited size, would likely have the effect of diluting the market impact of clustered activity and possibly even lower the overall development pace by causing uncertainty amongst developers as to where the “best” and “hottest” places are to build.

Therefore, a fundamental assumption is that it is neither beneficial nor desirable to too quickly “open up” excess amounts of development sites, particularly when the cost of servicing them is high and potential site availabilities may get significantly ahead of market capacity to absorb.

### 15.1.3 General Federal and State Funding Sources

The State of Wisconsin is unlikely to be a source of any significant funding under any state transportation program. The State’s most likely source of funding, if any, would come from budgets, assets and programs revolving around its role as a large “user” in the Central Downtown Madison area with important property holdings and employee base there. Funding in this regard is discussed below in its role large potential “user” of the system.

### 15.2 Key City Sources

Given the above funding principles and route characteristics of the Downtown Loop, the following have been identified as the most promising sources of City funding that could be applied towards the project cost. Possible ranges for these and other sources are shown in Table 18, below:

#### 15.2.1 Tax Increment Financing (TIF)

A single “Central City” revitalization Tax Increment District with boundaries 3 blocks beyond the “Downtown Loop” would contain approximately $1.6 billion in current assessed property value. Within 5 to 7 years of announcement of a definitive streetcar financing plan and decision to construct, value of existing property in this area might be expected to grow by $130 to $200 million due to the “streetcar effect”, over and above nominal economic growth and inflation. In addition, new development in the area in that same time frame might add another $200 to 350 million in value.
Thus the total “lift” in value in the designated area, due to the combined effect of the streetcar’s impact on property values and due to new development, might be in the order of $330 to $550 million over and above baseline growth in assessments on existing property and thus theoretically potentially available for tax increment. If all of the taxing jurisdictions agreed to revert their share of taxes to the TIF District (e.g. City, School District, Dane County etc: total tax rate = $1.91 per $100 AV) the annual revenue stream might be $6.3 to $10.5 million/year and support in the order of $85 to 145 million in bonding capacity.\(^2\)

However, a very substantial portion of the property in the described potential “Central City” TID boundaries is already included in one of TIDs # 23, 25, 28 or 32. In the extreme case, if all of this property was excluded, the remaining assessed value base available to a new TID would be in the order of $100 million or 6% of the total. Similarly, the amount of new development capacity might be approximately 1 million sf. or 14% of the potential new development. All told, a reduced scale TID excluding all the other existing districts might yield (in 5 to 7 years) an annual revenue stream of $.75 to $1.2 million/year and support in the order of $10 to $16 million in bonding capacity.

In fact, it may be possible to arrive at viable numbers somewhere within the range between the least and most favorable scenario by either (1) closing out some or all of the existing TIDs within the boundaries of a new “Central City” revitalization TID and refinance the existing and remaining project obligations in those areas as part of a new overall Central City revitalization program that includes these projects AND the streetcar project or (2) creating some form of “overlay” TIF funding approach that allows revenues collected in excess of those needed to fund current obligations to be applied towards funding the streetcar.

More detailed analysis of the economic, fiscal and legal aspects of the existing districts and these merger strategies appears to be justified on a priority basis given the large potential funding source identified. Even at the low end of the range, proceeds from a “partial Central City TID” (if all applied to the streetcar) appear to be able to fund approximately 20-25% of the total capital cost of the Downtown Loop. The City of Sacramento, California used a similar approach in the mid 1980’s when it merged its four then existing Redevelopment Project Areas (each a separate TIF district) into a single large Central City Revitalization District and refinanced its bonds. A substantial portion of the new bond proceeds were used to finance the first phase of Sacramento’s Light Rail System.

### 15.2.2 City Owned Land

At least four City owned sites have been identified within the Downtown Loop area as having substantial potential for redevelopment into substantially higher density transit oriented mixed use developments. They comprise parking lots, some of the lower density parking decks and/or other underdeveloped sites. Through a combination of development approaches including (1) shared parking (2) above grade parking garages with many levels and (3) use of public/private development partnerships, existing public parking can be replaced in a more efficient form and substantial private revenue producing new residential, commercial and retail development added in at Madison’s premium locations.

\(^2\) Assuming 20-25 year bonds at 4.5 to 5% interest
These sites might have a potential residual value in the order of $5 million to $15 million, even after allowing for the costs of replacing existing public parking capacity. For example, the City’s Brayton parking lot might alone be able to accommodate approximately 250,000 sf of housing, retail and commercial uses with a value of $8 million to $10 million. From this would be subtracted the $3 million to $5 million that might be required to replace the existing surface parking spaces belonging to the City.

Again, given the large amount of potential value that is tied up in these sites, a more detailed analysis of their individual specific real estate economics appears to be justified.

### 15.2.3 Parking Revenues

The City currently operates over 1400 on-street metered spaces and over 4,000 off street public parking spaces in parking ramps and lots. Most of these spaces are in the areas that would be served by the Downtown Loop. Annual net revenue collections from these sources total approximately $9 million/year or $1,667 per space/year or approximately $6.40 per space per weekday (Monday-Friday). These revenue levels (per space) are substantially less than would be needed to finance the cost of new parking spaces (after allowing for operating costs and debt service) and represent a subsidy to parkers. They also increase costs to the city by creating excessive demand for more subsidized parking while reducing the incentive to use public transit or streetcar.

Other cities, such as Portland, have increased parking rates for both on-street and garage spaces and used some or all of the added revenues to support bond payments to help pay for their streetcar system.

An average $1 dollar a day (or 15% increase) in downtown parking space rates might increase revenues by up to perhaps $1.1 million/year. This added revenue stream could produce, if dedicated to debt service for bonds issued to support the streetcar construction, in the range of $15 million.

### 15.3 Other Key Sources

The following are additional potential local sources of revenue support that should be considered given the large benefits that each of these groups would derive from adjacency to the proposed Downtown Loop. These three sources of activity will generate a major portion of the early ridership of the system since they are important destination points for users. They also each hold substantial developed and underdeveloped properties that would increase significantly in value due to the presence of streetcar.

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3 There might be some loss of use due to the higher rates, but not necessarily within the modest levels of increase being hypothesized. The above case assumes a 15% drop-off in demand for each 1% that rates are increased. Actual “elasticity” of demand needs to be more accurately determined. A higher degree of decrease per each % increase in rates (in combination with streetcar service) may be very economically attractive, because besides the added revenue it provides, it might also be able to lessen demand for parking to the point where (1) new garages would not have to be provided at subsidized rates and (2) it might free up existing spaces that could then be used to support added new development without creating the need to build new spaces.
15.3.1 University of Wisconsin

The streetcar route has been designed to deliver passengers directly to the main gate of the Campus and to various related University facilities along portions of the route (dormitories, residential units, entertainment/retail areas, sports venues). University destined or originated trips could account for over 15% of the initial ridership of the system.

The streetcar can play a role in decreasing the University’s need to build additional parking, increase visitation of its facilities and programs by the community’s employees, residents and visitors, increase accessibility to alternative but convenient housing resources and increase the recruiting appeal of the University to both students, faculty and staff. The streetcar can also possibly reduce some of the bus service costs the University or its students may be incurring either directly (through farebox) or indirectly (through bus passes or other student fee paid mechanisms, University fund transportation services, etc).

As well, the value of any University landholdings that might be used for public/private partnership development along the route (e.g. existing parking lots, or sites similar to the University Square project) will increase substantially due to the “streetcar effect”.

Collectively these benefits to the University and its students, faculty and staff over 20 or 30 years, may amount to many tens of millions of dollars. A small annual surcharge on students, faculty and staff (e.g. increase student activity fees by $5/semester in return for free streetcar use; or increase in parking rates in Campus garages, etc) could perhaps raise in the range of $1/2 million year. This in turn might support the equivalent of $7 million in debt financing.

15.3.2 State and other Large Users

The State of Wisconsin, and Dane County, with thousands of workers in the Downtown Madison area, will, like the University be major beneficiaries of the line. The benefits accrue not only to their workers, but also their daily patrons and clientele. Both of these entities could be approached to help fund the system through either annual funding contracts or up front grants in exchange for bulk passes for their riders.

The State and County also hold valuable real estate in the downtown area, including for example a portion of the Brayton parking lot. It is possible to consider approaches whereby the State and/or County contribute/leverage some of these assets (or the future value increase from them) into the funding mix for the streetcar, without necessarily having to provide any direct cash funding.

15.3.3 Property and Business Owners as Group

The owners of the $1.4 billion in developed property and $200 million in estimated potential redevelopment sites along the Downtown Loop will stand to benefit very significantly from the increased rents, and value creation, deriving from the “streetcar effect”. Most businesses can expect to see increased levels of patronage and sales.

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4 As mentioned earlier, this may amount to up to $200 million in value increase in existing properties and $350 million in value in new development over 7 years.

5 A growing body of analysis reveals that retail activity along light rail and streetcar lines increases as customer access to those retail stores improves. Benefits range from 12 to 30% in the examples studied.
Other cities (Portland, Seattle, and Tyson’s Corner area of Fairfax, Va.) have used their equivalent of a Business Improvement District or Public Improvement District to raise a portion of the funding needed to assure that fixed rail becomes a reality in their neighborhood. In Tyson’s Corner, the property owners voluntarily agreed to 25 cents per $100 Assessed Value supplemental tax on their property to support local contribution to extend Metrorail through their area. Arguably, fixed heavy rail may produce somewhat higher property value benefits than streetcar. Even assuming the creation of a voluntary “Streetcar” Public Improvement District, covering the area within three blocks of the alignment at a rate of 10 cents per $100 Assessed Value (or 40% of the Metrorail example) would yield approximately $1.4 million/year from the date it was initiated. This could support up to $20 million in capital costs.

In Seattle, a Local Improvement District, was set up and the property owners have agreed to pay more than 50% of the total capital cost of the South Lake Union Streetcar ($55 million total cost). Their total assessments average $2 square foot of land, to be collected over 18 years. Applying the same level of assessment in Madison, might yield $35 to 40 million.

15.4 Auxiliary/Supplemental Sources

A number of additional revenue sources have been used by other localities to help finance their streetcar systems. These are very briefly outlined below along with an order of magnitude estimate of their revenue raising potential in the Madison setting. They are viewed as “supplemental resources” that, if available, could help cover embellishments to the “Downtown Loop”, such as more landscaping or amenities at station stops, possibly slightly increased frequency of service, or as a reserve to cover potential cost overruns. In and of themselves, they would not provide an adequate resource base to fund the “Downtown Loop”, and efforts to secure them would only be advised once the City is reasonably confident it has lined up an adequate combination of funding from amongst its “Key City Sources”.

15.4.1 Naming/Sponsorship Rights and Advertising

These sources could include rights to naming and branding the entire system as the “Your Name Here” Streetcar (in Tampa, the local utility obtained rights to call the system there the TECO “Trolley”) in return for a single upfront or long term series of annual payments. Various other systems have used approaches to allow naming of individual cars or stations, as well as advertising in the streetcars and at station platforms.

Collectively, these approaches, if applicable in Madison, might generate up to $5 million over 20 years.

15.4.2 Utility Providers

A major cost component of the system is the provision of the electrical supply (transformers, substations, overhead wires), the relocation of existing electrical utilities and, of course, the ongoing provision of electricity. It is reasonable to approach the electric utility to partner in the

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6 Various factors need to be examined, such as whether the City of Madison has, or has not, already granted any sort of exclusive advertising/franchise rights to any operators/providers of street furniture, transportation system, etc.
project and share some of the costs, since it gains large valuable revenue producing bulk customer and may see some opportunities to obtain economical upgrades/repairs to its basic system as part of the utility relocation work during the construction phase. Costs of the electrical components of the Downtown Loop could total up to $15 million. It may be possible to have the electric utility make this part of the investment and recover it through a specially negotiated rate for providing power to the streetcar. The electric utility may be able to borrow money at a lower cost than the City or other potential sources.

As well, there may be opportunities for Madison Gas and Electric to take tax credits for other in-lieu contributions that reduce project cost (such as interim location of the system’s maintenance shop on its land).

Similar situations may apply, to a lesser extent, with the City’s other private gas, cable and other utility providers with respect to utility relocation/upgrade projects.

15.4.3 General Fund CIP monies and Special Purpose Grants

Other localities have covered a small but not insignificant portion of their system costs from among a large menu of varied and sometimes unique, or one time only, sources. These could range from such sources as certain line items of their Capital Improvement Programs (where certain amounts of funding may already have been set aside for perhaps repaving/upgrade of certain street sections that happen to be on the streetcar route, bridge reconstructions, downtown streetscape/infrastructure improvement funds), park community facilities bond issues, and other local improvement funds. Another potential source of limited funding can come from Community Development Block Grants, and State and Federal economic development sources.

15.4.4 Bonus Density, and In-Lieu of Parking Contributions and other Land Use Tools

A number of communities will conditionally grant increased density entitlements on sites highly accessible to fixed rail transit facilities subject to the site owner providing “offsetting” mitigation measures. These mitigation efforts can include such approaches as direct funding of a portion of the transit system (impact fees, or alternative “mitigation” such as funding a portion of the stops and line in front of or near the property). Another approach is to grant a reduction in zoning parking requirements (due to the proximity to transit) linked to payment of an “in lieu” fee that the granting agency can use to either provide public parking or improved public transportation (such as a streetcar) at its discretion.

In communities where the difference between current allowed land use and build out (pre-streetcar) and future allowed build out (post-streetcar) is large, the potential landowner and developer proffers can be financially very substantial. However, this approach cannot be relied upon when allowable density increases post-streetcar are small (or where they are already achievable “by right” but may not have previously had the right “economic” environment in which to be realized).

A review of the zoning pattern in Madison, in the areas accessible by the Downtown Loop suggests that while some opportunities to use this approach may exist in theory, extensive reliance on it is impracticable as a principal funding tool. There may be a limited number of cases where there are opportunities to allow conditional up-zonings without significant adjacent neighborhood impacts. More promising may be the potential to consider a general reduction in
the parking requirements for new developments along the streetcar line (in Portland, the parking requirement was done away with entirely) and the collection of in-lieu fees related to owners who elect the reductions.

Collectively, these approaches could conservatively generate over $10 million, but would take considerable time to implement and mature. A more detailed study of the existing land use situation is suggested, since the upside potential of this approach could be significant.

Table 18. Potential Funding Sources and Yield

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Yield of Source</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td><strong>City</strong></td>
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<td></td>
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<tr>
<td>TIF</td>
<td>$10</td>
<td>$30</td>
</tr>
<tr>
<td>Owned Properties</td>
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<td>Parking Sources</td>
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<td>Naming Rights</td>
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<td>Utilities</td>
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<td>General Fund/CIP/bond measure</td>
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<tr>
<td>Other eg. Transportation/CDBG</td>
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<td><strong>Subtotal : City Sources</strong></td>
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<td><strong>County &amp; Other Large Users</strong></td>
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<tr>
<td><strong>Subtotal:</strong></td>
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</tr>
<tr>
<td><strong>TOTALS:</strong></td>
<td><strong>$26</strong></td>
<td><strong>$140</strong></td>
</tr>
</tbody>
</table>
Appendix A

Madison Streetcar Preliminary Feasibility Study

Utility Impacts
SOUTH SECTION

Percentages listed are for parallel lines of specific utilities, located approximately within driving lanes or parking lanes, over the entire length of the roadway segment. These parallel lines have the highest potential for conflicts. Conflicts are assumed to require some level of relocation and/or adjustments of lines, manholes or valves. Other possible conflicts are also noted. Electric manholes should be avoided due to regular use by the utility. Based on maps dated 1-24-07 and revised east routes 1-30-07.

