

# Streetcar Introduction

## The Milwaukee Connector Study

The Milwaukee Connector study is evaluating transit improvements for Milwaukee County. Bus Rapid Transit (BRT) and Streetcar technologies are being considered.

This meeting will focus on the **Streetcar** component, which is intended to circulate people around downtown and to adjacent neighborhoods.



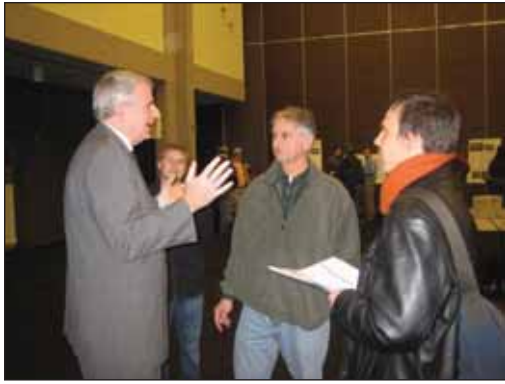
## Meeting Purpose

The purpose of the meeting is to:

- Update the public on progress of the Streetcar component for the Milwaukee Connector study.
- Present alternatives for a Streetcar starter line in downtown Milwaukee.
- Review preliminary analysis for each Streetcar route alternative.
- Obtain public feedback to assist with Streetcar route selection.



# Study Update



## February 2009 Scoping Meetings

Six public scoping meetings for the Milwaukee Connector study were held during February 2009. The meetings oriented the public to the current phase of the Milwaukee Connector study. Also, the meetings obtained public feedback on both the Streetcar and Bus Rapid Transit (BRT) components of the project.

The scoping meetings showed:

- Overall support for improving and investing in Milwaukee transit.
- Support for a combined BRT and Streetcar system to enhance transit in Milwaukee.
- Support for a linear Streetcar system instead of a downtown Streetcar loop.



## Current Project Activities

Since the scoping meeting in February 2009, the following activities have occurred to shape the Milwaukee Connector study:

- On March 11, 2009, President Obama signed into law the Omnibus Appropriations Act of 2009. The legislation split the \$91.5 million in federal funds reserved for the results of the Milwaukee Connector study, directing 60% of the money to the City of Milwaukee for a downtown rail line and 40% of the money to Milwaukee County for buses.

- The City of Milwaukee has incorporated public comments from the scoping meetings and developed three route alternatives.

- The City has prepared preliminary analysis to assist with route refinement and selection.



# Defining Streetcar

## Definition of Streetcar

A Streetcar is a vehicle that runs on rails embedded in the road. Streetcar systems are commonly used for short trips linking key destinations, as proposed for the Milwaukee Connector, but can also be used for longer trips. Modern Streetcar vehicles in the United States consist of a single car with three articulated sections.



## Milwaukee Streetcar Goals

The Milwaukee Streetcar would implement a starter line in downtown Milwaukee that will:

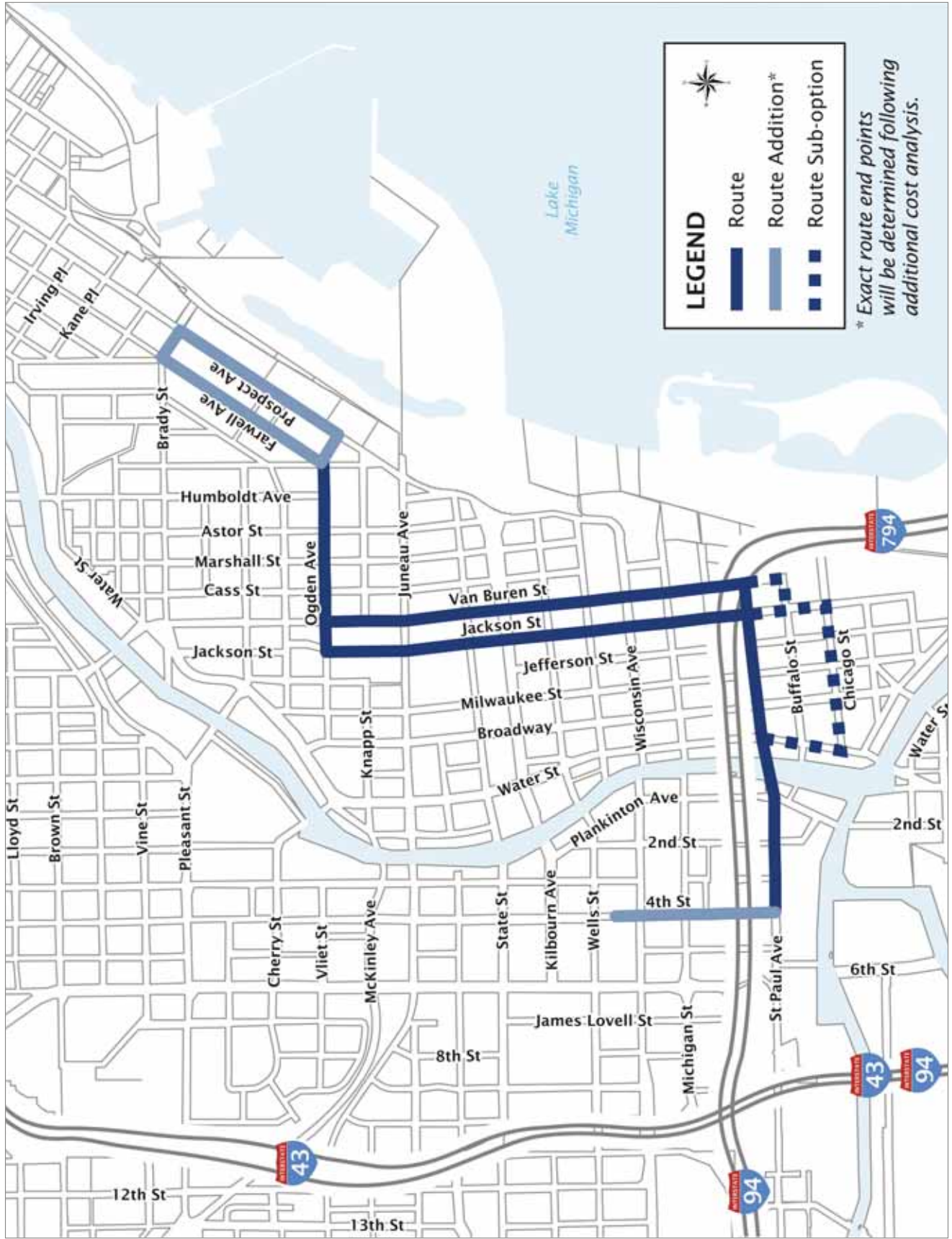
- Circulate people around downtown and to adjacent neighborhoods.
- Improve transit utilization in the City of Milwaukee.



