

DRAFT REPORT | MAY 31, 2016
**HENNEPIN AND
1ST AVENUE
TRANSPORTATION
STUDY**

Prepared for:
City of Minneapolis



Prepared by:
Alliant Engineering, Inc.



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Executive Summary

A multimodal transportation study has been completed to evaluate the existing transportation system and a range of roadway concepts in the Nicollet Island-East Bank (NIEB) and Marcy Holmes Neighborhoods. This planning study examined one-way, two-way, and hybrid roadway configurations along the Hennepin and 1st Avenue corridors with consideration for quality of life, access, safety, connectivity, and mobility for all modes of travel.

Along with other priorities, this study identifies draft roadway concepts and documents benefits and impacts (i.e., pros and cons) associated with any potential implementation. Particular attention is paid to the following elements:

- Access to and from primary destination points,
- Innovative pedestrian and bicycle infrastructure,
- Providing a safe environment for all travel modes,
- Alignment with future development plans,
- Changes in traffic operations and parking demand,
- Existing and planned transit service, and
- Consideration of travel through the study area.

Purpose

The purpose of this study was to develop and evaluate roadway concepts that improve safety and comfort for all users within the public right of way, while ensuring improved neighborhood connectivity and mobility for all modes within and through the study area. Key neighborhood goals include:

- Connect pedestrian, bicycle, and transit infrastructure to the River and to adjacent neighborhoods and districts, including downtown Minneapolis, the University of Minnesota, Dinkytown and the Northeast Arts District.
- Provide an exceptional urban pedestrian experience for people of all ages.
- Enhance the pedestrian and bicyclist experience and improve pedestrian and bicyclist safety and comfort.
- Achieve a better balance between pedestrian, bicycle, transit and automobile travel modes.
- Expand and improve pedestrian, bicycling, and transit infrastructure throughout the neighborhood.
- Improve multi-modal connections with existing transportation networks to improve access to and from destinations throughout Minneapolis and beyond.
- Parking will be conveniently accessible for residents and visitors who choose to travel by car.
- Support improved transit services and infrastructure including the Nicollet-Central Streetcar implementation, real time transit information signage and otherwise.

Corridor Needs

A detailed technical analysis was completed to evaluate the existing roadway, multimodal facilities, the future land use, and transportation network conditions. Key elements include the

corridor characteristics, pedestrian and bicycle network, parking, transit, roadway safety, land use, and mobility.

Alternatives Development

The alternatives development process developed and evaluated a multitude of cross-section configurations based upon input from stakeholders and a review of the purpose and needs. From this range of alternatives, a screening evaluation was completed to evaluate 88 typical cross-sections against key objectives. This process identified the alternatives that best met the project goals and were carried forward for further screening and evaluation.

Concept Design

Six leading cross-section configurations were developed into more refined concept designs to illustrate how the typical sections may be applied through the study area.

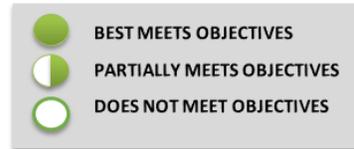
- Concept 1-1B: One-way, Two Travel Lanes with Right Side Transit and Protected Bike Lane
- Concept 1-2B: One-way, Three Travel Lanes with Off Peak Parking, Left Side Streetcar and Protected Bike Lane
- Concept 1-2C: One-way, Three Travel Lanes with Right Side Transit and Protected Bike Lane
- Concept 2-1A: Two-way, Three Travel Lanes, Two Side Parking and Standard Bike Lane
- Concept 2-1B: Two-way, Three Travel Lanes, One Side Parking and Protected Bike Lane
- Concept 2-1C: Two-way, Three Travel Lanes, Two Side Parking and Protected Bike Lane

The primary goal of each concept design was to balance the vision of the community, existing physical constraints, and the regional role Hennepin and 1st Avenue serve beyond the immediate neighborhood. The design features included in each concept included: a protected bicycle facility, streetcar alignment (both left and right side alignments are illustrated), wider sidewalks and increased pedestrian space wherever feasible, shorter pedestrian crosswalks, on street parking, opportunities for “greening”, and vehicle travel lanes.