Park St (13,700’ long):
Storm Sewer {City Madison}:
  Inbound: 5%
  Outbound: 20%
  7 crossings of >36”

Pumping station adjacent to RR, north of Regent St ~50’ from Park St

Sanitary Sewer {City Madison}:
  Inbound: 20%
  Outbound: 35%

Water {City Madison}:
  Inbound: 35%
  Outbound: 40%

Gas {MG&E}:
  Inbound: 1% (60psi)
  Outbound: 15% (60 psi); 5% (20psi)

Buried Electric {MG&E}:
Inbound: 7% (buried high voltage transmission)
Outbound: 7% (buried high voltage transmission). Several manholes in right driving/parking lane (Erin St to State).
Telephone:
Inbound: 50%
Outbound: 50%

State St.—lower section {1900’ long}:
Storm Sewer {City Madison}:
Outbound: 40%

Sanitary Sewer {City Madison}:
Outbound: 50%

Water {City Madison}:
Outbound: 100%

Gas {MG&E}:
Outbound: 0%

Buried Electric {MG&E}:
Outbound: Manholes in parking lane

Telephone:
Outbound: 50%

State St.—upper section (closer to square) {500’ long}:
Storm Sewer {City Madison}:
Outbound: 0%

Sanitary Sewer {City Madison}:
Outbound: 0%
Water {City Madison}:
Outbound: 0%

Gas {MG&E}:
Outbound: 75%

Buried Electric {MG&E}:
Outbound: Manholes in parking lane
1 crossing of buried high voltage transmission line at Henry

Telephone:
Outbound: 50%

**West Johnson St. [3300' long]:**

Storm Sewer {City Madison}:
Inbound: 40%

G:\MISC\HDR Madison Streetcar\Design\PHASE 1_util route summary_SOUTH.doc

Sanitary Sewer {City Madison}:
Inbound: 0%

Water {City Madison}:
Inbound: 100%

Gas {MG&E}:
Inbound: 10% (20 psi)

Buried Electric {MG&E}:
Inbound: Manholes in left driving/parking lane

Telephone:
Inbound: 50%
**Broom St (2800' long):**

Storm Sewer (City Madison):
Outbound: 25%

Sanitary Sewer (City Madison):
Outbound: 45%

Water (City Madison):
Outbound: 90%

Gas (MG&E):
Outbound: 10%

Buried Electric (MG&E):
Outbound: Manholes in left driving/parking lane
1 crossing of buried high voltage transmission line at Mifflin

Telephone:
Outbound: 50%

**Wilson St (2800' long):**

Storm Sewer (City Madison):
Outbound: 0%

Sanitary Sewer (City Madison):
Outbound: 20%

Water (City Madison):
Outbound: 80%
Gas (MG&E):
Outbound: 40% (20 psi)
Buried Electric {MG&E}:
Outbound: Manholes in left driving/parking lane

Telephone:
Outbound: 50%

**Fairchild St (1200’ long):**
Storm Sewer {City Madison}:
Outbound: 50%

Sanitary Sewer {City Madison}:
Outbound: 20%

Water {City Madison}:
Outbound: 100%

Gas {MG&E}:
Outbound: 40% (20 psi)

Buried Electric {MG&E}:
Outbound: Manholes in right parking lane

Telephone:
Outbound: 50%

All segments will impact City of Madison street lights and traffic signals.
Percentages listed are for parallel lines of specific utilities, located approximately within driving lanes or parking lanes, over the entire length of the roadway segment. These parallel lines have the highest potential for conflicts. Conflicts are assumed to require some level of relocation and/or adjustments of lines, manholes or valves. Other possible conflicts are also noted. Electric manholes should be avoided due to regular use by the utility. Based on maps dated 1-24-07 and revised east routes 1-30-07.

**Butler St {1100’ long} (inbound=E.Wash to Wilson):**

Storm Sewer {City Madison}:
- Inbound: 0%
- 1 crossing of >36”

Sanitary Sewer {City Madison}:
- Inbound: 0%

Water {City Madison}:
- Inbound: 100%

Gas {MG&E}:
- Inbound: 0%

Buried Electric {MG&E}:
- Inbound: 0 %

Telephone:
- Inbound: 50%
**E. Washington Ave (2200' long)**

Storm Sewer {City Madison}:
Inbound: 40%
3 crossing of >36”

Sanitary Sewer {City Madison}:
Inbound: 70%

Water {City Madison}:
Inbound: 15%
Gas {MG&E}:
Inbound: 0%

Buried Electric {MG&E}:
Inbound: 1 crossing of buried high voltage transmission lines (2) at Blount

Telephone:
Inbound: 50%

---

**Ingersoll St (900’ long) (inbound=Main to Mifflin)**

Storm Sewer {City Madison}:
Inbound: 0%

Sanitary Sewer {City Madison}:
Inbound: 0%

Water {City Madison}:
Inbound: 90%

Gas {MG&E}:
Inbound: 0%

Buried Electric {MG&E}:
Inbound: 1 manhole at Main St intersection. Avoidance is probable in final design.
1 crossing of buried high voltage transmission line at E. Washington
Telephone:
Inbound: 50%

*Miifflin St. {900’ long} (inbound=Ingersoll to Livingston)*:
Storm Sewer {City Madison}:
Inbound: 0%

Sanitary Sewer {City Madison}:
Inbound: 25%

Water {City Madison}:
Inbound: 100%

Gas {MG&E}:
Inbound: 0%

Buried Electric {MG&E}:
Inbound: None
Telephone:
Inbound: 50%

*Livingston St {400’ long} (inbound=Mifflin to E. Wash)*:
Storm Sewer {City Madison}:
Inbound: 0%

Sanitary Sewer {City Madison}:
Inbound: 0%

Water {City Madison}:
Inbound: 100%
Gas {MG&E}:
Inbound: 0%

Buried Electric {MG&E}:
Inbound: 1 manhole at East Washington intersection. Avoidance probable in final design.

Telephone:
Inbound: 50%

All segments will impact City of Madison street lights and traffic signals.
Appendix C
Madison Streetcar Preliminary Feasibility Study
Traffic Impacts

Park Street

State Street (Library Mall)—W. Johnson St.

General Character of Route

Park Street can be broken down into two sections:

Section 1 (State St. to University Ave.): 2 to 3-lane un-divided urban roadway that is classified as a collector. The cross section varies from one driving lane and a paved shoulder to two driving lanes with the outer lane shared with bikes.

Section 2 (University Ave. to W. Johnson St.): 4-lane divided urban roadway that is classified as a primary arterial. The cross section consists of 2 driving lanes with 1 bike lane.

Speed limit is 25 mph.

Lane Usage

It is anticipated the streetcar will use the driving lane in Section 1. There will be impacts to vehicular traffic during peak periods since the streetcar will occupy one of the travel lanes.

It is anticipated the streetcar will use the rightmost travel lane in Section 2. There will be impacts to vehicular traffic in these areas during peak periods since the streetcar will occupy one of the travel lanes.

Parking

No parking is allowed along the route.

Intersection Impress

A new intersection will be required at Library Mall, but this will only be for streetcar use only. No signalization is anticipated. Streetcar will yield to vehicular traffic.

It is not anticipated that a separate phase would be needed at any of the signalized intersection locations since the streetcar will not need to make left turns from the far right lane. The following list identifies the signalized intersections.

♦ University Ave
♦ West Johnson St

Some adjustments to signal timing and/or use of pre-emption may be necessary to maintain streetcar progression along the route. Modifications to intersection curb lines are anticipated to accommodate stop locations.
Pedestrian Interaction
This route provides good opportunities for pedestrians to interact with the streetcar. This section has a high level of pedestrian traffic and vehicular traffic is accustomed to their presence. There is a pedestrian overpass, just south of the proposed Library Mall intersection that enhances pedestrian safety. This is a highly used bike route. There are potential conflicts with bicycles along this segment.

West Johnson Street

Park Street—Broom Street

General Character of Route
West Johnson is a 3 to 4-lane un-divided urban roadway that is classified as a primary arterial. The cross section can be broken down into 2 sections:

♦ Section 1 (Park St—Basset St.): 4 driving lanes

♦ Section 2 (Basset St. to Broom St): 3 driving lanes and one bike lane on left side

This is a one-way street. Speed limit is 25 mph.

Lane Usage
It is anticipated the streetcar will use the left most driving lanes. There will be impacts to vehicular traffic in these areas during peak periods since the streetcar will occupy one of the travel lanes.

Parking
No parking is allowed along the route.

Intersection Impacts
All intersections are signalized. It is not anticipated that a separate phase would be needed at any of the signalized intersection locations since the streetcar will not need to make left turns from the far right lane. The following list identifies the signalized intersections.

♦ North Lake St

♦ North Frances St

♦ Henry Mall

♦ Basset St

♦ Broom St.

Some adjustments to signal timing and/or use of pre-emption may be necessary to maintain streetcar progression along the route. Modifications to intersection curb lines are anticipated to accommodate stop locations.
**Pedestrian Interaction**

This route provides good opportunities for pedestrians to interact with the streetcar. Most of the intersections already accommodate moderate to high levels of pedestrian traffic and vehicular traffic is accustomed to their presence. Possible conflicts with bike lane function.

**Broom Street**

**West Johnson Street—West Gorham Street**

*General Character of Route*

Broom St. is a 2-lane un-divided urban roadway that is classified as an arterial. The cross section is two driving lanes and a paved shoulder/parking lane on the right side. This is one-way street going westerly (W. Johnson to W. Gorham) Speed limit is 25 mph.

*Lane Usage*

It is anticipated the streetcar will use the driving lane.

*Parking*

There is 2-hour parking along this segment.

*Intersection Impacts*

The intersection with Gorham is signalized. It is not anticipated that a separate phase would be needed since the streetcar will not need to make a left turn from the far right lane. Some adjustments to signal timing and/or use of pre-emption may be necessary to maintain streetcar progression along the route. Modifications to intersection curb lines are anticipated to accommodate stop locations.

*Pedestrian Interaction*

This route provides good opportunities for pedestrians to interact with the streetcar. Most of the intersections already accommodate moderate to high levels of pedestrian traffic and vehicular traffic is accustomed to their presence.

**Broom Street**

**West Gorham St.—State Street**

*General Character of Route*

Broom St. is a 2-lane urban roadway that is classified as an arterial. The cross section is one driving lane and a paved shoulder/parking lane on both sides. Speed limit is 25 mph.

*Lane Usage*

It is anticipated the streetcar will use a driving lane.

*Parking*

There is parking and loading zones along this segment.
Intersection Impacts
The intersection with State St is un-signalized.

Pedestrian Interaction
This route provides good opportunities for pedestrians to interact with the streetcar. The intersection already accommodate moderate to high levels of pedestrian traffic and vehicular traffic is accustomed to their presence.

State Street

Broom St.—N. Lake Street

General Character of Route
State St. is a 2-lane urban roadway that is classified as a local road. The cross section is one driving lane and a paved shoulder on both sides. This is not a thru street; only pedestrians, busses, deliveries, emergency vehicles are permitted. Speed limit is 25 mph.

Lane Usage
It is anticipated the streetcar will use the driving lane.

Parking
There is no parking along this segment, but business deliveries are made from the shoulder.

Intersection Impacts
The intersection with Lake St is all way stop controlled. This 3-way intersection will need to have a leg added and may need to be signalized.

Pedestrian Interaction
This route provides good opportunities for pedestrians to interact with the streetcar. The route already accommodates high levels of pedestrian traffic. This is a highly used bike route. There are potential conflicts with the tracks for some bicyclists.

State Street

N. Lake Street—Park Street

General Character of Route
This segment is a pedestrian mall.

Lane Usage
The streetcar will create a new route in this area.

Parking
There is no parking along this segment.
Intersection Impacts
A new intersection will be required at Park Street.

Pedestrian Interaction
This route provides good opportunities for pedestrians to interact with the streetcar. The route already accommodates high levels of pedestrian traffic.

EAST SECTION

East Main Street

Webster St.—S. Ingersoll St.

General Character of Route
East Main Street is a 2-lane un-divided urban roadway that is classified as a local street. The cross section is one driving lane and a shoulder/parking lane in each direction. Speed limit is 25 mph.

Lane Usage
It is anticipated the streetcar will use the driving lane. There will be minimal impacts to vehicular traffic in these areas during peak periods since the streetcar will occupy the travel lane.

Parking
Parking allowed along entire route. Loss of several stalls at the Blair and Ingersoll intersections to accommodate stops will be required.

Intersection Impacts
All existing intersections are stop controlled. Modifications to intersection curb lines are anticipated to accommodate stop locations. A signal is being proposed at the intersection of E. Main and Blair Streets.

Pedestrian Interaction
This route provides good opportunities for pedestrians to interact with the streetcar. The route has low to moderate levels of pedestrian traffic and vehicular traffic will need to adjust to additional pedestrians.

Main Street

Fairchild Street—Webster Street

General Character of Route
Main St is a 1-lane urban roadway that is classified as a local street. The cross section has 1 driving lane with a parking lane on one side of the street. The section on the capitol square has a diamond lane on the right side, parallel parking on the left. The sections off the square have
diagonal parallel parking on the left side of traffic. These are one-way streets that run opposite to each other (off-square vs. on-square). Speed limit is 25 mph.

**Lane Usage**

It is anticipated the streetcar will use the parking lanes on the off-square section and a portion of the diamond lane on the square.

**Parking**

Parking is allowed along the route. A loss of the stalls in the off-square portions is anticipated.

**Intersection Impacts**

The intersections are signalized. It is not anticipated that a separate phase would be needed at any of the signalized intersection locations since the streetcar will not need to make left turns from the far right lane. Some adjustments to signal timing and/or use of pre-emption may be necessary to maintain streetcar progression along the route. Modifications to intersection curb lines are anticipated to accommodate stop locations.

**Pedestrian Interaction**

This route provides good opportunities for pedestrians to interact with the streetcar. Most of the intersections already accommodate moderate to high levels of pedestrian traffic and vehicular traffic is accustomed to their presence. Conflicts with bike lane on the square are anticipated.

**South Ingersoll Street**

**E. Main St.—E. Mifflin Street**

**General Character of Route**

Ingersoll Street is a 2-lane un-divided urban roadway that is classified as a local street. The cross section is one driving lane. Speed limit is 25 mph.

**Lane Usage**

It is anticipated the streetcar will use the driving lane. There will be minimal impacts to vehicular traffic during peak periods since the streetcar will occupy one of the travel lanes.

**Parking**

No parking is allowed along the route.

**Intersection Impacts**

The intersection with East Washington Avenue is signalized. It is not anticipated that a separate phase would be needed since the streetcar will not need to make left turns from the far right lane. Some adjustments to signal timing and/or use of pre-emption may be necessary to maintain streetcar progression along the route. Modifications to intersection curb lines are anticipated to accommodate stop locations.

**Pedestrian Interaction**
This route provides good opportunities for pedestrians to interact with the streetcar. The route has low to moderate levels of pedestrian traffic and vehicular traffic will need to adjust to additional pedestrians.

**E. Mifflin Street**

**S. Ingersoll Street—N. Livingston Street**

*General Character of Route*

E. Mifflin St. is a 2-lane un-divided urban roadway that is classified as a local street. The cross section is one driving lane in each direction. Speed limit is 25 mph.

*Lane Usage*

It is anticipated the streetcar will use the driving lane. There will be minimal impacts to vehicular traffic in these areas during peak periods since the streetcar will occupy the travel lanes.

*Parking*

Parking is not allowed in this segment.

*Intersection Impacts*

All intersections are stop controlled. Modifications to intersection curb lines are anticipated to accommodate stop locations.

*Pedestrian Interaction*

This route provides good opportunities for pedestrians to interact with the streetcar. Most of the intersections already accommodate moderate to high levels of pedestrian traffic and vehicular traffic is accustomed to their presence.

**N. Livingston Street**

**E. Mifflin Street—E. Washington Ave**

*General Character of Route*

N. Livingston St. is a 2-lane un-divided urban roadway that is classified as a local street. The cross section is two driving lanes and a paved shoulder/parking lane on both sides. Speed limit is 25 mph.

*Lane Usage*

It is anticipated the streetcar will use the driving lane. There will be minimal impacts to vehicular traffic in these areas during peak periods since the streetcar will occupy the travel lanes.

*Parking*

There is parking along this segment.

*Intersection Impacts*
All intersections are stop controlled. Modifications to intersection curb lines are anticipated to accommodate stop locations.