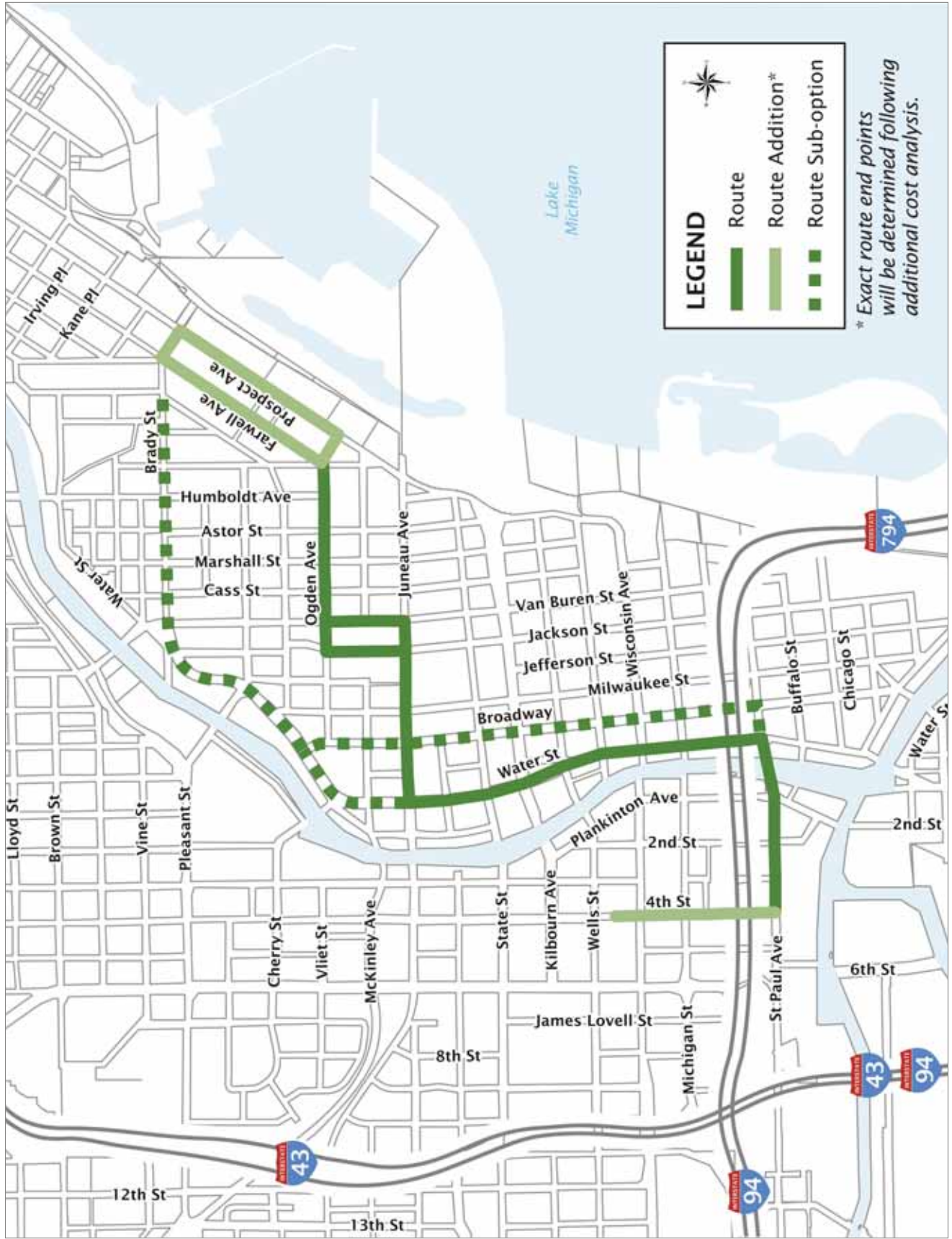
- Link the Milwaukee Intermodal Station with the central business district, key destinations and attractions.
- Enhance Milwaukee's ParkOnce program by coordinating parking facilities with a transit system that connects to activity-generators.
- Promote transit-oriented development (TOD) along transit corridors and on underutilized properties. TOD is the development of commercial space, housing, services and job opportunities close to public transportation, thereby reducing dependence on automobiles.
- Provide dense downtown residential areas with additional transit choices.
- Provide an easy-to-use Streetcar system that is integrated with other modes for residents and visitors.
- Create a Streetcar starter system that can expand to nearby neighborhoods and destinations.