Concept Evaluation

A detailed evaluation was conducted for the six concept designs to assess their individual benefits and impacts to the right-of-way, users, residents, and businesses. The evaluation focused on the key objectives and neighborhood priorities. A detailed traffic operation analysis was conducted to assess access, mobility, and the benefits and impacts (i.e., pros and cons) associated with any potential implementation of the concept designs. A summary of the qualitative evaluation is shown below.

Criteria	One-Way			Two-Way		
	Concept 1-1B (B5)	Concept 1-2B (C3)	Concept 1-2C	Concept 2-1A	Concept 2-1B (C4)	Concept 2-1C
Mobility and Safety						
Pedestrian and Bicycles						
Transit						
Quality of Life						
Economic Development						



The analysis indicates there may be negative mobility and access impacts under forecasted p.m. peak period conditions with the design concept that reduces the number of northbound travel lanes on Hennepin Avenue. The concepts with two travel lanes along Hennepin Avenue (one-way or two-way scenarios) are expected to experience congestion at the first couple traffic signals into the network (Main Street to University Avenue). The congestion is the result of the combined impact from a reduction to two travel lanes, additional signal phases at Main Street, and transit operations (dwelling transit vehicles) in the right lane. The two-way scenario introduces complication with the potential for the left lane to be blocked by a yielding motorist waiting to turn left and dwelling transit vehicles in the right lane. A queue length extending over the Hennepin Avenue Bridge is expected. This may impact the operation of the West River Parkway and Nicollet Island bus stops and streetcar stations. The overall travel time impact as result of this congestion is expected to triple the motor vehicle and double bus transit travel times under the two travel lane scenarios. It may be reasonable to assume motorists may divert to other travel routes or the demand may spread to time periods outside of the peak period. A macro-level travel demand modeling analysis was not conducted to estimate the potential diversion to other routes in downtown and near-downtown neighborhoods.

Next Steps

Planning-level construction cost estimates were prepared to help assess the funding need. The estimated cost for a full reconstruction is approximately \$17.2 Million. Interim implementation of one-way or two-way concepts could be addressed as part of a pavement marking or resurfacing project. The costs have been estimated at \$590,000 and \$1.2 Million (cost do not include bituminous or concrete resurfacing, but do include bituminous seal coat) for the one-way and two-way alternatives, respectively. Any efforts related to advancing a full reconstruction of the corridors would require more detailed engineering, investigation, and stakeholder engagement. Upon determining the long-term operations of the Hennepin and 1st Avenue corridors, a detailed study of the Central/Hennepin/5th intersection will be required to identify and evaluate potential intersection improvement solutions to address the mobility, safety, multimodal deficiencies, greening, and the potential development of special service districts.

1.0 Introduction

A multimodal transportation study has been completed to evaluate the existing transportation system and a range of roadway concepts in the Nicollet Island-East Bank (NIEB) and Marcy Holmes Neighborhoods. This planning study examined one-way, two-way, and hybrid roadway configurations along the Hennepin and 1st Avenue corridors with consideration for quality of life, access, safety, connectivity, and mobility for all modes of travel.

1.1 Project Location

This study evaluated the segments of Hennepin Avenue and 1st Avenue NE between the Hennepin Avenue Bridge and 7th Street NE (northeast of Central Avenue). Both corridors serve as a primary connection between the Downtown Central Business District and Northeast Minneapolis, along with access to local businesses and adjoining neighborhoods. In addition to evaluating the Hennepin Avenue and 1st Avenue NE corridors, the study includes all signalized intersections within proximity of the study area. Figure 1 illustrates the study area and key intersections included within the transportation study.

1.2 Study Overview

Several transportation studies have been completed in recent years that identify potential multimodal opportunities, potential redevelopment, and transit system enhancements that will affect the NIEB and Marcy Holmes neighborhoods. The studies have identified the Hennepin and 1st Avenue NE corridors as part of the protected bicycle plan¹ and part of the Nicollet-Central streetcar alignment². In addition, a top priority identified by residents in the NIEB neighborhood small area plan³ is to restore the Hennepin and 1st Avenue NE to two-way street operation. A record of recent previous studies is shown on the study corridor timeline on Page 4.