Pedestrian Interaction
This route provides good opportunities for pedestrians to interact with the streetcar. The intersections already accommodate moderate levels of pedestrian traffic and vehicular traffic is accustomed to their presence.

**East Washington Ave.**

**N. Livingston St.—Butler Street**

*General Character of Route*

E. Washington Ave. is a 3-lane urban divided roadway that is classified as a primary arterial. The cross section can be broken down into 3 sections:

- Section 1 (N. Livingston to Blount St): 3 driving lanes with 1 diamond lane (bikes, buses and right turns)
- Section 2 (Blount St. to Blair St.): 1 left turn lane, 1 left turn/thru, 2 thru/right driving lanes.
- Section 3 (Blair St. to Butler St.) : 3 driving lanes with outside shoulder/parking lane

*Lane Usage*

It is anticipated the streetcar will use the middle driving lane on Section 1 and the inside driving lane in Sections 2 & 3. There will be impacts to vehicular traffic in these areas during peak periods since the streetcar will occupy one of the travel lanes.

*Parking*

The only parking is allowed between Blair St and Butler St. No loss of parking is anticipated.

*Intersection Impacts*

It is not anticipated that a separate phase would be needed at the Blair St. signalized intersection location since the streetcar will not need to make left turns from the far right lane. Some adjustments to signal timing and/or use of pre-emption may be necessary to maintain streetcar progression along the route. The remaining intersections are stop controlled on the side road only. Modifications to intersection curb lines are anticipated to accommodate stop locations.

*Pedestrian Interaction*

This route provides good opportunities for pedestrians to interact with the streetcar. The intersections already accommodate moderate levels of pedestrian traffic and vehicular traffic is accustomed to their presence.
Butler Street

East Washington Ave.—E. Wilson Street

*General Character of Route*

Butler St. is a 2-lane urban roadway that is classified as a collector. The cross section is one driving lane and a shoulder/parking lane both sides. Speed limit is 25 mph.

*Lane Usage*

It is anticipated the streetcar will use the driving lane. There will be impacts to vehicular traffic in these areas during peak periods since the streetcar will occupy one of the travel lanes.

*Parking*

There is parking along this segment. Loss of several stalls will be required where stops are placed.

*Intersection Impacts*

The intersection with Wilson St is signalized. It is not anticipated that a separate phase would be needed since the streetcar will not need to make left turns from the far right lane. Some adjustments to signal timing and/or use of pre-emption may be necessary to maintain streetcar progression along the route. All others are all way stop controlled. Modifications to intersection curb lines are anticipated to accommodate stop locations.

*Pedestrian Interaction*

This route provides good opportunities for pedestrians to interact with the streetcar. The intersections already accommodate moderate levels of pedestrian traffic and vehicular traffic is accustomed to their presence.

East Wilson Street

Butler Street—Broom Street

*General Character of Route*

East Wilson St. is a 1 to 2-lane urban roadway that is classified as a collector. The cross section can be broken down into 2 sections:

- Section 1 (Butler St. to Henry St): 2 driving lanes with 1 parking lane on both sides
- This is a one way street going westerly (Butler to Henry)
- Section 2 (Henry St. to Broom St.): 1 driving lane

Speed limit is 25 mph.
Lane Usage

The streetcar can use either driving lane. There will be impacts to vehicular traffic in these areas during peak periods since the streetcar will occupy one of the travel lanes.

Parking

There is parking along both sides on this segment, between Butler St. and Henry St. Loss of several stalls will be required where stops are placed.

Intersection Impacts

The intersections with Henry and Broom Streets are signalized. It is not anticipated that a separate phase would be needed since the streetcar will not need to make left turns from the far right lane. If the right driving lane is used, modifications to the Wilson/Henry Streets signal will be necessary. All others are stop controlled on the side road. Modifications to intersection curb lines are anticipated to accommodate stop locations.

Pedestrian Interaction

This route provides good opportunities for pedestrians to interact with the streetcar. The intersections already accommodate moderate levels of pedestrian traffic and vehicular traffic is accustomed to their presence.

Broom Street

W. Wilson Street—W. Johnson Street

General Character of Route

Broom St. is a 2-lane urban roadway that is classified as an arterial. The cross section has 2 driving lanes and a parking lane on the right. This is a one way street going westerly (Wilson to Johnson). Speed limit is 25 mph.

Lane Usage

It is anticipated the streetcar will use one of the driving lanes. There will be impacts to vehicular traffic in these areas during peak periods since the streetcar will occupy one of the travel lanes.

Parking

There is parking along one side. A loss of several stalls will be required where stops are placed.

Intersection Impacts

The intersections are signalized. It is not anticipated that a separate phase would be needed since the streetcar will not need to make left turns from the far right lane. Modifications to intersection curb lines are anticipated to accommodate stop locations. The following list identifies the signalized intersections:

- Doty St.
- West Washington Ave.
West Johnson St.

Pedestrian Interaction
This route provides good opportunities for pedestrians to interact with the streetcar. The intersections already accommodate moderate levels of pedestrian traffic and vehicular traffic is accustomed to their presence.

West Johnson Street

Broom Street—State Street

General Character of Route
West Johnson is a 3-lane un-divided urban roadway that is classified as a primary arterial. The cross section has 3 driving lanes. This is a one-way street (Broom to State) Speed limit is 25 mph.

Lane Usage
It is anticipated the streetcar will use the left most driving lanes. There will be impacts to vehicular traffic in these areas during peak periods since the streetcar will occupy one of the travel lanes.

Parking
No parking is allowed along the route.

Intersection Impacts
The State St. intersection is signalized. Some modifications to the signal will be necessary. It is not anticipated that a separate phase would be needed at any of the signalized intersection locations since the streetcar will not need to make left turns from the far right lane. Some adjustments to signal timing and/or use of pre-emption may be necessary to maintain streetcar progression along the route. Modifications to intersection curb lines are anticipated to accommodate stop locations.

Pedestrian Interaction
This route provides good opportunities for pedestrians to interact with the streetcar. Most of the intersections already accommodate moderate to high levels of pedestrian traffic and vehicular traffic is accustomed to their presence.

State Street

W. Johnson St.—Fairchild St.

General Character of Route
State St. is a 2-lane urban roadway that is classified as a local road. The cross section is one driving lane and a paved shoulder on both sides. This is not a thru street; only pedestrians, busses, deliveries, emergency vehicles are permitted. Speed limit is 25 mph.
Lane Usage
It is anticipated the streetcar will use the driving lane.

Parking
There is no parking along this segment, but business deliveries are made from the shoulder.

Intersection Impacts
The intersection with Fairchild St is signalized. It is not anticipated that a separate phase would be needed at any of the signalized intersection locations since the streetcar will not need to make left turns from the far right lane. Some adjustments to signal timing and/or use of pre-emption may be necessary to maintain streetcar progression along the route. Modifications to intersection curb lines are anticipated to accommodate stop locations.

Pedestrian Interaction
This route provides good opportunities for pedestrians to interact with the streetcar. The route already accommodates high levels of pedestrian traffic. This is a highly used bike route. There are potential conflicts with bicycles along the route.

Fairchild Street

State Street—Main Street

General Character of Route
Fairchild is a 2-lane un-divided urban roadway that is classified as an arterial. The cross section has 2 driving lanes with parking lanes on both sides. This is a one-way street (State to Main) Speed limit is 25 mph.

Lane Usage
It is anticipated the streetcar will use one the left most driving lane. There will be impacts to vehicular traffic in these areas during peak periods since the streetcar will occupy one of the travel lanes.

Parking
Parking is allowed on both sides along the route.

Intersection Impacts
The West Washington Ave. intersection is signalized. It is not anticipated that a separate phase would be needed at any of the signalized intersection locations since the streetcar will not need to make left turns from the far right lane. Some adjustments to signal timing and/or use of pre-emption may be necessary to maintain streetcar progression along the route. Modifications to intersection curb lines are anticipated to accommodate stop locations.

Pedestrian Interaction
This route provides good opportunities for pedestrians to interact with the streetcar. Most of the intersections already accommodate moderate to high levels of pedestrian traffic and vehicular traffic is accustomed to their presence.
SOUTH SECTION

Park Street

South Transfer Point—University Ave

General Character of Route

Park Street is a 4-lane divided urban roadway that is classified as a primary arterial. The cross section can be broken down into 3 sections:

♦ Section 1 (South Transfer Point to RR crossing & Lakeside to West Washington Ave.): 2 driving lanes with 1 diamond lane (bikes, buses and right turns)

♦ Section 2 (RR crossing to Lakeside Street): 2 driving lanes and paved shoulder

♦ Section 3 (West Washington Ave. to University Ave.): 2 driving lanes with 1 bike lane

A portion of the route from the West Beltline to West Washington Ave. is designated as USH 151. Speed limit is 30 mph to Regent St then drops to 25 mph.

Lane Usage

It is anticipated the streetcar will use the diamond/shoulder lane for the majority of the route. In areas where this auxiliary lane is narrow, West Washington Ave. to University Ave, the streetcar will need to use the rightmost travel lane. There will be impacts to vehicular traffic in these areas during peak periods since the streetcar will occupy one of the travel lanes. There are some alternative routes (e.g. West Washington Ave for traffic heading to/from capitol area) that can be used to avoid this portion of Park St.

Parking

Majority of route does not allow parking. The areas that permit 2-hour parking are from the RR crossing to Fish Hatchery and from Erin St. to Drake St. A loss of this parking is anticipated to accommodate the streetcar in the diamond/shoulder lane.

Intersection Impacts

It is not anticipated that a separate phase would be needed at any of the signalized intersection locations since the streetcar will not need to make left turns from the far right lane. The following list identifies the signalized intersections.

♦ Buick St

♦ Plaenert Dr.

♦ Wingra Dr
Some adjustments to signal timing and/or use of pre-emption may be necessary to maintain streetcar progression along the route. The remaining 7 intersections are stop controlled on the side road only. Modifications to intersection curb lines are anticipated to accommodate stop locations. A signal is proposed near the intersection of Badger Rd and the South Transfer Point.

Pedestrian Interaction

Two high volume pedestrian corridors are encountered along the route. The Wingra Creek Bike Path is intersected at Wingra Street and the UW-Madison campus is traversed from Regent Street to Library Mall. This route provides good opportunities for pedestrians to interact with the streetcar. Most of the intersections already accommodate moderate to high levels of pedestrian traffic and vehicular traffic is accustomed to their presence. Conflicts with bike lanes are anticipated.

Park Street

State Street (Library Mall)—University Ave.

General Character of Route

Park Street is a 2 to 3-lane un-divided urban roadway that is classified as a collector. The cross section varies from one driving lane and a paved shoulder to two driving lanes with the outer lane shared with bikes. Speed limit is 25 mph.

Lane Usage

It is anticipated the streetcar will use the driving lane. There will be impacts to vehicular traffic during peak periods since the streetcar will occupy one of the travel lanes.

Parking

No parking is allowed along the route.
Intersection Impacts
There are no existing intersections in this segment. A new intersection will be required at Library Mall, but this will only be for streetcar use only. No signalization is anticipated. Streetcar will yield to vehicular traffic.

Pedestrian Interaction
This route provides good opportunities for pedestrians to interact with the streetcar. This section has a high level of pedestrian traffic and vehicular traffic is accustomed to their presence. There is a pedestrian overpass approximately mid-block that enhances pedestrian safety. This is a highly used bike route. There are potential conflicts with bicycles along this segment.

West Johnson Street

Park Street—Broom Street

General Character of Route
West Johnson is a 3 to 4-lane un-divided urban roadway that is classified as a primary arterial. The cross section can be broken down into 2 sections:

- Section 1 (Park St—Basset St.): 4 driving lanes
- Section 2 (Basset St. to Broom St): 3 driving lanes and one bike lane on left side

This is a one-way street. Speed limit is 25 mph.

Lane Usage
It is anticipated the streetcar will use the left most driving lanes. There will be impacts to vehicular traffic in these areas during peak periods since the streetcar will occupy one of the travel lanes.

Parking
No parking is allowed along the route.

Intersection Impacts
All intersections are signalized. It is not anticipated that a separate phase would be needed at any of the signalized intersection locations since the streetcar will not need to make left turns from the far right lane. The following list identifies the signalized intersections.

- North Lake St
- North Frances St
- Henry Mall
- Bassett St
- Broom St.
Some adjustments to signal timing and/or use of pre-emption may be necessary to maintain streetcar progression along the route. Modifications to intersection curb lines are anticipated to accommodate stop locations.

Pedestrian Interaction

This route provides good opportunities for pedestrians to interact with the streetcar. Most of the intersections already accommodate moderate to high levels of pedestrian traffic and vehicular traffic is accustomed to their presence. Possible conflicts with bike lane function.

Broom Street

West Johnson Street—West Gorham Street

General Character of Route

Broom St. is a 2-lane un-divided urban roadway that is classified as an arterial. The cross section is two driving lanes and a paved shoulder/parking lane on the right side. This is one-way street going westerly (W. Johnson to W. Gorham) Speed limit is 25 mph.

Lane Usage

It is anticipated the streetcar will use the driving lane.

Parking

There is 2-hour parking along this segment.

Intersection Impacts

The intersection with Gorham is signalized. It is not anticipated that a separate phase would be needed since the streetcar will not need to make a left turn from the far right lane. Some adjustments to signal timing and/or use of pre-emption may be necessary to maintain streetcar progression along the route. Modifications to intersection curb lines are anticipated to accommodate stop locations.

Pedestrian Interaction

This route provides good opportunities for pedestrians to interact with the streetcar. Most of the intersections already accommodate moderate to high levels of pedestrian traffic and vehicular traffic is accustomed to their presence.

Broom Street

West Gorham St.—State Street

General Character of Route

Broom St. is a 2-lane urban roadway that is classified as an arterial. The cross section is one driving lane and a paved shoulder/parking lane on both sides. Speed limit is 25 mph.

Lane Usage
It is anticipated the streetcar will use a driving lane.

Parking
There is parking and loading zones along this segment.

Intersection Impacts
The intersection with State St is un-signalized.

Pedestrian Interaction
This route provides good opportunities for pedestrians to interact with the streetcar. The intersection already accommodate moderate to high levels of pedestrian traffic and vehicular traffic is accustomed to their presence.

State Street

Broom St.—N. Lake Street

General Character of Route
State St. is a 2-lane urban roadway that is classified as a local road. The cross section is one driving lane and a paved shoulder on both sides. This is not a thru street; only pedestrians, busses, deliveries, emergency vehicles are permitted. Speed limit is 25 mph.

Lane Usage
It is anticipated the streetcar will use the driving lane.

Parking
There is no parking along this segment, but business deliveries are made from the shoulder.

Intersection Impacts
The intersection with Lake St is all way stop controlled. This 3-way intersection will need to have a leg added and may need to be signalized.

Pedestrian Interaction
This route provides good opportunities for pedestrians to interact with the streetcar. The route already accommodates high levels of pedestrian traffic. This is a highly used bike route. There are potential conflicts with the tracks for some bicyclists.

State Street

N. Lake Street—Park Street

General Character of Route
This segment is a pedestrian mall.

Lane Usage
The streetcar will create a new route in this area.

Parking
There is no parking along this segment.

Intersection Impacts
A new intersection will be required at Park Street.

Pedestrian Interaction
This route provides good opportunities for pedestrians to interact with the streetcar. The route already accommodates high levels of pedestrian traffic.

Table 18 below summarizes the rating of each evaluated street with respect to these potential engineering conflicts. A high level of feasibility/low level of conflict is depicted (in the "Consumer Reports" format) as a full circle; a medium rating of feasibility and conflict as a divided circle, and a low rating of feasibility/high incidence of conflict is shown as an empty circle)
### Table 19. Feasibility and Conflict of Evaluated Streets

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<th>FREIGHT RAIL</th>
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Appendix D

Minutes
June 21, 2006
6 PM

1. Presentation:

Mayor Cieslewicz opened with remarks. Then Charlie Hales (HDR) introduced the panelists, Jimmy Moses, a real estate developer from Little Rock, Arkansas and Kevin Phelps, a conference center owner and former City Council member from Tacoma, Washington. Mike Burton, vice-provost for Portland State University was also to be present but was unable because of the weather and airlines.