# Route Alternatives: ALTERNATIVE 1



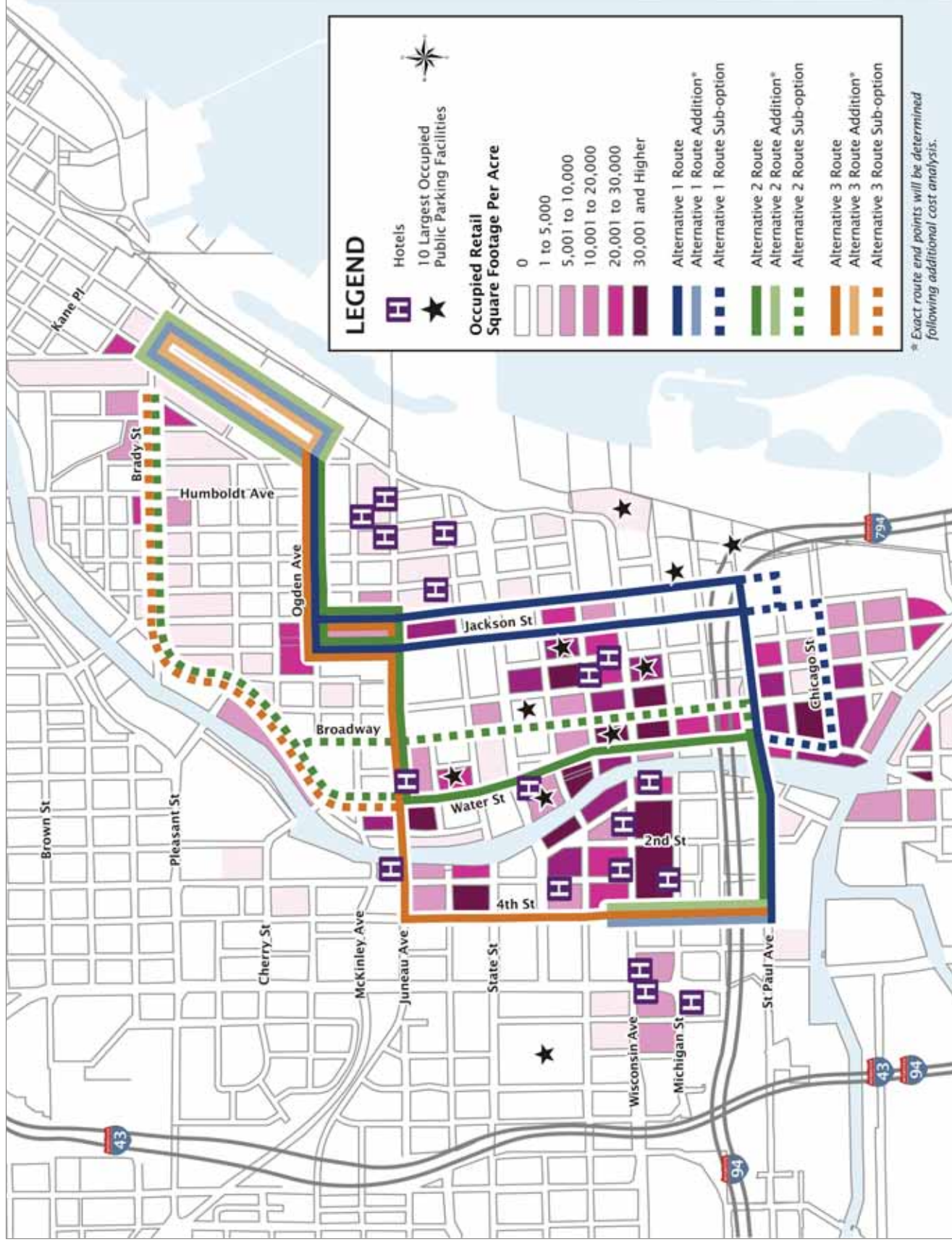
# Route Alternatives: ALTERNATIVE 2



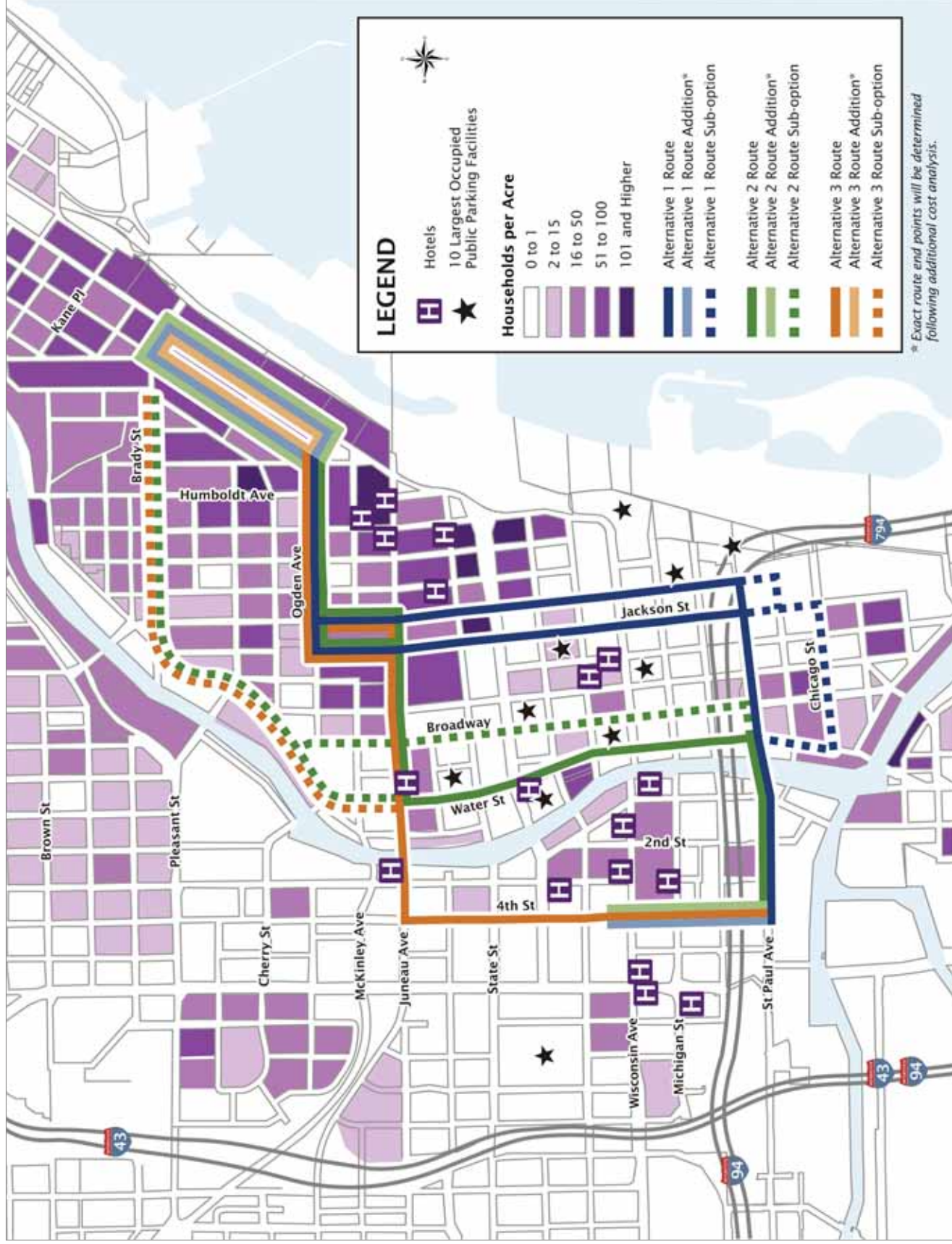