Along with other priorities, this study will identify draft roadway concepts and document benefits and impacts (i.e., pros and cons) associated with any potential implementation. There will be particular attention to the following elements:

- Access to and from primary destination points,
- Innovative pedestrian and bicycle infrastructure,
- Providing a safe environment for all travel modes,
- Alignment with future development plans,
- Changes in traffic operations and parking demand,
- Existing and planned transit service, and
- Consideration of travel through the study area.

¹ Protected Bikeway Update to the Minneapolis Bicycle Master Plan, City of Minneapolis, August 2015

² Nicollet-Central Modern Streetcar Environmental Assessment, City of Minneapolis, February 2015

³ Nicollet Island-East Bank Neighborhood Small Area Plan, NIEB Neighborhood Association, September 2014

The study will follow a high level analysis approach starting with an understanding of the primary goals and values, issues and constraints, identification and screening of alternatives and completing a more detailed evaluation to understand the tradeoffs.



Study Process

The technical analysis will be supplemented by stakeholder input throughout the study process. A Technical Committee, comprised of local government officials and an appointed neighborhood Study Advisory Committee participated throughout the study.

1.3 Study Purpose and Need

The purpose of this study was to develop and evaluate concepts that improve safety and comfort for all users within the public right of way, while ensuring improved neighborhood connectivity and mobility for all modes within and through the study area. Key neighborhood goals include:

- Connect pedestrian, bicycle, and transit infrastructure to the River and to adjacent neighborhoods and districts, including downtown Minneapolis, the University of Minnesota, Dinkytown and the Northeast Arts District.
- Provide an exceptional urban pedestrian experience for people of all ages.
- Enhance the pedestrian and bicyclist experience and improve pedestrian and bicyclist safety and comfort.
- Achieve a better balance between pedestrian, bicycle, transit and automobile travel modes.
- Expand and improve pedestrian, bicycling, and transit infrastructure throughout the neighborhood.
- Improve multi-modal connections with existing transportation networks to improve access to and from destinations throughout Minneapolis and beyond.
- Parking will be conveniently accessible for residents and visitors who choose to travel by car.
- Support improved transit services and infrastructure including the Nicollet-Central Streetcar implementation, real time transit information signage and otherwise.

The objective of this study was to summarize the impacts (e.g., pros and cons) of several potential concept design configurations for Hennepin and 1st Avenue that meet to varying degrees the primary goals of the stakeholders and neighborhood. This study frames the pros and cons and design considerations, but does not make recommendations or prioritization of a preferred concept. Information included in this study will help inform future design decisions and set the foundation for a more detailed engineering and design evaluation. This study focuses on the Hennepin Avenue

and 1st Avenue segments. At the outset and through the study process, the Central Avenue/Hennepin Avenue/5th Street intersection (Central/Hennepin Triangle) was identified as deficient for pedestrians, motorists and bicycles. Improvements to this intersection are not identified in this study, but upon determining the long-term operations of the Hennepin and 1st Avenue corridors a detailed study of the Central/Hennepin/5th intersection will be required to identify and evaluate potential intersection improvement solutions.