2. Public Comment:

- Rick Cathcart – Owns bicycle messenger service and has concerns about the impact tracks will have. Also have concerns about the impacts on winter/year-round cycling?
  - Charlie – Portland has a big bicycling community. There is the danger of catching wheel in slot, but signs were created to educate cyclists. We did have some accidents but no serious accidents. You have to do education and outreach. You can’t do bike lane and streetcar in same lane. Can look to Europe – Amsterdam has about 25% mode share for bikes and miles and miles of trams so we have to learn from them. There are definitely are design and public education issues.
  - Jimmy – More biking now because “trolley tames the traffic.”
  - Kevin – 70% of streetcar line is in a dedicated right of way so no major issues with bikes.
  - Charlie – On winter issues, we have to learn from Europe. We can look to Germany and the Czech Republic where lots of cities have trams and lots of snow and ice.
  - Mayor - City of Madison did have streetcars and ice and snow for over 40 years ending in 1935.
- Ed Blume – From the Madison Peak Oil group - he showed a chart of oil supply through history and had no question. Production of oil will be dropping, we need mass transit.
- Bruce Woods – The speakers talk a lot about how their cities were in bad shape but Madison is already there with condo boom downtown, etc.; concerned about impact on affordable housing; what is role of streetcar in our type of city;
Charlie – We are getting lots of high end housing around country with or without streetcar; so, the question is how to serve and sustain quality of life; the community has to address affordability with parallel agenda but transit can’t do it alone.

Jimmy – had a lot of low and moderate income housing before the streetcar and higher end product that has brought balance – cities need to work on balance and diversity; every city has to think about congestion, pollution, oil prices; electric is quiet and streetcars seem to calm traffic; make neighborhoods bikeable and walkable;

Kevin – need to make investment now on 20 or 30 year window to shape your city – Tacoma is now looking to expand their lines and they expect high level of support; also had reverse problems

- No name? Tacoma designed for streetcar and light rail, how much did that add to the cost?
  - Kevin - Don’t know the answer; possibly 5 or 10%
- No name? Have you found trolleys cheaper than streetcars?
  - Charlie - Older vehicles (trolleys) were cheaper to buy initially, but not so much anymore (the good ones are gone); and, trolleys have higher maintenance costs and have technical issues such as ADA requirements.
- No name? How was your streetcar line funded?
  - Jimmy - $30 million -Regional transit authority and federal government; Operating costs are on a multi-county basis – originally there was argument that only two of nine cities would benefit but has not stopped construction;
  - Kevin – $80 million - additional food and beverage tax, motor vehicle excise tax and state sales tax through referendum ($7 billion package)

Carl Durocher - What type of pre-existing transit did your community have and what were the types of impacts on that transit, including on funding?
  - Jimmy – bus system has experienced growth because of increases in ridership, interest and excitement about mass transit, etc. gas prices have contributed; in general regional system has 10,000 riders and streetcar is 1,000 of that; funding is always a problem and we need a broader funding mechanism; also now looking at using streetcar to airport (6 miles);
  - Charlie – Streetcars have generally been additive to bus and light rail system – can take a trip that wasn’t practical before; haven’t gone back for more funding;
  - Kevin – had bus service and express routes; have regional bus and commuter rail – Critics said commuter rail would just be shifting riders from mode to mode but they have seen continued growth on regional bus; stigma in my community about riding the bus; unfortunate but reality; attracted whole new type of transit user – consistent pattern across the country

Bob Schaefer – Congestion is often used as an argument for these projects. What have you measured? What are the impacts on traffic? In regards to bicycles, how will you handle on south Park Street where there is no parallel street on which to divert them? Bus systems have a stigma because of appearance what if used rubber tires with streetcar shell? What types of platforms would you have and how long would people have to wait? And what about weaving of cars?
  - Charlie- In regards to bikes on Park Street, one option is run streetcar on left travel lane and you don’t want to pick a hostile territory for a station. We are not at weaving stage of work yet. In regards to congestion, in Portland we were trying
to cause congestion; trying to have busier livelier downtown. Relieving congestion is not purpose of this project. The streetcar line has not had a material impact on traffic, no more impact than a bus.

- Jimmy – Ditto about congestion. We had a rubber tire trolley that ran for two or three years in Little Rock and ridership was minimal. With the rail system ridership jumped dramatically. Rubber tired trolleys have reappeared with higher ridership. Streetcars have encouraged more transit use overall.

- Kevin – In regards to congestion, the parking demand changed. We built an intermodal station with 2,500 on edge and freed up valuable spaces neared to shopping, offices, museums, etc. We also got more people out of businesses during the day. Additional point, bus rapid transit is not as good as light rail because light rail has predictability. Streetcars get signal preference.

- Hans Noeldner – Have you defined per line-mile threshold for density needed to support streetcars? Did light rail allow for less parking per square foot in zoning around line?
  - Charlie – There is no rule of thumb for density to support streetcar yet. The density depends on local and tourist mix. Part of goal is to catalyze development and density may not be there at time of construction. Would estimate that you need density of about 20 units/acre.
  - Kevin – In Tacoma we allowed developers to reduce parking per square foot within zoning districts and gave developers incentives to build in this area. Assumed about 800 feet for people to walk to line but it ended up a much farther distance. They abated property tax for 10 years along the streetcar line.
  - Jimmy – Little Rock dropped all parking requirements downtown.

- No name: Conflict among neighborhoods because they wanted the routes – how establish priorities?
  - Jimmy – We have an extension policy is that if Little Rock gets an extension, North Little Rock gets the next one.
  - Kevin – In Tacoma, early on people didn’t want the light rail (same in Seattle) changed dramatically since then.
  - Charlie – No conflict when first started but now there is a little

- Mark Opitz – has development in city center hurt other parts of region?
  - Jimmy – no
  - Kevin – no
  - Charlie - no

- No name: Have taxis been affected by new system?
  - Charlie - I don’t think so because the rising tide raises all boats as city becomes more of a destination. We were faced with that concern when we extended light rail connection to airport but have not heard of negative impacts.

- No name: Hours of use?
  - Charlie - Portland is from 5am to midnight weekdays, weekends until 2 am.
  - Jimmy - little rock starts at 11am to 10 pm weekdays, 11-midnight on Sat and 11 to 5 pm on Sun.
  - Kevin – Tacoma is similar to Portland

- No name: Overhead wires – can do without them?
  - Charlie – You can power without overhead wires but it is expensive. In Portland we had lots of concern before, but it has not been an issue since, especially when you have lots of street trees;
o Jimmy – had just put all utilities underground so there was concern about overhead wires at first, hasn’t heard any complaints since it became a reality.
  o Kevin - same thing as Portland

- No name: How do you get political support from unserved areas?
  o Jimmy – Unserved areas were concerned initially but at the same time were willing to try anything downtown. Now people want it in their neighborhoods.
  o Kevin - Sound transit has broad range of support in the region, with a 70% approval for agency in Tacoma’s county. Even bus system has gone to voters for additional taxes and it was approved.

- No name: Links to other forms of transportation?
  o Charlie - Portland streetcar is linked to bus and to regional system, including Amtrak; Albuquerque will have regional commuter rail with just two downtown stops and streetcars as circulator;
  o Kevin – Streetcar is connected to transit hub from which Sounder commuter rail, greyhound, Amtrak and bus is served

- No name: System costs per mile?
  o Charlie - Some lines are single track some are double track; Portland has a five mile single track loop at roughly $11 million per mile.
  o Jimmy - Little Rock’s line cost $8 million per mile for 2.5 miles of single track.
  o Kevin – Tacoma Link cost $80 million for 1.6 mile with some double track, but that includes a maintenance center, ability to upgrade to light rail and operational costs because there are no fare for 20 years

Charlie concluded with an update on the rest of process:
This summer team will be analyzing corridors and holding stakeholder meetings, in the fall there will be more opportunities for public to comment at the Streetcar Directions Open House, and the final report is due in June 2007.
Before you leave, we’d like to get your impressions on a few key questions. Please answer these questions and return this evaluation form at the “check-in” table before you leave. Thanks so much for your participation!

1. What are the greatest opportunities that streetcars present for Madison?
   - Increased availability and use of attractive, frequent, predictable, public forms of mass transit. Streetcars provide an alternative and environmentally friendly transportation option that will decrease our reliance on oil and the automobile. The introduction of the streetcar as an integral part of a regional rail transit system will provide relief from gas prices that will continue to rise.
   - Streetcars can help maintain and increase the quality of life for Madison’s growing population by reducing the externalities associated with population growth. Traffic congestion, pollution, and the lack of available parking will all be mitigated by the presence of an additional form of mass transit.
   - The addition of streetcars will enhance the opportunities for commercial development and infill development on the Isthmus.
   - Streetcars will increase accessibility to businesses, entertainment venues, and services for moderate income neighborhoods surrounding the Isthmus, mitigating the trend of gentrification. A circulating, people moving system between the Square, Campus, and medical facilities will enhance the vitality of the downtown area.
   - Streetcars can help reverse the trend of suburban sprawl in surrounding communities (i.e. Fitchburg, Verona, etc.) by allowing increased density in the downtown and near downtown neighborhoods.

2. What are the greatest opportunities that streetcars present for you, your business, or your organization?
   - Streetcars will reduce commute times, air pollution, traffic, and the need to drive an automobile when one needs to navigate around the city. They will also make downtown travel much easier by providing consistent and reliable stoppage points, reducing the need to plan trips ahead of time.
   - Property values will rise with the addition of streetcars.
• Improving accessibility to downtown locations is imperative for a growing population, especially the aging Baby Boomer generation who can no longer walk, bike, or drive safely, and low income residents unable to afford the use of an automobile.

• Streetcars will bring improvements to downtown businesses, reducing cycles of commercial downtime by always making it easy reach destination points in central locations.

3. What are the greatest challenges or unanswered questions for implementing streetcars in Madison?
• How much will the project cost and how will it be funded? The city has many needs and many problems that have to be addressed including police funding, weed clogged lakes, dirty water, crime, poverty, etc. Are street cars more important and more deserving of the city’s time, energy, and money than these issues?

• Will the introduction of streetcars provide relief or just contribute to the shortage of parking on the Isthmus? Park and rides only cause an increased need for parking, a need that the downtown is not able to accommodate. How will the City address the excessive current and future needs for parking?

• Can streetcars be safely and efficiently integrated with current and future transportation options? A streetcar track running parallel with bus, bike, and auto lanes is potentially unsafe and confusing. Multiple modes of transportation running together may increase congestion by holding up stop lights and slowing down traffic that must wait for stopped streetcars. The City has a growing problem with commuter congestion caused by traffic from neighboring municipalities. Will the streetcars be able to relieve this congestion?

• Will the streetcars be a more user friendly and rider efficient form of transportation than the bus system or a costly duplicative system? What measures are being taken to ensure that ridership will increase? Will the streetcar be affordable to all income levels? What locations will be targeted for stopping points, and what groups of people will be targeted as riders?

• What is the expected time frame for the implementation of streetcars and how will this negatively impact downtown businesses? Planning, political, and construction impediments are notoriously lengthy and costly in Madison. How will this project be different?

• Will the City be able to convince doubters of the intangible costs associated with not implementing a form of mass transit? The cost of infrastructure associated with increased suburban sprawl, air and traffic pollution associated with a growing population, and the rising costs of driving automobiles associated with increasing gas prices are a sample of the consequences mass transit can help control.
4. Please offer any other comments, suggestions, or opinions you have on the Streetcar Study or this forum in the space provided below.

- All opinions need to be heard and all possible options need to be explored. Mass transit is needed in Madison, but streetcars may not be the best fit for the city. Have cost effective and affordable bus upgrades or an electric bus system been considered? The completion of a north beltline would also relieve some problems. A thorough and well done public participation process considering all viewpoints is the key to this project.

- The study area for the project is too small and the likely possible routes are too limited. The streetcar needs to extend throughout the city to be useful. Suggestions for extended lines include East Town, West Town, Sherman Avenue to the North Side Shopping Mall and Warner Park, John Nolen Drive to Alliant Energy Center, the Airport and Amtrak station, Middleton, Sun Prairie, Monona, Fitchburg, Verona, and McFarland.

- How does the streetcar help the issues of affordable housing and commuter traffic pressure from neighboring municipalities?

- Many people are concerned with pedestrian/biker safety and the integrated use of the streetcar with auto traffic. Possible solutions are to keep the streetcar running along the medians of major roadways like Park St., East Washington, West Washington, and University Ave. Others think the system is safer and more cost effective running on existing rail lines and not integrated on the streets.

- The neighborhood associations and the planning council need to be better used as allies in education and public forums. They have grassroots connections and the ability to reach a large number of people. Will presenters be available at neighborhood meetings?
Minutes
June 22, 2006
12 PM

1. Presentation:

Mayor Cieslewicz opened with remarks. Then Charlie Hales (HDR) introduced the panelists from the Forum on June 21; Jimmy Moses, a real estate developer from Little Rock, Arkansas and Kevin Phelps, a conference center owner and former City Council member from Tacoma, Washington. Mike Burton, vice-provost for Portland State University was also to be present but was unable because of the weather and airlines. Jimmy, Kevin and Mike (via speakerphone) made short presentations before having conversations with the attendees.

2. Comments/Issues:

BUSINESS, HOSPITALITY AND CONVENTION TABLES

- Simplicity for visitors (in a "not simple" city)
- Great way for people to see the city
- Connect all major activities and lodging
- Workforce mobility for hospitality industry – there is no parking for workforce (* I think this is a key issue for a growing visitor destination)
- Transit would broaden visitor opportunities – share campus visitors, etc.
- Parking off beltline to get to downtown events
- Aging population – "don't come to downtown anymore – too much work" (* key issues with aging baby boomers – make it easy to get to downtown, spend money, enrich life, etc.)
- Like rail over bus – quiet
- Don't like buses on State
- Increase revenue flow – get people out of downtown to other areas
- Increase events which would increase occupancy rates
- Concern that spending all money on transit would limit money for other needed projects/redevelopment
The business folks at one table seemed skeptical. The discussion revolved around the financial viability of a streetcar system. Some of the questions:

- Why would this be better than the system that was scrapped 70 yrs ago?
- Why replace route-flexible buses with non-flexible streetcars?
- How much would it cost?
- How was the capital cost funded in other systems?
- Were local businesses asked to help fund it?
- What is the operating deficit?
- How is the operating deficit funded?
- How does this compare with buses?
- Does it really provide any benefits beyond buses?
- Madison doesn't have large, distinct destinations (such as a theatre district, etc.), so how could this work here?

GOVERNMENT & NEIGHBORHOODS TABLES

- Due to growing population projections, mass transit options need to be integrated into the city for residents to maintain a high quality of life. Increased populations will bring increases to traffic, parking needs, car fumes, etc.
- Current forms of transportation need to be preserved. Streetcars and light rail need to be integrated along with other forms (bikes, pedestrian, autos, buses). Should not take away from current mass transit (buses). All forms need to be complimentary to each other.
- Concern over whether streetcars may increase congestion instead of reducing it. If traffic needs to stop behind streetcars it could lead to MORE congested streets downtown. One opinion was that slowing down traffic would be a good idea on streets such as Park where pedestrian travel is a nightmare. Additionally, questions were raised over how street lights would be affected. Would streetcars have the right of way? Sensors to alter the lights? Timed to coincide with lights?
- Concern over the safety of streetcars mixed with bikers. It was noted that many bike paths do not currently mix with street traffic. Some felt streetcar would be more predictable as opposed to a bus because you know where the street car is going (i.e. it cannot change lanes). Others felt they were more comfortable with buses because they “trust” the drivers.
- Many concerns about frequency and speed. Where are the lines planning to go? Since the lines are so expensive, and introduction of a line to one area will be likely at first, where will this line be?
- Will the streetcars use existing rail lines? Will they be single or double tracks?
- Seems to be some doubt about how streetcars could fit down already narrow streets like Park St and State St., especially if mixed with a bike lane. If the on/off platforms are in the median, pedestrian/rider safety when crossing traffic is a concern.
- The neighborhood reps are looking forward to/hoping for increased presence from the city at neighborhood meetings. Feel they can be much more utilized in getting positive word out. Their grassroots connections allow them to influence and communicate ideas with people who otherwise may be reluctant to express ideas or support.
- Streetcar investments in currently disenfranchised areas (e.g., Park Street) should be part of a starter system.
- Transit investments have lagged behind City growth both at the edge and through central city redevelopment. The transit system needs to better reflect the demands of new growth.