# Route Alternatives: ALTERNATIVE 3



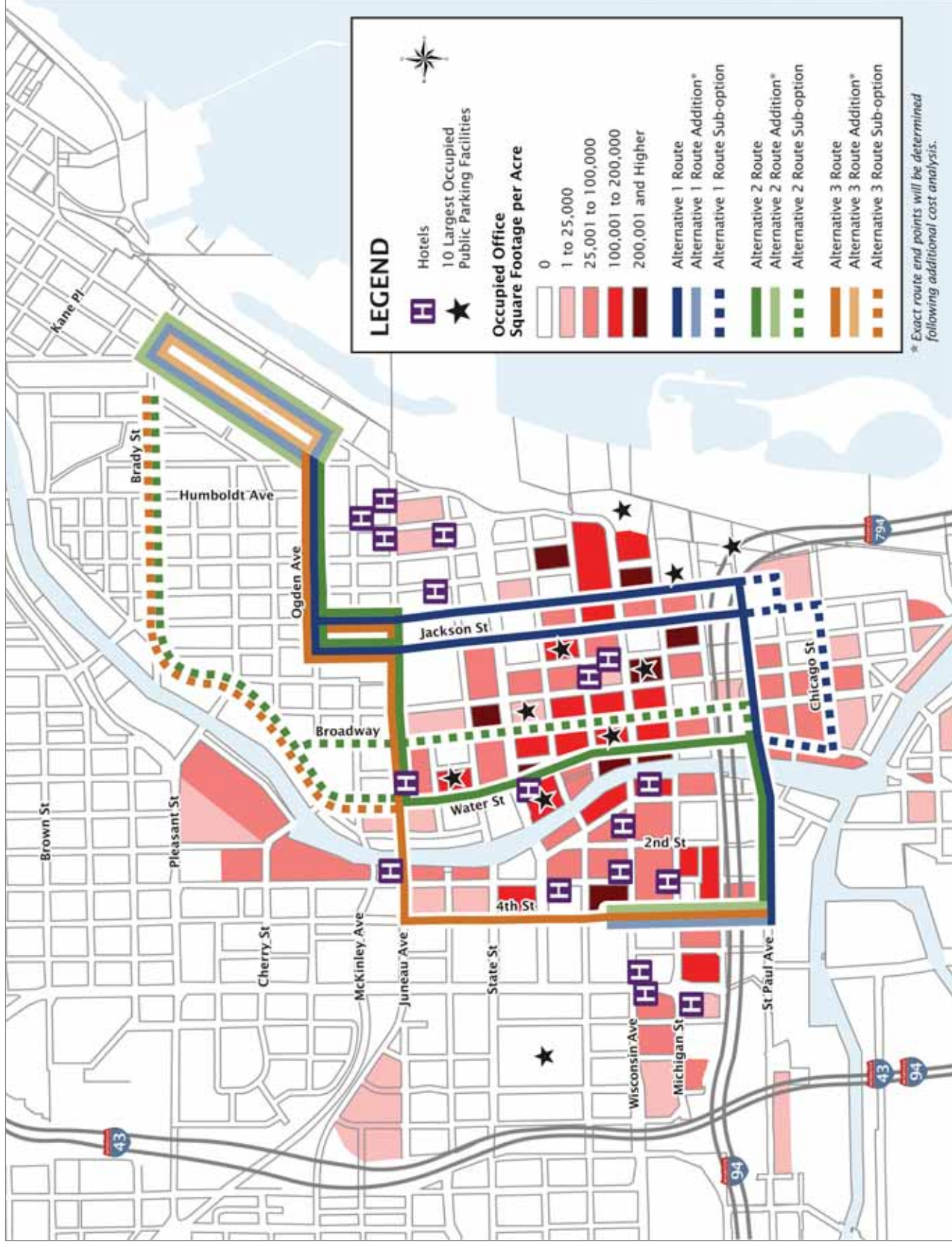
# Occupied Retail Square Footage per Acre