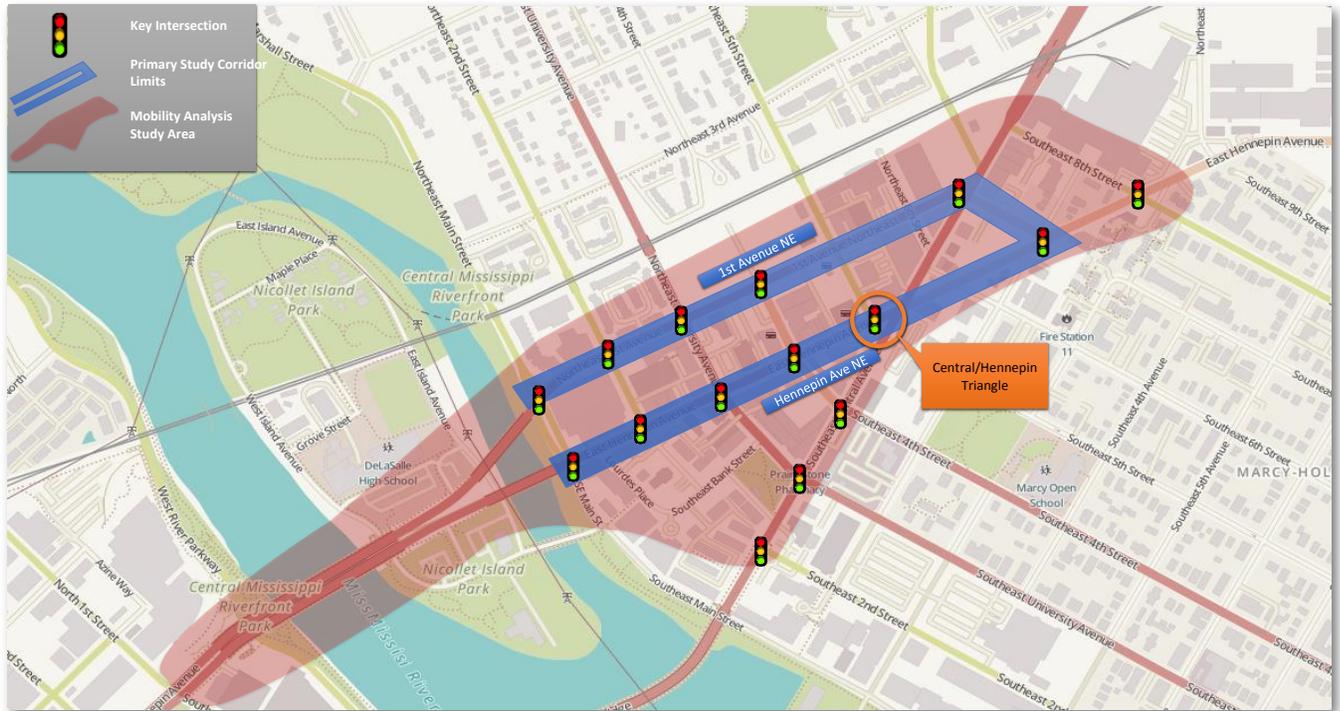
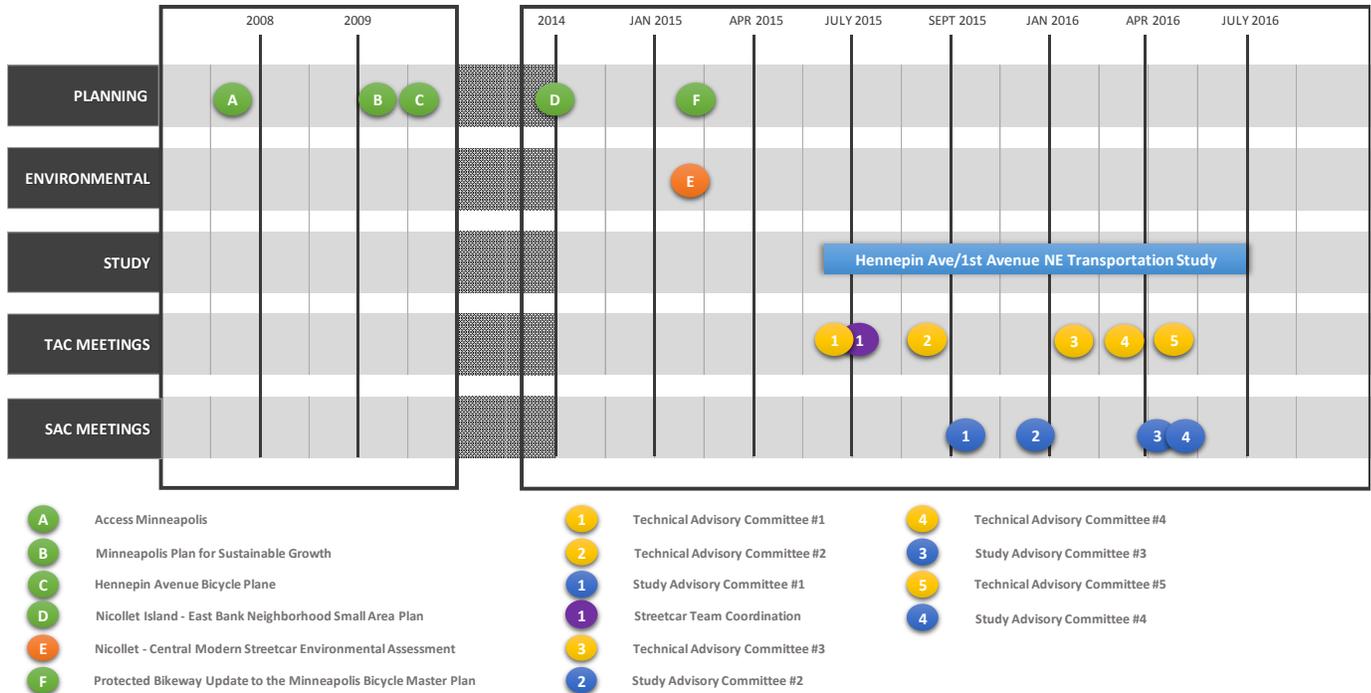