DEVELOPERS AND LANDOWNERS TABLES

- The more intangible benefits of introducing streetcars—such as on downtown livability—needs to be emphasized. Creating the desired city form should be a leading reason why the City should consider streetcars.
- What is a streetcar? People need more education, graphics, and statistics to help them understand what a streetcar is, how frequently it would arrive and stop, and other aspects to help build understanding and how it is different from commuter rail. A “streetcar fact sheet” is needed.
- The streetcar proposal that results from this process and future hand-outs, etc. should explain how the streetcar network will be integrated with bikes and busses. For example, the main bike paths should be considered and shown on future streetcar system maps.
- The unique reasons why streetcars are right for Madison should be emphasized. These include the facts that the bus system is well-ridden, biking is extremely popular, and ideas like community car have taken hold.
- Helsinki’s transit system may be a good northern-climate model for consideration.

EDUCATION AND HOSPITALITY TABLES

- Funding for a system is a big concern. If tools like special assessments are considered, the impact on small business would be a concern. System construction and operation should not be born solely by nearby land owners, many of whom may not have grand redevelopment plans.
- Idea: Why not run streetcar from Airport to South Park Street and commuter rail from Middleton to East Towne area?
- It will be important to compare the costs of a streetcar system to other types of transportation investments being contemplated or recently completed (e.g., Verona Road interchange, Highway 12, Verona bypass).
- Initial streetcar lines should focus in areas where they will provide the missing “spark” that may be needed to encourage private reinvestment and redevelopment.
- Madison Area Technical College (MATC) wished they were in the study area. They have ~45,000 students throughout the 12 counties they cover. Many of these students commute between the Truax field campus and the downtown campus. Currently they have to take 2 buses to accomplish the commute.
- Health and Family Services at the Villager Mall wants to make sure that there are more direct routes for some of their constituents. It can take up to 90 minutes to take the bus system to the hospital instead of a car ride that would take less than 15 minutes. Don’t have the streetcar for just the neighborhoods that are upscale or the students.
- The study should emphasis that it will lower pollution and may provide a means to create affordable housing opportunities, possibly closer to downtown.
The Madison Streetcar Directions Neighborhood Workshop held on Thursday, December 14, 2006 provided citizens with an interactive experience designed to help shape a potential streetcar system in Madison and guide the completion of the streetcar feasibility study in 2007. There were 81 registrants for the workshop; many others attended but chose not to register. The purposes of the workshop were to:

- Educate the public about what streetcars are and how they relate to bicycles, pedestrians, buses and other transportation options
- Share information on the Streetcar study, including study area and information learned since the June 2006 Streetcar Summit
- Share and discuss current activity areas and redevelopment opportunities, and how streetcars may help advance these opportunities
- Help narrow down the range of streetcar route options for the east, west, and south corridors, which include the downtown and UW Campus

Following a presentation outlining the study's purpose and updating what has been completed, participants took part in an interactive, four-station workshop. Each station was staffed by two consultant team members, and focused on a particular component of the study. The stations included:

- Station 1: Directions and Connections
- Station 2: Revitalization and Community Design
- Station 3: Evaluating Route Options
- Station 4: System Design

At each station, participants were asked to respond to a series of focused questions by offering written suggestions and/or placing corresponding comments on maps. Facilitators were also available to provide additional detail on the technical analysis and feasibility of different routes. Written evaluation forms were also available, and some participants chose to respond after the workshop. The following captures all of the written feedback from the workshop.

**Station 1: Directions and Connections**

**Question 1: What would it take for you to ride a streetcar in Madison?**
- Having in place a commuter rail system that connects to it from suburban communities. This would also foster/promote a more regional buy-in regarding the use of limited federal funds.
- Fixing all of Madison’s other problems first.
- Able to ride in a reasonable time to a point close to my desired destination.
- I would never ride one – or a bus.
- All you need to do it build it and have it run all day and well into the night and I’ll use it frequently.
- Regular, timely, convenient, dependable
- I would need to get to my destination faster than I can by bike.
- A streetcar that could take me from my doorstep to my destination 24/7 with no waiting or transfers.
- Something that will get me to work by 6:00 am.
- Faster than buses/rush hour traffic.
- It would have to serve my residential area.
- I would have to be able to transfer from bus to streetcar at no additional cost.
- To know how people of low income would benefit from this.
• Be able to take bikes on it
• Be able to take it downtown without transferring to a bus.
• Easy in getting in and out without delays in paying on board.
• Must be more convenient than a car.
• A direct route to destination with travel time roughly equal to auto travel and shorter than biking time.
• Very frequent service so that you would not have to schedule day around transit schedule.

Question 2: What questions should be answered for you to support streetcars?
• How are they integrated into current traffic/parking limitations?
• Any whistles like trains?
• We already have buses!
• How will they be integrated into connections with the current metro system?
• Where will money come from to build and operate system?
• Why is this a priority over public safety, drinking water, and a credible bus system?
• Why is this better than a good bus system? We don’t have one more decrease of budget problems!
• Would you consider expanding to the eastside suburbs?
• How many police would be required to keep it safe?
• Why do we need rail at all? Why can’t we have a bus-only transit system?
• Question is phrased like there are no existing supporters – I already support streetcars.
• How much market development occurs in Portland without subsidy?
• What would the expected construction costs be for the streetcar system?
• What would the expected operating costs be for the streetcar system?
• Where would the funds come from?
• What density (population) do we need to make it viable?
• What do we give up (e.g., opportunity costs) to build the system?
• Will East Washington, newly upgraded, be torn up again?
• Will bus service continue to be cut?
• Idea – Ordinance/zoning requirement that would require any construction on major public space (e.g., Monona Terrace, Overture) include integrated streetcar stop infrastructure so that stops won’t have to be “shoehorned” in.
• Does it move more people more efficiently than an upgraded bikeway and bus system?
• Can this be cost effective in a Wisconsin climate?
• What goals does streetcar accomplish, and who/how many people benefit long term?
• Can tracks be designed and located so that bikes can share their routes?
• How will we handle street closures? (Farmers Market, Art Fair, Maxwell Street Days, etc.)
• How will electromagnetic fields generated by the cars/lines affect people who live near them? Has this been studied elsewhere?
• Provide evidence that non-flexible-route streetcars are more cost effective than flexible-route buses.
• Who will benefit most from “redevelopment”?
• What is the “big picture” plan that connects all this – redevelopment/streetcars?
• What is the highest priority in this proposal for streetcars?
  o People’s needs for transit to and from home, work, social things?
  o Meeting or serving the needs of developers?
• Definitely do the Park Street Corridor
  o Greatest redevelopment opportunities
  o Neighborhoods along Park deserve shot in the arm.
  o Increased tax base in comparison to west
  o Perfect for spurring new “Villager”.
Question 3: To what existing places should streetcars run?

- Olbrich Botanical Gardens and Atwood/Winnebago business district.
- Airport!
- Nowhere, I am transit-dependant and believe this project will have unintended consequences.
- Link capital square, university, union corners, airport, and Hilldale.
- Hilldale, UW Clinic – critical destinations (especially clinic loop).
- Middleton, Fitchburg, Sun Prairie, Westport
- Milwaukee, Janesville
- University Avenue to Whitney Way
- Coliseum
- Middleton-Monona
- 133 West Lincoln Street, Oregon, WI

Related to Question #3, participants were also asked to mark on maps where they lived and where they may want to get via streetcar. The results, which will help guide routing evaluation, are presented on the following map.

General comments participants had regarding Station 1: Directions and Connections:

- What is the primary purpose for a streetcar system? Is this meant to be supplemental or displacive with regards to current modes? Or is the target to displace single occupancy vehicles (ours)?
- Well, certainly Campus and Capital routes should be key. Also, routes to the east would be ideal (Atwood over).
- Given that this is the second time I have visited the downtown and that my house isn’t on any of the maps, this seems like a boondoggle in the making.
- Link airport, Union Corners, Capital Square, University, and Hilldale and have 2 or 3 easy connections with commuter rail.
- Olbrich Gardens
- We need to have more direct connections.
- Integration with other transportation options should allow for ease in transfer and the shortest wait times possible (e.g., quick and easy transfer from streetcar to bus). Long waits to transfer will discourage riders.
- This whole thing is a heartbreaking waste of our taxes. The concept is retrograde and shallow. Meanwhile, people are crying for better bus service.
Station 2: Revitalization and Community Design

Question 1: What land-use/community design goals do we want streetcars to help with in the Madison area?

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<th>Land Use/Community Design Goals</th>
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<td>Define urban form/density</td>
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<tr>
<td>Revitalize under-utilized buildings and sites</td>
<td>9</td>
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<tr>
<td>Foster live/ work opportunities</td>
<td>4</td>
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<tr>
<td>Reduce auto dependency/ energy consumption</td>
<td>31</td>
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<tr>
<td>Reduce number of parking spaces</td>
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<td>Create more pedestrian-oriented development</td>
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<tr>
<td>Improve access to employment</td>
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<tr>
<td>Foster higher quality development</td>
<td>8</td>
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<tr>
<td>Create unique destinations</td>
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</tbody>
</table>

Participants were also asked, at Station 2, to evaluate and comment on redevelopment opportunity maps that consultants had prepared for the project. The following maps provide those comments.

General comments participants had related to Station 2: Revitalization and Community Design:

- If the streetcar is going to be used to drive redevelopment, it must be the primary means of transportation, think NYC. Use the streetcar idea as an “engine” to change the transportation culture.
- Use streetcars as a tool to attract employers (especially major ones) to urban core.
- This is clearly an excellent way to increase foot traffic in neighborhoods. We can make better communities and increase funds into the local economy!
- Redevelopment seems to be happening well enough (and we’re already paying out enough in TIF) without streetcars.
- There is a big opportunity in the Packers/ Pennsylvania Avenue area for redevelopment and that would help get the streetcar to the airport.
- The Schenk’s Corner neighbors have recently welcomed the density liked by streetcars prior to the implementation. Help support our decision.
- The redevelopment of downtown will be good for business.
- Madison needs affordable vocational training. Could this be on a streetcar route in the central Park/Isthmus region?
- As the metropolis grows the possibility of effective use of mass transit diminishes. Look at New York. Now add million people in the urban area and grid lock everywhere despite subways, express ways, etc.
Public Comments from December 14th, 2006

1. Encourage redevelopment of existing auto sales, auto service, and gas station properties as large scale (or small) commercial development such as grocery stores that current Isthmus residents auto commute to the Beltline to get to.

2. There is a huge redevelopment opportunity heading out east in vicinity of Pennsylvania/Packers that would help get the streetcar out to airport too.

3. Encourage redevelopment of churches, schools, and businesses (no location on map board).

4. Must integrate all modes of public transportation including inter-city and interstate into one seamless whole - must go to airport.

5. Union corners will be a great destination for a streetcar.

6. Redevelopment of Park St. will be enhanced by streetcar line.

7. Streetcars will be a great tool to make redevelopment of E. Wash. corridor successful. Integrate with E. Wash. BUILD plan.
Station 3: Evaluating Route Options

General comments participants had related to Station 3: Evaluating Route Options:

- I’d like to see a little more weight given to the idea of making the streetcar become the primary means of transportation (as opposed to just an engine for redevelopment).
- I think the route should go all the way down South Park Street. This would be a great way to bring more of a community feel to that end.
- It would be nice to display the location of the Historic Streetcar lines on a map.
- None of the routes possess destinations/origin points that interest me. Knowing the cost will keep me disinterested.
- Don’t use the West Main option (100 block). Run down Fairchild to Doty past the jail and City building. This route would flow better than the sharp left turn at Main. The pedestrian safety island would be sacrificed. The phone company cars are allowed under some State Street to park in front of the telephone building (service trucks and cars). This would be an unnecessary legal battle. The city lost in their effort this year to prevent them from parking. Often much of the whole 100 block up West Main Street on the north side is packed full with phone company vehicles. Far too congested when the Doty option is available. You don’t have to go on the square. The trolley would be going the wrong way on a one-way street on West Main.
- Olbrich Gardens is a regional destination. What’s wrong with Willy/Eastwood/Atwood line?
- There are a lot of good ideas of planning out intersections.
- If streetcar comes every 5 minutes, ridership will grow. Development will come to the streetcar corridor. Look at Highway 12.
- Even though the square is rated low, it seems that the square area needs to be served.
- Would like to see an east side route extend at least to Union Corners. Would like it better if route extended to Olbrich Park.

Participants were also asked, at Stations 3 and 4, to evaluate and comment on route option maps that consultants had prepared for the project. The following maps provide those comments.

Station 4: System Design

General comments participants had related to Station 4: System Design:

- Particularly downtown, when laying out tracks, use the streetcar to fix all issues with delivery trucks.
- The streetcars look like buses on the inside and will get caught in traffic like buses. Adjust bus routes (and add more) instead...since, apparently, streetcar routes can be adjusted.
- I live in Madison because I can live conveniently without a car. Therefore, I welcome improved transit options, especially rail. I currently rarely take the bus, because it is not punctual or dependable in my opinion. Adverse weather or traffic congestion throw off the bus schedule and leave me waiting for the bus not knowing whether it will really show up. If the streetcar is dependent on traffic or fair weather like the bus, we should probably look at other options, such as light rail. My other hesitation about streetcars is that they would not take me out to the malls or big box retail centers where I have to do a lot of my shopping.
- Bicyclists are very creative and will accommodate streetcar traffic and rails, so don’t worry too much about it as a potential conflict.
- University Avenue is the heaviest traveled street.
- Every 5 minute arrival and departure then people will use it.
- Have you considered Dayton Street/Kohl Center to Camp Randall – South Park Street? Is there a bus lane that the streetcar could share? This line seems like a good first choice. I also think the east/isthmus route has potential.
- Worried that extensive street running will leave streetcars mired in traffic, increasing trip times to the point of discouraging potential riders. Would like to see more dedicated lanes or use of rail ROW to avoid traffic conflicts.
Additional Comments

Additional comments, suggestions, or opinions participants had on the Streetcar Study or the workshop in general:

- My biggest question is why we should spend this money on recreating a 19th Century transit system rather than building a 21st Century transit system – like personal monorail or something like that.
- It might make businesses, and maybe some residents, howl at first, but consider removal of on-street parking to create streetcar only lanes when looking at routes. Also, consider making heavy use of existing “diamond” lanes (for example on University Avenue through Campus, which already has lanes in both directions).
- Camp Randall is considered the prime terrorist target in Wisconsin. Breese Terrace is barricaded on game days. How could a streetcar serve this area?
- Streetcars are a critical tool to make urban core a vital center to the region.
- My boyfriend and I are students here in Madison. We recently moved from Portland, OR and I think this is vital to building community and building local economies.
- Portland, OR is considered a success. Bus, light rail, and streetcar. Why change the timeline? Streetcar needs to work off the light rail. Put streetcar on existing rails to build support for light rail then move it to streets.
- Mandating telecommuting would offer greater pollution and congestion reduction. What is the proposed City WiFi for? Conversion of buses to bio-diesel would reduce pollution and help area farmers. Just because the electricity isn’t generated here doesn’t mean it isn’t polluting. Try fixing the rest of Madison’s problems first!
- Get one route built and the public will demand more.
- The idea is to encourage people to use public transportation. The streetcar will attract more people.
- I don’t see streetcar solving problems efficiently that better bus service could. Buses need to be diesel/hybrid/electric, or just electric and must run frequently enough that we don’t have to plan our schedules around it – every five minutes.
- Without knowing costs/funding it seems you’re getting ahead of yourselves. You’re having citizens doing a lot of work for something that is far from certain.
- Discuss funding options – even in general terms, to give us general ideas. I’d rather see my tax dollars spent on our schools, but if streetcars can be self supporting financially, I’d be enthusiastic about them. The compatibility with bikes is a major concern – so consider routes that are less desirable for bikes.
- To encourage ridership, best thing would be to have fast trip times and frequent service. If one must be considered more important, frequency should be priority. Wait times should be considered as part of trip times. I have always considered the time I have to wait for a bus as part of my trip. Some way of informing waiting riders when the next streetcar will be arriving would be very helpful. Many people need to know that streetcars will not be competing with buses or taking away resources from buses – this will reduce many objections.
- I still want to learn more about these ideas. I did not participate in any workshops, as home and work are not in the study areas. I spent too much time writing this. Thank you for your openness. Why not just use a “special group of buses” (I know Mr. Hale said he doesn’t know why rails attract people more than buses) that travel along pre-marked routes that are not rails, but are say “special colored pavement or substandard ride or overhead banners. Certainly buses would be more modular.” In lieu of running these substantially large machines at the wrong times and locations. Where or when more passengers are expected send additional buses. Again order special low-platform streetcar looking buses that are, at that smaller, yet sealable, flexible, nimble and perhaps in their own designated stops and accesses in some location. When fewer are needed, even less energy will be used than those street-tanks I’ve seen. Route them as circulators like we otherwise would with streetcars. Perhaps there could be some fleet-share with Metro when Metro could use their vehicles (perhaps be replaced eventually) but not the current Metro buses or their lame routes mixed with the special new fleet. What’s more, routes would be more easily scalable.
• While I applaud the city for wanting to do something that will help transportation and congestion in the downtown area, I’m sad that I really don’t think this will help. I have been a Madison Metro bus rider for the last 6 years on an almost daily basis. It started after I took a position at the university and felt that I didn’t want to use my car to commute the few miles I had to go as well as deal with parking hassles and costs for the downtown area. Unfortunately, the Metro bus system has not been overly reliable for me. There are days that I know I have to take the car because I can’t count on the bus to be on time or if the bus is full to even accept passengers. On many occasions the bus has been dangerously full to the point that it’s left people standing on the curb to wait for another bus. I work full time and then rely on the bus to get me to my next destination for part time work. If I get left on the curb because of overcrowding – it’s another 20 minutes before the next bus comes. That jeopardizes my employment. So, I end up having to pay $10 a day on days that I know I can’t take that chance just so I can keep my part-time employment. I also feel that these proposed routes really won’t help the situation. It will be nice for me since I work on campus and don’t have transportation if I want to get out at lunch time and run to a restaurant or store farther down State Street than I normally get. But, otherwise for me to commute to work, it doesn’t help at all. I live on the north side near Oscar Mayer and Shabazz School. The streetcars don’t even get close to that area. I’d still need to rely on a bus to get me part way downtown and then deal with transferring to the streetcar. It’s easier for me to stay on the bus at that point. I would much rather see the city put the money into improving the Metro bus system. There are a lot of gaps in locations where the bus goes as well as times. If I miss my bus now I need to wait another 20 minutes before the next bus arrives. I’ve also found that if I go to the gym past certain hours, the bus goes from a 20 minute wait to an hour. So, if I miss that bus I have to stand around for an hour waiting. In that time I can walk home. While I have and can do that, with the safety issues that are happening in the city right now, as a single female I don’t feel safe walking the distance from my gym to home at that time of night – as well as standing on a street corner waiting for a bus for an hour. But, if that money could be put into expanding the bus service to include more routes, increase the number of times per hour that the bus operates – I think it would solve a lot more problems that the city has for transportation issues.

• Can’t we just sneak out at night and paint some “rails” on the street? Then we could purchase a few European bi-articulated buses and run them on the Mayor’s favorite “streetcar” route. He might not notice it isn’t a real streetcar and call the project a success. We could move it around easily and have lots of “routes”.

• Adding streetcars or light-rail to the Madison transportation system is almost the silliest thing I’ve ever heard. This is a money-pit waiting to go wrong. How dare you in city government propose such a ludicrous idea! Invest that money in hydrogen powered bus technology, road repair, hire police officers, anti-graffiti teams, or for goodness sakes maybe use it to mow our Madison parks next summer! The beloved park by my house looks like a hayfield now! A trolley or streetcar system will not bring more people to downtown, and will not help with your creating denser areas. I can’t believe the amount of money you are wasting just to study this alone! Please stop. We do not need streetcars in Madison.

• I think that this streetcar thing is just another dumb way to waste more of the dollars that could be spent on bettering our city. I have lived in this town for 50 years. This is just not needed. We can’t seem to fix Northport Drive or University Avenue, but we can spend hotel taxes that we don’t need on the buses. What about snow and ice? What a mess you are going to make.

• Why propose streetcars when buses are not even full?

• Does not seem to be a good way to spend city resources.

• Why not a route to the airport?

• 100 West Main is already tight with parking and one-way traffic, and telephone company parking there (some sort of easement for them to park along the street that is in dispute), makes area very congested at times. Route down Fairchild and Doty would be okay.
• I think that Madison, unlike other cities, may be more likely to have streetcar meet mode-shift demand for commuters, in addition to local circulator needs for the resident/worker population. The three corridors of the study area make the shape of a "Y". The tips of the Y are natural catch points (arterial funnels) at the perimeter of the central city area. I would specifically place the tips at Hill Farms (west, Hwy 14/University Ave), Villager Mall (south, Hwy 14/beltline), and First Street (east, Hwys 151 & 113). All three of these tip areas could be developed with multi-use/parking facilities to be the parking-places-of-choice, instead of downtown ramps, for many workers and recreational visitors. Opportunities for transfer among bus and other rail would make these extremely versatile hubs around which TOD would thrive.

• As you know, Tenney-Lapham is interested streetcar as part of the solution to reclaiming the neighborhood overall, but in particular to reducing the arterial damage being done to Johnson and Gorham residents’ quality-of-life. Nearly 48,000 trips are made on Johnson/Gorham daily primarily by single occupant vehicles. We already see existing demand for commuter mode-shifting because it’s easier/cheaper to park on our side streets and take the bus or bike the rest of the way downtown or to campus. Given all of this, I think the proposed Ingersoll Street cut-over on the east corridor misses the opportunities offered at the Hwys 151 and 113 "tip" - not just for mode-shifting but also for future support of the eastern part of the East Washington BUILD.

• Is it a realistic expectation that vehicle mode-shifters could make up a sizeable part of streetcar ridership? If so, the collocation of perimeter parking resources with streetcar termini (at all 3 "tips" eventually) could be a win-win for ridership and central city land use goals. I would be very interested in hearing your reaction to these thoughts, by email or in person. Two final notes: the City is about to undertake a Parking Strategic Plan next year and East Johnson is slated for reconstruction in the near future.
Appendix D

Minutes
June 21, 2006
6 PM

1. Presentation:

Mayor Cieslewicz opened with remarks. Then Charlie Hales (HDR) introduced the panelists, Jimmy Moses, a real estate developer from Little Rock, Arkansas and Kevin Phelps, a conference center owner and former City Council member from Tacoma, Washington. Mike Burton, vice-provost for Portland State University was also to be present but was unable because of the weather and airlines.

2. Public Comment:

• Rick Cathcart – Owns bicycle messenger service and has concerns about the impact tracks will have. Also have concerns about the impacts on winter/year-round cycling?
  o Charlie – Portland has a big bicycling community. There is the danger of catching wheel in slot, but signs were created to educate cyclists. We did have some accidents but no serious accidents. You have to do education and outreach. You can’t do bike lane and streetcar in same lane. Can look to Europe – Amsterdam has about 25% mode share for bikes and miles and miles of trams so we have to learn from them. There are definitely are design and public education issues.
  o Jimmy – More biking now because “trolley tames the traffic.”
  o Kevin – 70% of streetcar line is in a dedicated right of way so no major issues with bikes.
  o Charlie – On winter issues, we have to learn from Europe. We can look to Germany and the Czech Republic where lots of cities have trams and lots of snow and ice.
  o Mayor - City of Madison did have streetcars and ice and snow for over 40 years ending in 1935.

• Ed Blume – From the Madison Peak Oil group - he showed a chart of oil supply through history and had no question. Production of oil will be dropping, we need mass transit.

• Bruce Woods – The speakers talk a lot about how their cities were in bad shape but Madison is already there with condo boom downtown, etc.; concerned about impact on affordable housing; what is role of streetcar in our type of city?
Charlie – We are getting lots of high end housing around country with or without streetcar; so, the question is how to serve and sustain quality of life; the community has to address affordability with parallel agenda but transit can’t do it alone.

Jimmy – had a lot of low and moderate income housing before the streetcar and higher end product that has brought balance – cities need to work on balance and diversity; every city has to think about congestion, pollution, oil prices; electric is quiet and streetcars seem to calm traffic; make neighborhoods bikeable and walkable;

Kevin – need to make investment now on 20 or 30 year window to shape your city – Tacoma is now looking to expand their lines and they expect high level of support; also had reverse problems

- No name? Tacoma designed for streetcar and light rail, how much did that add to the cost?
  - Kevin - Don’t know the answer; possibly 5 or 10%
- No name? Have you found trolleys cheaper than streetcars?
  - Charlie - Older vehicles (trolleys) were cheaper to buy initially, but not so much anymore (the good ones are gone); and, trolleys have higher maintenance costs and have technical issues such as ADA requirements.
- No name? How was your streetcar line funded?
  - Jimmy - $30 million -Regional transit authority and federal government; Operating costs are on a multi-county basis – originally there was argument that only two of nine cities would benefit but has not stopped construction;
  - Kevin – $80 million - additional food and beverage tax, motor vehicle excise tax and state sales tax through referendum ($7 billion package)

Carl Durocher - What type of pre-existing transit did your community have and what were the types of impacts on that transit, including on funding?

- Jimmy – bus system has experienced growth because of increases in ridership, interest and excitement about mass transit, etc. also gas prices have contributed; in general regional system has 10,000 riders and streetcar is 1,000 of that; funding is always a problem and we need a broader funding mechanism; also now looking at using streetcar to airport (6 miles);

- Charlie – Streetcars have generally been additive to bus and light rail system – can take a trip that wasn’t practical before; haven’t gone back for more funding;

- Kevin – had bus service and express routes; have regional bus and commuter rail – Critics said commuter rail would just be shifting riders from mode to mode but they have seen continued growth on regional bus; stigma in my community about riding the bus; unfortunate but reality; attracted whole new type of transit user – consistent pattern across the country

- Bob Schaefer – Congestion is often used as an argument for these projects. What have you measured? What are the impacts on traffic? In regards to bicycles, how will you handle on south Park Street where there is no parallel street on which to divert them? Bus systems have a stigma because of appearance what if used rubber tires with streetcar shell? What types of platforms would you have and how long would people have to wait? And what about weaving of cars?
  - Charlie- In regards to bikes on Park Street, one option is run streetcar on left travel lane and you don’t want to pick a hostile territory for a station. We are not at weaving stage of work yet. In regards to congestion, in Portland we were trying
to cause congestion; trying to have busier livelier downtown. Relieving congestion is not purpose of this project. The streetcar line has not had a material impact on traffic, no more impact than a bus.

- Jimmy – Ditto about congestion. We had a rubber tire trolley that ran for two or three years in Little Rock and ridership was minimal. With the rail system ridership jumped dramatically. Rubber tired trolleys have reappeared with higher ridership. Streetcars have encouraged more transit use overall.

- Kevin – In regards to congestion, the parking demand changed. We built an intermodal station with 2,500 on edge and freed up valuable spaces neared to shopping, offices, museums, etc. We also got more people out of businesses during the day. Additional point, bus rapid transit is not as good as light rail because light rail has predictability. Streetcars get signal preference.

- Hans Noeldner – Have you defined per line-mile threshold for density needed to support streetcars? Did light rail allow for less parking per square foot in zoning around line?
  - Charlie – There is no rule of thumb for density to support streetcar yet. The density depends on local and tourist mix. Part of goal is to catalyze development and density may not be there at time of construction. Would estimate that you need density of about 20 units/acre.
  - Kevin – In Tacoma we allowed developers to reduce parking per square foot within zoning districts and gave developers incentives to build in this area. Assumed about 800 feet for people to walk to line but it ended up a much farther distance. They abated property tax for 10 years along the streetcar line.

- Jimmy – Little Rock dropped all parking requirements downtown.

- No name: Conflict among neighborhoods because they wanted the routes – how establish priorities?
  - Jimmy – We have an extension policy is that if Little Rock gets an extension, North Little Rock gets the next one.
  - Kevin – In Tacoma, early on people didn’t want the light rail (same in Seattle) changed dramatically since then.
  - Charlie – No conflict when first started but now there is a little

- Mark Opitz – has development in city center hurt other parts of region?
  - Jimmy – no
  - Kevin – no
  - Charlie - no

- No name: Have taxis been affected by new system?
  - Charlie - I don’t think so because the rising tide raises all boats as city becomes more of a destination. We were faced with that concern when we extended light rail connection to airport but have not heard of negative impacts.

- No name: Hours of use?
  - Charlie - Portland is from 5am to midnight weekdays, weekends until 2 am.
  - Jimmy - little rock starts at 11am to 10 pm weekdays, 11-midnight on Sat and 11 to 5 pm on Sun.
  - Kevin – Tacoma is similar to Portland

- No name: Overhead wires – can do without them?
  - Charlie – You can power without overhead wires but it is expensive. In Portland we had lots of concern before, but it has not been an issue since, especially when you have lots of street trees;
Jimmy – had just put all utilities underground so there was concern about overhead wires at first, hasn’t heard any complaints since it became a reality.

Kevin - same thing as Portland

- No name: How do you get political support from unserved areas?
  - Jimmy – Unserved areas were concerned initially but at the same time were willing to try anything downtown. Now people want it in their neighborhoods.
  - Kevin - Sound transit has broad range of support in the region, with a 70% approval for agency in Tacoma’s county. Even bus system has gone to voters for additional taxes and it was approved.

- No name: Links to other forms of transportation?
  - Charlie - Portland streetcar is linked to bus and to regional system, including Amtrak; Albuquerque will have regional commuter rail with just two downtown stops and streetcars as circulator;
  - Kevin – Streetcar is connected to transit hub from which Sounder commuter rail, greyhound, Amtrak and bus is served

- No name: System costs per mile?
  - Charlie - Some lines are single track some are double track; Portland has a five mile single track loop at roughly $11 million per mile.
  - Jimmy - Little Rock’s line cost $8 million per mile for 2.5 miles of single track.
  - Kevin – Tacoma Link cost $80 million for 1.6 mile with some double track, but that includes a maintenance center, ability to upgrade to light rail and operational costs because there are no fare for 20 years

Charlie concluded with an update on the rest of process:
This summer team will be analyzing corridors and holding stakeholder meetings, in the fall there will be more opportunities for public to comment at the Streetcar Directions Open House, and the final report is due in June 2007.
Before you leave, we’d like to get your impressions on a few key questions. Please answer these questions and return this evaluation form at the “check-in” table before you leave. Thanks so much for your participation!

1. What are the greatest opportunities that streetcars present for Madison?
   - Increased availability and use of attractive, frequent, predictable, public forms of mass transit. Streetcars provide an alternative and environmentally friendly transportation option that will decrease our reliance on oil and the automobile. The introduction of the streetcar as an integral part of a regional rail transit system will provide relief from gas prices that will continue to rise.
   - Streetcars can help maintain and increase the quality of life for Madison’s growing population by reducing the externalities associated with population growth. Traffic congestion, pollution, and the lack of available parking will all be mitigated by the presence of an additional form of mass transit.
   - The addition of streetcars will enhance the opportunities for commercial development and infill development on the Isthmus.
   - Streetcars will increase accessibility to businesses, entertainment venues, and services for moderate income neighborhoods surrounding the Isthmus, mitigating the trend of gentrification. A circulating, people moving system between the Square, Campus, and medical facilities will enhance the vitality of the downtown area.
   - Streetcars can help reverse the trend of suburban sprawl in surrounding communities (i.e. Fitchburg, Verona, etc.) by allowing increased density in the downtown and near downtown neighborhoods.