# Households per Acre



# Occupied Office Square Footage per Acre



# Streetcar Technology Options



**UNITED STREETCAR**  
(Portland, Seattle, Tacoma)



**BOMBARDIER FLEXITY**  
(Toronto)



**TORONTO ALRV**

<b>Status</b>	New	New	Refurbished (built 1973)
<b>Length of vehicle</b>	66'	92'5"	72'7"
<b>Height of vehicle</b>	11'3"	11'3"	11'3"
<b>Vehicle clearance</b>	14'	N/A	N/A
<b>Catenary clearance</b>	20'6"	19'	19'
<b>Width of vehicle</b>	8'1"	8'4"	8'3"
<b>Number of seats</b>	30 to 40	40 to 60	61
<b>Vehicle capacity</b>	130 to 160	190 to 260	155
<b>Turning radius</b>	60'	37' to 50'	37'
<b>Track gauge</b>	4'7"	4'8 1/2" to 4'10 7/8"	4'10 7/8"
<b>Catenary arm</b>	Extending single arm	Extending single arm	Traditional trolley pole
<b>Power supply</b>	Electric	Electric/hybrid	Electric
<b>Ability to join or train vehicles</b>	No	No	No
<b>Traffic Signal Priority</b>	Yes	No	Yes
<b>Low Floor/Level Boarding</b>	Partial – 50%	Yes – Full	No
<b>Price (in millions of \$)</b>	Est. \$3 to \$3.5 m	Est. \$3.5 to \$4 m	Est. \$1 to \$2 m
<b>Lead time required to acquire vehicle</b>	N/A	N/A	N/A