Figure 1. Study Area

1.4 Stakeholder and Public Involvement

A key part to the completion of the study is the stakeholder and public involvement process, which included a Technical Advisory Committee (TAC) and an appointed neighborhood Study Advisory Committee (SAC). Meetings were held between June 2015 and May 2016 as illustrated in the study corridor project timeline.



Study Corridor Project Timeline

1.4.1 Technical Advisory Committee

The TAC consisted of members from the City of Minneapolis Traffic and Parking Services, Transportation Planning and Programming, and Community Planning and Economic Development divisions, Hennepin County Public Works, the Minnesota Department of Transportation (MnDOT), and Metro Transit. The role of the TAC was to provide the study direction. They were given the opportunity to provide feedback on technical analysis, make recommendations on the alternatives analysis, and guide the development of the study design concepts.

The TAC met five times over the course of the study and was an integral part in developing the alternatives and design concepts.

- **TAC Meeting 1** – discussed the project goals, the major issues of concern, challenges and discuss the existing conditions inventory.
- **TAC Meeting 2** – discuss the cross-section alternatives development process and evaluation metrics.
- **TAC Meeting 3** – held following the completion of the cross-section alternatives analysis and focused on identifying the key concept alternatives for further evaluation.
- **TAC Meeting 4** – discussed the results of the traffic operations analysis and reviewed the concept design alternatives.
- **TAC Meeting 5** – provided a final summary of the concept designs, project goals and finalized the study report.

1.4.2 Neighborhood Study Advisory Committee

The SAC consisted of a group of local stakeholders, business, and neighborhood representatives. The role of SAC was to communicate information to and from the respective neighborhood and business associations, actively provide input and guidance throughout the study, and to help the City of Minneapolis collectively work towards achieving the neighborhood goals, city and regional goals, while maintaining an efficient multimodal transportation system.

The SAC met four times of the course of the study. Each meeting was scheduled at key study milestones to communicate information and to receive important input.

- **SAC Meeting 1** – communicated the study process, provided a review of the existing conditions inventory, and heard important priorities and objectives of the neighborhood.
- **SAC Meeting 2** – discussed and received feedback on the preliminary cross-section alternatives.
- **SAC Meeting 3** – discussed and received feedback on the concept designs.
- **SAC Meeting 4** – discussed and received feedback on the concept designs.

Meeting minutes collected at each of the SAC meetings are provided for reference in Appendix A.

1.4.3 Project Website

A website was established at the beginning of the project. The URL for the site is <http://www.minneapolismn.gov/cip/2016/WCMSP-174777>. The purpose of the website is to provide another way for the general public to be informed about the project status and to disseminate information.

2.0 Existing and Future Conditions

An efficient transportation system is vital to the economic viability of the city, the region and the state. Minneapolis must remain livable and walkable to maintain its regional and national competitiveness. Transportation along Hennepin and 1st Avenue is multi-modal, comprised of pedestrian, bicycle, transit and automobile. There are unique design challenges and often times competing interests associated with each mode. The existing and future network conditions for the Hennepin Avenue and 1st Avenue NE corridors are documented in the following sections. Key elements include the corridor characteristics, pedestrian and bicycle network, parking, transit, roadway safety, land use, and mobility.