2. What are the greatest opportunities that streetcars present for you, your business, or your organization?
   - Streetcars will reduce commute times, air pollution, traffic, and the need to drive an automobile when one needs to navigate around the city. They will also make downtown travel much easier by providing consistent and reliable stoppage points, reducing the need to plan trips ahead of time.
   - Property values will rise with the addition of streetcars.
• Improving accessibility to downtown locations is imperative for a growing population, especially the aging Baby Boomer generation who can no longer walk, bike, or drive safely, and low income residents unable to afford the use of an automobile.

• Streetcars will bring improvements to downtown businesses, reducing cycles of commercial downtime by always making it easy reach destination points in central locations.

3. What are the greatest challenges or unanswered questions for implementing streetcars in Madison?
   • How much will the project cost and how will it be funded? The city has many needs and many problems that have to be addressed including police funding, weed clogged lakes, dirty water, crime, poverty, etc. Are street cars more important and more deserving of the city’s time, energy, and money than these issues?

   • Will the introduction of streetcars provide relief or just contribute to the shortage of parking on the Isthmus? Park and rides only cause an increased need for parking, a need that the downtown is not able to accommodate. How will the City address the excessive current and future needs for parking?

   • Can streetcars be safely and efficiently integrated with current and future transportation options? A streetcar track running parallel with bus, bike, and auto lanes is potentially unsafe and confusing. Multiple modes of transportation running together may increase congestion by holding up stop lights and slowing down traffic that must wait for stopped streetcars. The City has a growing problem with commuter congestion caused by traffic from neighboring municipalities. Will the streetcars be able to relieve this congestion?

   • Will the streetcars be a more user friendly and rider efficient form of transportation than the bus system or a costly duplicative system? What measures are being taken to ensure that ridership will increase? Will the streetcar be affordable to all income levels? What locations will be targeted for stopping points, and what groups of people will be targeted as riders?

   • What is the expected time frame for the implementation of streetcars and how will this negatively impact downtown businesses? Planning, political, and construction impediments are notoriously lengthy and costly in Madison. How will this project be different?

   • Will the City be able to convince doubters of the intangible costs associated with not implementing a form of mass transit? The cost of infrastructure associated with increased suburban sprawl, air and traffic pollution associated with a growing population, and the rising costs of driving automobiles associated with increasing gas prices are a sample of the consequences mass transit can help control.
4. Please offer any other comments, suggestions, or opinions you have on the Streetcar Study or this forum in the space provided below.

- All opinions need to be heard and all possible options need to be explored. Mass transit is needed in Madison, but streetcars may not be the best fit for the city. Have cost effective and affordable bus upgrades or an electric bus system been considered? The completion of a north beltline would also relieve some problems. A thorough and well done public participation process considering all viewpoints is the key to this project.

- The study area for the project is too small and the likely possible routes are too limited. The streetcar needs to extend throughout the city to be useful. Suggestions for extended lines include East Town, West Town, Sherman Avenue to the North Side Shopping Mall and Warner Park, John Nolen Drive to Alliant Energy Center, the Airport and Amtrak station, Middleton, Sun Prairie, Monona, Fitchburg, Verona, and McFarland.

- How does the streetcar help the issues of affordable housing and commuter traffic pressure from neighboring municipalities?

- Many people are concerned with pedestrian/biker safety and the integrated use of the streetcar with auto traffic. Possible solutions are to keep the streetcar running along the medians of major roadways like Park St., East Washington, West Washington, and University Ave. Others think the system is safer and more cost effective running on existing rail lines and not integrated on the streets.

- The neighborhood associations and the planning council need to be better used as allies in education and public forums. They have grassroots connections and the ability to reach a large number of people. Will presenters be available at neighborhood meetings?
MADISON STREETCAR FEASIBILITY STUDY
MADISON STREETCAR LUNCH

Minutes
June 22, 2006
12 PM

1. Presentation:
Mayor Cieslewicz opened with remarks. Then Charlie Hales (HDR) introduced the panelists from
the Forum on June 21; Jimmy Moses, a real estate developer from Little Rock, Arkansas and Kevin
Phelps, a conference center owner and former City Council member from Tacoma, Washington.
Mike Burton, vice-provost for Portland State University was also to be present but was unable
because of the weather and airlines. Jimmy, Kevin and Mike (via speakerphone) made short
presentations before having conversations with the attendees.

2. Comments/Issues:
BUSINESS, HOSPITALITY AND CONVENTION TABLES

- Simplicity for visitors (in a "not simple" city)
- Great way for people to see the city
- Connect all major activities and lodging
- Workforce mobility for hospitality industry – there is no parking for workforce (* I think
  this is a key issue for a growing visitor destination)
- Transit would broaden visitor opportunities – share campus visitors, etc.
- Parking off beltline to get to downtown events
- Aging population – "don't come to downtown anymore – too much work" (* key issues with
  aging baby boomers – make it easy to get to downtown, spend money, enrich life, etc.)
- Like rail over bus – quiet
- Don't like buses on State
- Increase revenue flow – get people out of downtown to other areas
- Increase events which would increase occupancy rates
- Concern that spending all money on transit would limit money for other needed
  projects/redevelopment
The business folks at one table seemed skeptical. The discussion revolved around the financial viability of a streetcar system. Some of the questions:

- Why would this be better than the system that was scrapped 70 yrs ago?
- Why replace route-flexible buses with non-flexible streetcars?
- How much would it cost?
- How was the capital cost funded in other systems?
- Were local businesses asked to help fund it?
- What is the operating deficit?
- How is the operating deficit funded?
- How does this compare with buses?
- Does it really provide any benefits beyond buses?
- Madison doesn't have large, distinct destinations (such as a theatre district, etc.), so how could this work here?

GOVERNMENT & NEIGHBORHOODS TABLES

- Due to growing population projections, mass transit options need to be integrated into the city for residents to maintain a high quality of life. Increased populations will bring increases to traffic, parking needs, car fumes, etc.
- Current forms of transportation need to be preserved. Streetcars and light rail need to be integrated along with other forms (bikes, pedestrian, autos, buses). Should not take away from current mass transit (buses). All forms need to be complimentary to each other.
- Concern over whether streetcars may increase congestion instead of reducing it. If traffic needs to stop behind streetcars it could lead to MORE congested streets downtown. One opinion was that slowing down traffic would be a good idea on streets such as Park where pedestrian travel is a nightmare. Additionally, questions were raised over how street lights would be affected. Would streetcars have the right of way? Sensors to alter the lights? Timed to coincide with lights?
- Concern over the safety of streetcars mixed with bikers. It was noted that many bike paths do not currently mix with street traffic. Some felt streetcar would be more predictable as opposed to a bus because you know where the street car is going (i.e. it cannot change lanes). Others felt they were more comfortable with buses because they “trust” the drivers.
- Many concerns about frequency and speed. Where are the lines planning to go? Since the lines are so expensive, and introduction of a line to one area will be likely at first, where will this line be?
- Will the streetcars use existing rail lines? Will they be single or double tracks?
- Seems to be some doubt about how streetcars could fit down already narrow streets like Park St and State St., especially if mixed with a bike lane. If the on/off platforms are in the median, pedestrian/rider safety when crossing traffic is a concern.
- The neighborhood reps are looking forward to/hoping for increased presence from the city at neighborhood meetings. Feel they can be much more utilized in getting positive word out. Their grassroots connections allow them to influence and communicate ideas with people who otherwise may be reluctant to express ideas or support.
- Streetcar investments in currently disenfranchised areas (e.g., Park Street) should be part of a starter system.
• Transit investments have lagged behind City growth both at the edge and through central city redevelopment. The transit system needs to better reflect the demands of new growth.

DEVELOPERS AND LANDOWNERS TABLES

• The more intangible benefits of introducing streetcars—such as on downtown livability—needs to be emphasized. Creating the desired city form should be a leading reason why the City should consider streetcars.
• What is a streetcar? People need more education, graphics, and statistics to help them understand what a streetcar is, how frequently it would arrive and stop, and other aspects to help build understanding and how it is different from commuter rail. A “streetcar fact sheet” is needed.
• The streetcar proposal that results from this process and future hand-outs, etc. should explain how the streetcar network will be integrated with bikes and busses. For example, the main bike paths should be considered and shown on future streetcar system maps.
• The unique reasons why streetcars are right for Madison should be emphasized. These include the facts that the bus system is well-ridden, biking is extremely popular, and ideas like community car have taken hold.
• Helsinki’s transit system may be a good northern-climate model for consideration.

EDUCATION AND HOSPITALITY TABLES

• Funding for a system is a big concern. If tools like special assessments are considered, the impact on small business would be a concern. System construction and operation should not be born solely by nearby land owners, many of whom may not have grand redevelopment plans.
• Idea: Why not run streetcar from Airport to South Park Street and commuter rail from Middleton to East Towne area?
• It will be important to compare the costs of a streetcar system to other types of transportation investments being contemplated or recently completed (e.g., Verona Road interchange, Highway 12, Verona bypass).
• Initial streetcar lines should focus in areas where they will provide the missing “spark” that may be needed to encourage private reinvestment and redevelopment.
• Madison Area Technical College (MATC) wished they were in the study area. They have ~45,000 students throughout the 12 counties they cover. Many of these students commute between the Truax field campus and the downtown campus. Currently they have to take 2 buses to accomplish the commute.
• Health and Family Services at the Villager Mall wants to make sure that there are more direct routes for some of their constituents. It can take up to 90 minutes to take the bus system to the hospital instead of a car ride that would take less than 15 minutes. Don’t have the streetcar for just the neighborhoods that are upscale or the students.
• The study should emphasis that it will lower pollution and may provide a means to create affordable housing opportunities, possibly closer to downtown.
The Madison Streetcar Directions Neighborhood Workshop held on Thursday, December 14, 2006 provided citizens with an interactive experience designed to help shape a potential streetcar system in Madison and guide the completion of the streetcar feasibility study in 2007. There were 81 registrants for the workshop; many others attended but chose not to register. The purposes of the workshop were to:

- Educate the public about what streetcars are and how they relate to bicycles, pedestrians, buses and other transportation options
- Share information on the Streetcar study, including study area and information learned since the June 2006 Streetcar Summit
- Share and discuss current activity areas and redevelopment opportunities, and how streetcars may help advance these opportunities
- Help narrow down the range of streetcar route options for the east, west, and south corridors, which include the downtown and UW Campus

Following a presentation outlining the study’s purpose and updating what has been completed, participants took part in an interactive, four-station workshop. Each station was staffed by two consultant team members, and focused on a particular component of the study. The stations included:

1. Station 1: Directions and Connections
2. Station 2: Revitalization and Community Design
3. Station 3: Evaluating Route Options
4. Station 4: System Design

At each station, participants were asked to respond to a series of focused questions by offering written suggestions and/or placing corresponding comments on maps. Facilitators were also available to provide additional detail on the technical analysis and feasibility of different routes. Written evaluation forms were also available, and some participants chose to respond after the workshop. The following captures all of the written feedback from the workshop.

**Station 1: Directions and Connections**

**Question 1: What would it take for you to ride a streetcar in Madison?**

- Having in place a commuter rail system that connects to it from suburban communities. This would also foster/promote a more regional buy-in regarding the use of limited federal funds.
- Fixing all of Madison’s other problems first.
- Able to ride in a reasonable time to a point close to my desired destination.
- I would never ride one – or a bus.
- All you need to do it build it and have it run all day and well into the night and I’ll use it frequently.
- Regular, timely, convenient, dependable.
- I would need to get to my destination faster than I can by bike.
- A streetcar that could take me from my doorstep to my destination 24/7 with no waiting or transfers.
- Something that will get me to work by 6:00 am.
- Faster than buses/rush hour traffic.
- It would have to serve my residential area.
- I would have to be able to transfer from bus to streetcar at no additional cost.
- To know how people of low income would benefit from this.
• Be able to take bikes on it
• Be able to take it downtown without transferring to a bus.
• Easy in getting in and out without delays in paying on board.
• Must be more convenient than a car.
• A direct route to destination with travel time roughly equal to auto travel and shorter than biking time.
• Very frequent service so that you would not have to schedule day around transit schedule.

Question 2: What questions should be answered for you to support streetcars?
• How are they integrated into current traffic/parking limitations?
• Any whistles like trains?
• How will they be integrated into connections with the current metro system?
• Where will money come from to build and operate system?
• Why is this a priority over public safety, drinking water, and a credible bus system?
• Why is this better than a good bus system? We don't have one more decrease of budget problems!
• Would you consider expanding to the eastside suburbs?
• How many police would be required to keep it safe?
• Why do we need rail at all? Why can't we have a bus-only transit system?
• Question is phrased like there are no existing supporters - I already support streetcars.
• How much market development occurs in Portland without subsidy?
• What would the expected construction costs be for the streetcar system?
• What would the expected operating costs be for the streetcar system?
• Where would the funds come from?
• What density (population) do we need to make it viable?
• What do we give up (e.g., opportunity costs) to build the system?
• Will East Washington, newly upgraded, be torn up again?
• Will bus service continue to be cut?
• Idea – Ordinance/zoning requirement that would require any construction on major public space (e.g., Monona Terrace, Overture) include integrated streetcar stop infrastructure so that stops won't have to be “shoehorned” in.
• Does it move more people more efficiently than an upgraded bikeway and bus system?
• Can this be cost effective in a Wisconsin climate?
• What goals does streetcar accomplish, and who/how many people benefit long term?
• Can tracks be designed and located so that bikes can share their routes?
• How will we handle street closures? (Farmers Market, Art Fair, Maxwell Street Days, etc.)
• How will electromagnetic fields generated by the cars/lines affect people who live near them? Has this been studied elsewhere?
• Provide evidence that non-flexible-route streetcars are more cost effective than flexible-route buses.
• Who will benefit most from “redevelopment”?
• What is the “big picture” plan that connects all this – redevelopment/streetcars?
• What is the highest priority in this proposal for streetcars?
  o People's needs for transit to and from home, work, social things?
  o Meeting or serving the needs of developers?
• Definitely do the Park Street Corridor
  o Greatest redevelopment opportunities
  o Neighborhoods along Park deserve shot in the arm.
  o Increased tax base in comparison to west
  o Perfect for spurring new “Villager”.


Question 3: To what existing places should streetcars run?
- Olbrich Botanical Gardens and Atwood/Winnebago business district.
- Airport!
- Nowhere, I am transit-dependant and believe this project will have unintended consequences.
- Link capital square, university, union corners, airport, and Hilldale.
- Hilldale, UW Clinic – critical destinations (especially clinic loop).
- Middleton, Fitchburg, Sun Prairie, Westport
- Milwaukee, Janesville
- University Avenue to Whitney Way
- Coliseum
- Middleton-Monona
- 133 West Lincoln Street, Oregon, WI

Related to Question #3, participants were also asked to mark on maps where they lived and where they may want to get via streetcar. The results, which will help guide routing evaluation, are presented on the following map.

General comments participants had regarding Station 1: Directions and Connections:
- What is the primary purpose for a streetcar system? Is this meant to be supplemental or displacive with regards to current modes? Or is the target to displace single occupancy vehicles (ours)?
- Well, certainly Campus and Capital routes should be key. Also, routes to the east would be ideal (Atwood over).
- Given that this is the second time I have visited the downtown and that my house isn’t on any of the maps, this seems like a boondoggle in the making.
- Link airport, Union Corners, Capital Square, University, and Hilldale and have 2 or 3 easy connections with commuter rail.
- Olbrich Gardens
- We need to have more direct connections.
- Integration with other transportation options should allow for ease in transfer and the shortest wait times possible (e.g., quick and easy transfer from streetcar to bus). Long waits to transfer will discourage riders.
- This whole thing is a heartbreaking waste of our taxes. The concept is retrograde and shallow. Meanwhile, people are crying for better bus service.
**Station 2: Revitalization and Community Design**

**Question 1:** What land-use/community design goals do we want streetcars to help with in the Madison area?

<table>
<thead>
<tr>
<th>Land Use/Community Design Goals</th>
<th>Votes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define urban form/density</td>
<td>16</td>
</tr>
<tr>
<td>Revitalize under-utilized buildings and sites</td>
<td>9</td>
</tr>
<tr>
<td>Foster live/ work opportunities</td>
<td>4</td>
</tr>
<tr>
<td>Reduce auto dependency/ energy consumption</td>
<td>31</td>
</tr>
<tr>
<td>Reduce number of parking spaces</td>
<td>7</td>
</tr>
<tr>
<td>Create more pedestrian-oriented development</td>
<td>26</td>
</tr>
<tr>
<td>Improve access to employment</td>
<td>10</td>
</tr>
<tr>
<td>Foster higher quality development</td>
<td>8</td>
</tr>
<tr>
<td>Create unique destinations</td>
<td>4</td>
</tr>
</tbody>
</table>

Participants were also asked, at Station 2, to evaluate and comment on redevelopment opportunity maps that consultants had prepared for the project. The following maps provide those comments.