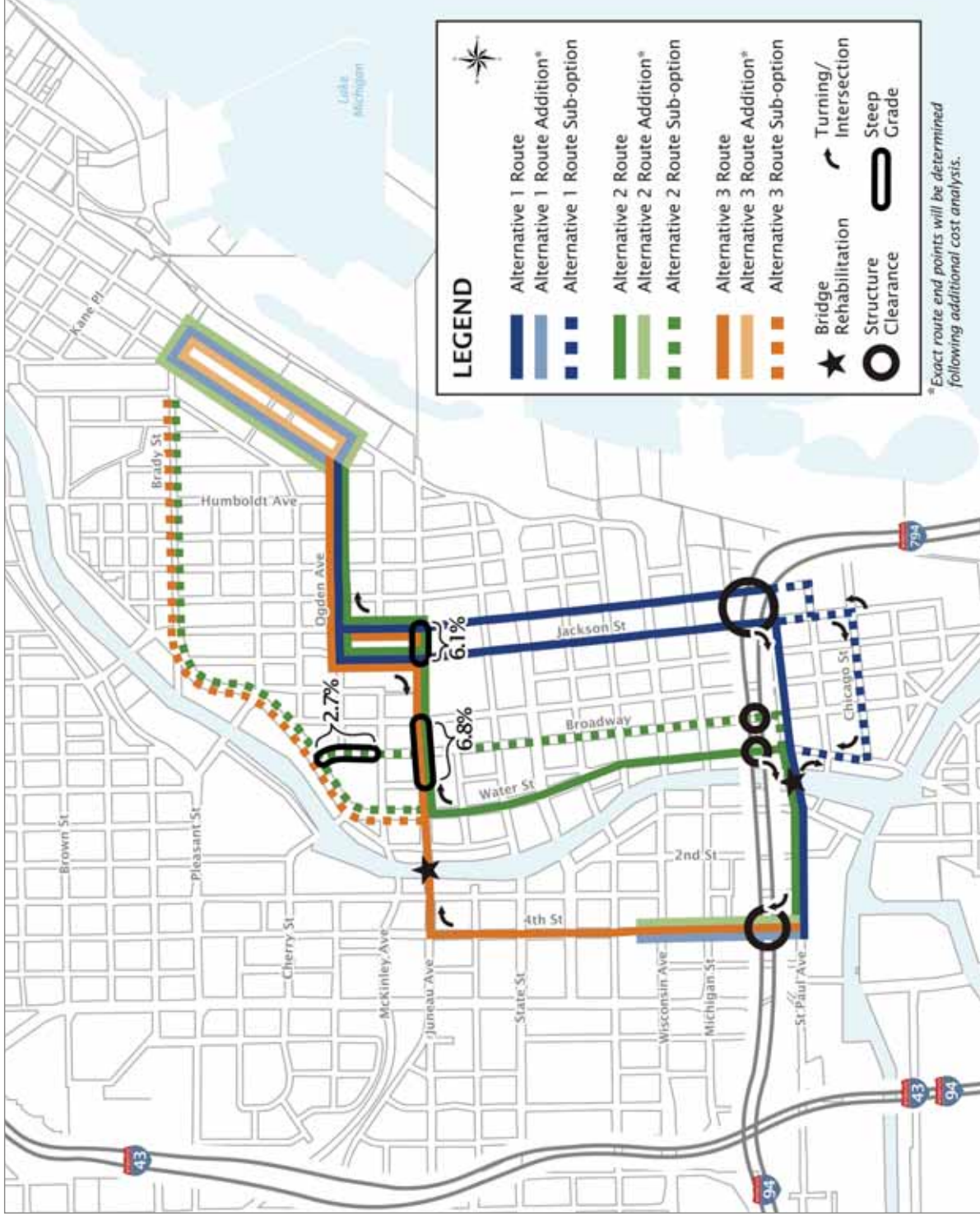
# Evaluation Criteria

To help evaluate and distinguish the three Streetcar route alternatives, the following criteria were developed. The criteria will be used to help select a preferred Streetcar route.

CRITERIA	EVALUATION FACTORS
<b>Public interest</b>	<ul style="list-style-type: none"> <li>• Public comments</li> <li>• Elected official support</li> </ul>
<b>Streetcar ridership</b>	<ul style="list-style-type: none"> <li>• Existing transit ridership</li> <li>• Population density</li> <li>• Employment centers</li> <li>• Attractions</li> <li>• Pedestrian activity</li> </ul> 
<b>Capital costs</b>	<ul style="list-style-type: none"> <li>• Utilities</li> <li>• Pavement condition</li> <li>• Right of way width</li> <li>• Route length</li> <li>• Fleet size</li> <li>• Yard and shop facility</li> <li>• Transit amenities</li> </ul> 
<b>Operating costs</b>	<ul style="list-style-type: none"> <li>• Service frequency</li> <li>• Fares</li> <li>• Hours of operation</li> <li>• Fleet size</li> </ul>
<b>Economic development potential</b>	<ul style="list-style-type: none"> <li>• Land use</li> <li>• Zoning</li> <li>• Vacant and underutilized parcels</li> <li>• Comprehensive plans</li> </ul>
<b>Operations</b>	<ul style="list-style-type: none"> <li>• Traffic volumes</li> <li>• Route length</li> <li>• Station spacing</li> <li>• Real-time travel information</li> <li>• Signal prioritization</li> <li>• Lane design (dedicated lane vs. mixed traffic)</li> <li>• System connectivity</li> </ul>
<b>Parking, traffic and other impacts</b>	<ul style="list-style-type: none"> <li>• On-street parking</li> <li>• Bike lanes</li> <li>• Property acquisitions</li> <li>• Driveway access</li> <li>• Turning movements</li> <li>• Traffic signals</li> </ul> 
<b>Environmental justice</b>	<ul style="list-style-type: none"> <li>• Demographics (race, income, poverty, age)</li> <li>• Vehicle ownership</li> <li>• Access to jobs</li> <li>• Access to social services and government facilities</li> </ul>
<b>Potential to expand</b>	<ul style="list-style-type: none"> <li>• Distance to key destinations</li> <li>• Proximity to existing transit</li> <li>• Ability to attract choice riders</li> </ul>

# Engineering Summary

- **UTILITIES** — Utility relocations are expected, but no major conflicts have been identified.
- **BRIDGES** — The bridges over the Milwaukee River at St. Paul and Juneau avenues would need to be renovated to accommodate streetcar loads and rails.
- **OVERHEAD STRUCTURES** — All routes meet the minimum vertical clearance of 14 feet, although special design considerations may be required to accommodate the catenary system for overhead structures that hang below 20 feet.
- **INTERSECTIONS** — Some intersections will require minor modifications to accommodate streetcar turning movements.
- **STEEP GRADE** — Elevations along Juneau Avenue and Broadway are the steepest but within maximum grade criteria of 9%; however, winter operations could be challenging in these locations.



# Streetcar Operations

## Station Spacing and Design

- The Streetcar will make frequent stops, every one to three blocks.
- The Streetcar will have simple stations or stops.
- The stations may have technology that identifies when the next vehicle will arrive.
- Stations may have an off-vehicle fare box collection system.



## Service Frequency

- The Streetcar will have 7-10 minute minimum frequency during peak periods.
- The Streetcar will have 15-20 minute maximum frequency during non-peak periods.
- Additional service can accommodate special events.



## Operating Characteristics

- The Streetcar will operate in a mixed traffic lane adjacent to the parking lane.
- Curb bump-outs will be used in select areas to increase boarding efficiency.
- Traffic signal priority may be given to the Streetcar.
- An overhead electric power source will be used to run the vehicles.
- The Streetcar route and stations will be coordinated with the MCTS bus lines and other arrivals at the Milwaukee Intermodal Station.

# Integration with Other Local Projects and Initiatives

Southeastern Wisconsin is taking on a number of different transit initiatives that could integrate well with the Milwaukee Streetcar:

## ➤ Kenosha, Racine, Milwaukee Commuter Rail Study (KRM)

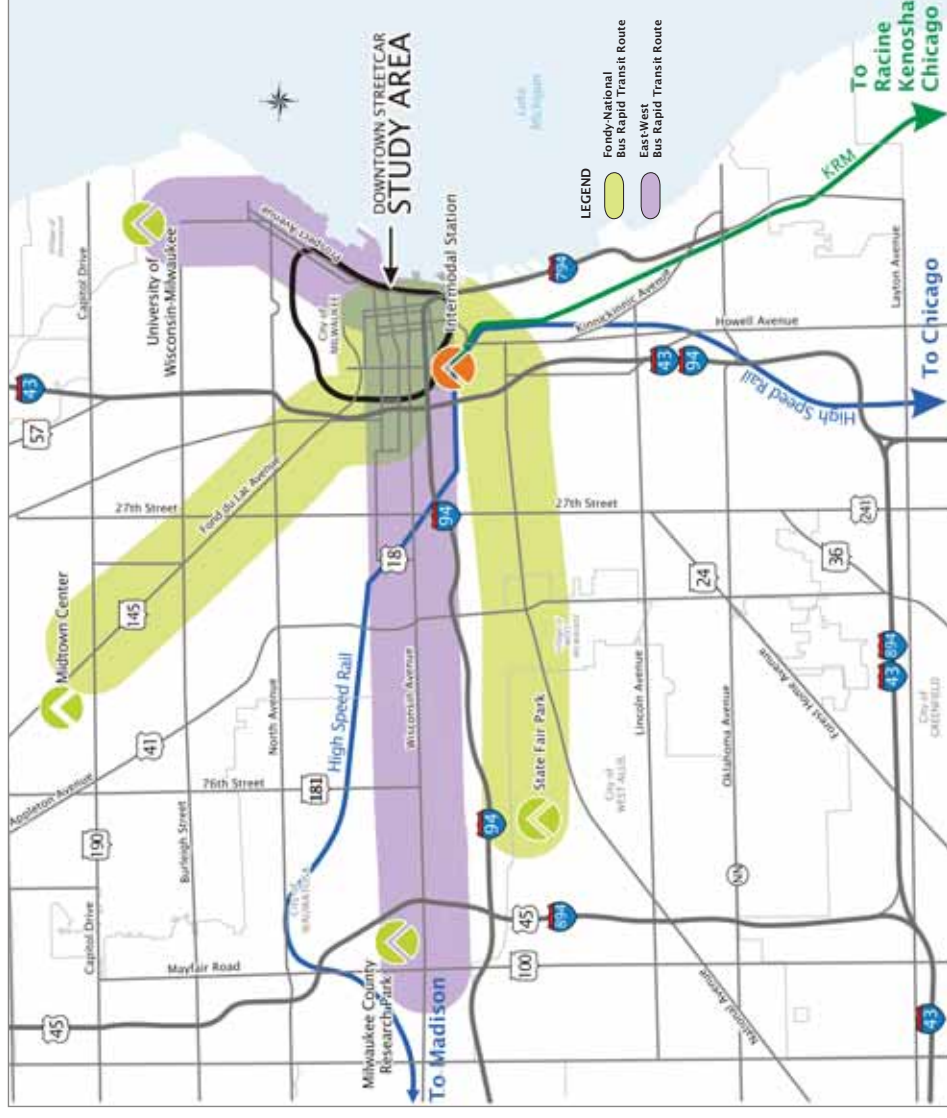
The KRM study is evaluating commuter rail service from Kenosha to Milwaukee. The project will add commuter rail service with approximately nine stations (or stops) along the route. The project has selected a locally preferred alternative and is working to receive authorization from the Federal Transit Administration to begin preliminary engineering.

## ➤ Midwest Regional Rail System (MWRRS)

Wisconsin and eight other Midwestern states are planning a 3,000-mile high-speed passenger rail system that would link cities throughout the Midwest. Modern trains would operate at speeds up to 110 mph. The Wisconsin component would be implemented in three phases beginning with a Chicago-Milwaukee-Madison line, then a Madison-St. Paul line and finally a Milwaukee-Green Bay line. Implementation of the project is dependent on securing state and federal funding.