**General comments participants had related to Station 2: Revitalization and Community Design:**

- If the streetcar is going to be used to drive redevelopment, it must be the primary means of transportation, think NYC. Use the streetcar idea as an “engine” to change the transportation culture.
- Use streetcars as a tool to attract employers (especially major ones) to urban core.
- This is clearly an excellent way to increase foot traffic in neighborhoods. We can make better communities and increase funds into the local economy!
- Redevelopment seems to be happening well enough (and we’re already paying out enough in TIF) without streetcars.
- There is a big opportunity in the Packers/ Pennsylvania Avenue area for redevelopment and that would help get the streetcar to the airport.
- The Schenk’s Corner neighbors have recently welcomed the density liked by streetcars prior to the implementation. Help support our decision.
- The redevelopment of downtown will be good for business.
- Madison needs affordable vocational training. Could this be on a streetcar route in the central Park/ Isthmus region?
- As the metropolis grows the possibility of effective use of mass transit diminishes. Look at New York. Now add million people in the urban area and grid lock everywhere despite subways, express ways, etc.
Public Comments from December 14th, 2006

1. Encourage redevelopment of existing auto sales, auto service, and gas station properties as large scale (or small) commercial development such as grocery stores that current Isthmus residents auto commute to the Beltline to get to.

2. There is a huge redevelopment opportunity heading out east in vicinity of Pennsylvania/Packers that would help get the streetcar out to airport too.

3. Encourage redevelopment of churches, schools, and businesses. (no location on map board)

4. Must integrate all modes of public transportation including inter-city and interstate into one seamless whole - must go to airport!

5. Union corners will be a great destination for a streetcar.

6. Redevelopment of Park St. will be enhanced by streetcar line.

7. Streetcars will be a great tool to make redevelopment of E. Wash. corridor successful. Integrate with E. Wash. BUILD plan.
Station 3: Evaluating Route Options

General comments participants had related to Station 3: Evaluating Route Options:

- I’d like to see a little more weight given to the idea of making the streetcar become the primary means of transportation (as opposed to just an engine for redevelopment).
- I think the route should go all the way down South Park Street. This would be a great way to bring more of a community feel to that end.
- It would be nice to display the location of the Historic Streetcar lines on a map.
- None of the routes possess destinations/origin points that interest me. Knowing the cost will keep me disinterested.
- Don’t use the West Main option (100 block). Run down Fairchild to Dotty past the jail and City building. This route would flow better than the sharp left turn at Main. The pedestrian safety island would be sacrificed. The phone company cars are allowed under some State Street to park in front of the telephone building (service trucks and cars). This would be an unnecessary legal battle. The city lost in their effort this year to prevent them from parking. Often much of the whole 100 block up West Main Street on the north side is packed full with phone company vehicles. Far too congested when the Dotty option is available. You don’t have to go on the square. The trolley would be going the wrong way on a one-way street on West Main.
- Olbrich Gardens is a regional destination. What’s wrong with Willy/Eastwood/Atwood line?
- There are a lot of good ideas of planning out intersections.
- If streetcar comes every 5 minutes, ridership will grow. Development will come to the streetcar corridor. Look at Highway 12.
- Even though the square is rated low, it seems that the square area needs to be served.
- Would like to see an east side route extend at least to Union Corners. Would like it better if route extended to Olbrich Park.

Participants were also asked, at Stations 3 and 4, to evaluate and comment on route option maps that consultants had prepared for the project. The following maps provide those comments.

Station 4: System Design

General comments participants had related to Station 4: System Design:

- Particularly downtown, when laying out tracks, use the streetcar to fix all issues with delivery trucks.
- The streetcars look like buses on the inside and will get caught in traffic like buses. Adjust bus routes (and add more) instead…since, apparently, streetcar routes can be adjusted.
- I live in Madison because I can live conveniently without a car. Therefore, I welcome improved transit options, especially rail. I currently rarely take the bus, because it is not punctual or dependable in my opinion. Adverse weather or traffic congestion throw off the bus schedule and leave me waiting for the bus not knowing whether it will really show up. If the streetcar is dependent on traffic or fair weather like the bus, we should probably look at other options, such as light rail. My other hesitation about streetcars is that they would not take me out to the malls or big box retail centers where I have to do a lot of my shopping.
- Bicyclists are very creative and will accommodate streetcar traffic and rails, so don’t worry too much about it as a potential conflict.
- University Avenue is the heaviest traveled street.
- Every 5 minute arrival and departure then people will use it.
- Have you considered Dayton Street/Kohl Center to Camp Randall – South Park Street? Is there a bus lane that the streetcar could share? This line seems like a good first choice. I also think the east/isthmus route has potential.
- Worried that extensive street running will leave streetcars mired in traffic, increasing trip times to the point of discouraging potential riders. Would like to see more dedicated lanes or use of rail ROW to avoid traffic conflicts.
Streetcar Route Options

Madison Streetcar Feasibility Study

MAP LEGEND
- Development Pending/Underway
- Conceptual Redevelopment/Infill Opportunity Areas
- Current Activity Centers
- Existing Transit Oriented Pattern or Population
- Streetcar Study Area

Public Comments from December 14th, 2006
1. Crop Science Lab completed at this location 2006.
2. Perfect intersection of L & rail and streetcar location.
3. Streetcar crossing at Blox St. would require light to control traffic.
4. What about looping through Hilldale further south?
5. Frey St. may not be viable since the street is narrow and will be heavily trafficked w/ Whole Foods at the corner.
6. Consider using street just to south of rail line (between rail & Coppus/Borders/etc.) for an alternate to using rail line.
7. Yes - E. Main or E. Wash. E. Wilson is BAD because of existing bike thoroughfare. E. Mifflin is BAD because of impacts on residential blocks.
8. If you only have 1 set of tracks on State St. - how do cars pass going in opposite directions?
9. As a regular rider, I see the Willy St. neighborhood as being a huge ridership for an E. Wilson line.
10. Beltline crossing is not pedestrian friendly or convenient for non-car travel - streetcar needs to cross Beltline to capture this goal.
11. E. Main route would inspire development - E. Main to S. Ingersoll to E. Wilson to Winnebago to Union Corners.
12. 100 Block W. Main.
13. With many ped's plus delivery trucks, adding tracks to State St. would render it dangerous for bikes and difficult for other traffic.
14. Run streetcar/more busses from South Madison up Park Street corridor and make Park Street tree lined and beautiful.
15. Get workers from here to places for lunch and shopping.
16. Bike right of way needs to be protected and expanded.
17. A stop at University Bay Drive at Marshall Court - ripe for redevelopment, easiest to include in design.
18. Good transit hub at Union Corners.
19. E. Main/Ingersoll hub - future reuse of Metro Bus Barn/Redevelopment & intensification of Marquette/Maitzer.
20. What about looping to East Towne and West Towne Mall? (general comment)
21. Go to/from airport. (general comment)
22. Impacts should be sensitive to reducing traffic flow possibilities. (general comment)
Additional Comments

A dditional comments, suggestions, or opinions participants had on the Streetcar Study or the workshop in general:

- My biggest question is why we should spend this money on recreating a 19th Century transit system rather than building a 21st Century transit system – like personal monorail or something like that.
- It might make businesses, and maybe some residents, howl at first, but consider removal of on-street parking to create streetcar only lanes when looking at routes. Also, consider making heavy use of existing “diamond” lanes (for example on University Avenue through Campus, which already has lanes in both directions).
- Camp Randall is considered the prime terrorist target in Wisconsin. Breese Terrace is barricaded on game days. How could a streetcar serve this area?
- Streetcars are a critical tool to make urban core a vital center to the region.
- My boyfriend and I are students here in Madison. We recently moved from Portland, OR and I think this is vital to building community and building local economies.
- Portland, OR is considered a success. Bus, light rail, and streetcar. Why change the timeline? Streetcar needs to work off the light rail. Put streetcar on existing rails to build support for light rail then move it to streets.
- Mandating telecommuting would offer greater pollution and congestion reduction. What is the proposed City WiFi for? Conversion of buses to bio-diesel would reduce pollution and help area farmers. Just because the electricity isn’t generated here doesn’t mean it isn’t polluting. Try fixing the rest of Madison’s problems first!
- Get one route built and the public will demand more.
- The idea is to encourage people to use public transportation. The streetcar will attract more people.
- I don’t see streetcar solving problems efficiently that better bus service could. Buses need to be diesel/hybrid/electric, or just electric and must run frequently enough that we don’t have to plan our schedules around it – every five minutes.
- Without knowing costs/funding it seems you’re getting ahead of yourselves. You’re having citizens doing a lot of work for something that is far from certain.
- Discuss funding options – even in general terms, to give us general ideas. I’d rather see my tax dollars spent on our schools, but if streetcars can be self supporting financially, I’d be enthusiastic about them. The compatibility with bikes is a major concern – so consider routes that are less desirable for bikes.
- To encourage ridership, best thing would be to have fast trip times and frequent service. If one must be considered more important, frequency should be priority. Wait times should be considered as part of trip times. I have always considered the time I have to wait for a bus as part of my trip. Some way of informing waiting riders when the next streetcar will be arriving would be very helpful. Many people need to know that streetcars will not be competing with buses or taking away resources from buses – this will reduce many objections.
- I still want to learn more about these ideas. I did not participate in any workshops, as home and work are not in the study areas. I spent too much time writing this. Thank you for your openness. Why not just use a “special group of buses” (I know Mr. Hale said he doesn’t know why rails attract people more than buses) that travel along pre-marked routes that are not rails, but are say “special colored pavement or substandard ride or overhead banners. Certainly buses would be more modular”. In lieu of running these substantially large machines at the wrong times and locations. Where or when more passengers are expected send additional buses. Again order special low-platform streetcar looking buses that are, at that smaller, yet sealable, flexible, nimble and perhaps in their own designated stops and accesses in some location. When fewer are needed, even less energy will be used than those street-tanks I’ve seen. Route them as circulators like we otherwise would with streetcars. Perhaps there could be some fleet-share with Metro when Metro could use their vehicles (perhaps be replaced eventually) but not the current Metro buses or their lame routes mixed with the special new fleet. What’s more, routes would be more easily scalable.
While I applaud the city for wanting to do something that will help transportation and congestion in the downtown area, I'm sad that I really don't think this will help. I have been a Madison Metro bus rider for the last 6 years on an almost daily basis. It started after I took a position at the university and felt that I didn't want to use my car to commute the few miles I had to go as well as deal with parking hassles and costs for the downtown area. Unfortunately, the Metro bus system has not been overly reliable for me. There are days that I know I have to take the car because I can't count on the bus to be on time or if the bus is full to even accept passengers. On many occasions the bus has been dangerously full to the point that it's left people standing on the curb to wait for another bus. I work full time and then rely on the bus to get me to my next destination for part time work. If I get left on the curb because of overcrowding - it's another 20 minutes before the next bus comes. That jeopardizes my employment. So, I end up having to pay $10 a day on days that I know I can't take that chance just so I can keep my part-time employment. I also feel that these proposed routes really won't help the situation. It will be nice for me since I work on campus and don't have transportation if I want to get out at lunch time and run to a restaurant or store farther down State Street than I normally get. But, otherwise for me to commute to work, it doesn't help at all. I live on the north side near Oscar Mayer and Shabazz School. The streetcars don't even get close to that area. I'd still need to rely on a bus to get me part way downtown and then deal with transferring to the streetcar. It's easier for me to stay on the bus at that point. I would much rather see the city put the money into improving the Metro bus system. There are a lot of gaps in locations where the bus goes as well as times. If I miss my bus now I need to wait another 20 minutes before the next bus arrives. I've also found that if I go to the gym past certain hours, the bus goes from a 20 minute wait to an hour. So, if I miss that bus I have to stand around for an hour waiting. In that time I can walk home. While I have and can do that, with the safety issues that are happening in the city right now, as a single female I don't feel safe walking the distance from my gym to home at that time of night - as well as standing on a street corner waiting for a bus for an hour. But, if that money could be put into expanding the bus service to include more routes, increase the number of times per hour that the bus operates - I think it would solve a lot more problems that the city has for transportation issues.

Can't we just sneak out at night and paint some "rails" on the street? Then we could purchase a few European bi-articulated buses and run them on the Mayor's favorite "streetcar" route. He might not notice it isn't a real streetcar and call the project a success. We could move it around easily and have lots of "routes".

Adding streetcars or light-rail to the Madison transportation system is almost the silliest thing I've ever heard. This is a money-pit waiting to go wrong. How dare you in city government propose such a ludicrous idea! Invest that money in hydrogen powered bus technology, road repair, hire police officers, anti-graffiti teams, or for goodness sakes maybe use it to mow our Madison parks next summer! The beloved park by my house looks like a hayfield now! A trolley or streetcar system will not bring more people to downtown, and will not help with your creating denser areas. I can't believe the amount of money you are wasting just to study this alone! Please stop. We do not need streetcars in Madison.

I think that this streetcar thing is just another dumb way to waste more of the dollars that could be spent on bettering our city. I have lived in this town for 50 years. This is just not needed. We can't seem to fix Northport Drive or University Avenue, but we can spend hotel taxes that we don't need looming at the buses. What about snow and ice? What a mess you are going to make.

Why propose streetcars when buses are not even full?

Does not seem to be a good way to spend city resources.

Why not a route to the airport?

100 West Main is already tight with parking and one-way traffic, and telephone company parking there (some sort of easement for them to park along the street that is in dispute), makes area very congested at times. Route down Fairchild and Doty would be okay.
• I think that Madison, unlike other cities, may be more likely to have streetcar meet mode shift demand for commuters, in addition to local circulator needs for the resident/worker population. The three corridors of the study area make the shape of a "Y". The tips of the Y are natural catch points (arterial funnels) at the perimeter of the central city area. I would specifically place the tips at Hill Farms (west, Hwy 14/University Ave), Villager Mall (south, Hwy 14/beltline), and First Street (east, Hwys 151 & 113). All three of these tip areas could be developed with multi-use/parking Facilities to be the parking-places-of-choice, instead of downtown ramps, for many workers and recreational visitors. Opportunities for transfer among bus and other rail would make these extremely versatile hubs around which TOD would thrive.

• As you know, Tenney-Lapham is interested streetcar as part of the solution to reclaiming the neighborhood overall, but in particular to reducing the arterial damage being done to Johnson and Gorham residents' quality-of-life. Nearly 48,000 trips are made on Johnson/Gorham daily primarily by single occupant vehicles. We already see existing demand for commuter mode-shifting because it's easier/cheaper to park on our side streets and take the bus or bike the rest of the way downtown or to campus. Given all of this, I think the proposed Ingersoll Street cut-over on the east corridor misses the opportunities offered at the Hwys 151 and 113 "tip" - not just for mode-shifting but also for future support of the eastern part of the East Washington BUILD.

• Is it a realistic expectation that vehicle mode-shifters could make up a sizeable part of streetcar ridership? If so, the collocation of perimeter parking resources with streetcar termini (at all 3 "tips" eventually) could be a win-win for ridership and central city land use goals. I would be very interested in hearing your reaction to these thoughts, by email or in person. Two final notes: the City is about to undertake a Parking Strategic Plan next year and East Johnson is slated for reconstruction in the near future.