## ➤ Milwaukee Intermodal Station

The City of Milwaukee and the Wisconsin Department of Transportation recently renovated the Milwaukee Intermodal Station in downtown Milwaukee. The station primarily served Amtrak prior to the renovation, but now provides multimodal service and connectivity for Amtrak Passenger Rail, Milwaukee County Transit Bus service (Route 57), Greyhound Bus Lines, Wisconsin Coach Lines and Lamers Bus Lines.



# Case Studies – Streetcar



## PORTLAND STREETCAR

<b>Phase 1 length:</b>	2.4 miles
<b>Full system length:</b>	4 miles (8 track miles)
<b>Year opened:</b>	2001
<b>Type of vehicle:</b>	Modern streetcar (Inekon/Skoda Model)
<b>Service area:</b>	Downtown and nearby neighborhoods
<b>Daily riders (average weekday):</b>	12,300 (fall 2008)
<b>Operator:</b>	Portland Streetcar, Inc.
<b>Owner:</b>	City of Portland
<b>Stops:</b>	22
<b>Average distance between stops:</b>	1/5 mile (2 blocks)
<b>No. of vehicles:</b>	10
<b>Frequency of service:</b>	12-15 minutes headway

The Portland Streetcar was designed to fit the scale and traffic patterns of the neighborhoods through which it travels. The streetcars run in mixed traffic and accommodate existing curbside parking and loading, except at platform stops. The track is a shallow 12-inch deep track slab designed to reduce construction time and utility relocations. Maneuverability of the shorter and narrower vehicles has allowed the streetcar track to be fitted to existing grades, limiting the scope of street and sidewalk reconstruction. Low-cost, minimal amenity stations were constructed.



## SEATTLE SOUTH LAKE UNION LINE

<b>System length:</b>	1.3 miles (2.6 track miles)
<b>Year opened:</b>	2007
<b>Type of vehicle:</b>	Modern streetcar (Inekon Model)
<b>Service area:</b>	Near Downtown neighborhood
<b>Daily riders (average weekday):</b>	1,500 (fall 2008)
<b>Operator:</b>	King County Metro
<b>Owner:</b>	Seattle Department of Transportation
<b>Stops:</b>	7
<b>Average distance between stops:</b>	1/5 mile (2 blocks)
<b>No. of vehicles:</b>	3
<b>Frequency of service:</b>	15 minutes headway

The South Lake Union Line is a new streetcar line that serves the downtown, Denny Triangle and South Lake Union areas of Seattle. This line provides local transit service, connects to the regional transit system, accommodates economic development, and contributes to neighborhood vitality. The streetcar required relocating utilities, track installation including a 12- to 18-track slab, roadway improvements, improving storm water, upgraded traffic signals, side-platform corner-curb bulbs located within the parking lane at the far side of intersections, installation of traction power substations and building a maintenance facility.



## TACOMA LINK

<b>System length:</b>	1.6 miles (2.4 track miles)
<b>Year opened:</b>	2003
<b>Type of vehicle:</b>	Modern streetcar (Skoda Model)
<b>Service area:</b>	Downtown
<b>Daily riders (average weekday):</b>	2,900 (2008)
<b>Operator:</b>	Sound Transit
<b>Owner:</b>	Sound Transit
<b>Stops:</b>	5
<b>Average distance between stops:</b>	1/4 mile (3 blocks)
<b>No. of vehicles:</b>	3
<b>Frequency of service:</b>	10 minutes headway

The Tacoma Link is a streetcar that runs on a light rail designed track serving the Tacoma Dome, University of Washington-Tacoma, Convention Center and Theater District. This line provides local transit service and connects to the regional commuter rail, local bus service, Amtrak service and a future light rail connection to the Sea-Tac International Airport. The streetcar line is both single and dual track and the construction costs are much higher than typical streetcars because the system was built to light rail standards.

# Streetcar Benefits

The Milwaukee Streetcar will benefit Milwaukee in the following ways:

- The Streetcar will provide an easy-to-use and efficient link between Milwaukee's downtown business district and nearby neighborhoods.
- The Streetcar will increase transit choices for Milwaukee residents, employees and visitors.
- The Streetcar will provide a direct transit connection between the Milwaukee Intermodal Station and downtown.
- The Streetcar will link to the existing bus service in Milwaukee and other transit initiatives such as the Kenosha-Racine-Milwaukee Commuter Rail project and the Midwest Regional Rail System.
- The Streetcar will support the goals of the Milwaukee Downtown Plan, which include "developing a downtown transit network to facilitate both internal circulation and connections to adjacent neighborhoods."
- The Streetcar supports Milwaukee's ParkOnce program by coordinating parking facilities with a transit system that connects to activity-generators.
- The Streetcar will provide a fixed transit system that promotes transit-oriented development (TOD) along the route. TOD is the development of commercial space, housing, services and job opportunities close to public transportation, thereby reducing dependence on automobiles.
- The Streetcar supports convention center and hotel customers.



# Next Steps for Streetcar

The following information shows estimated timelines for the implementation of the Streetcar. All timelines are subject to change depending on the results of the locally preferred alternative and preliminary engineering design.

- **Public meeting** – October 8, 2009
- **Coordination with Milwaukee County Transit System** – Ongoing
- **Streetcar technical analysis** – October 2009 to December 2009
- **Locally preferred alternative approved** – December 2009 to January 2010
- **Engineering and design completed** – Fall 2011
- **Construction completed** – Fall 2013
- **Streetcar operations begin** – Spring 2014