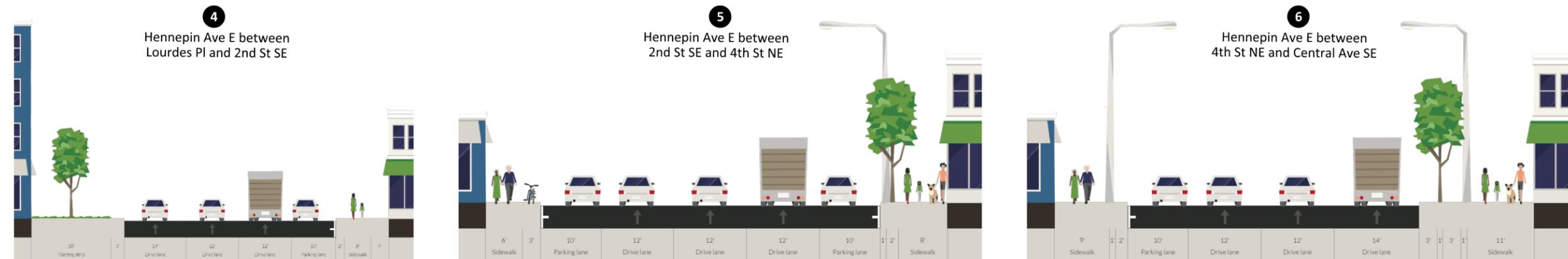
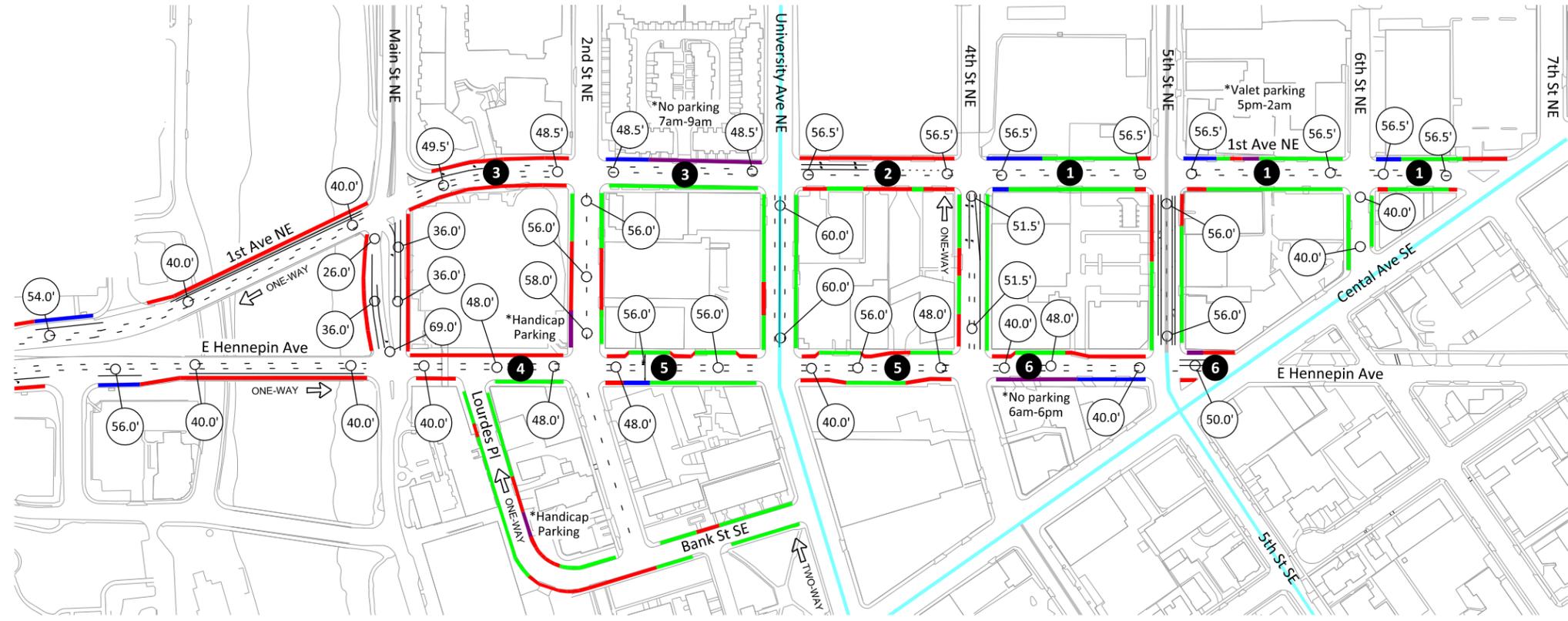
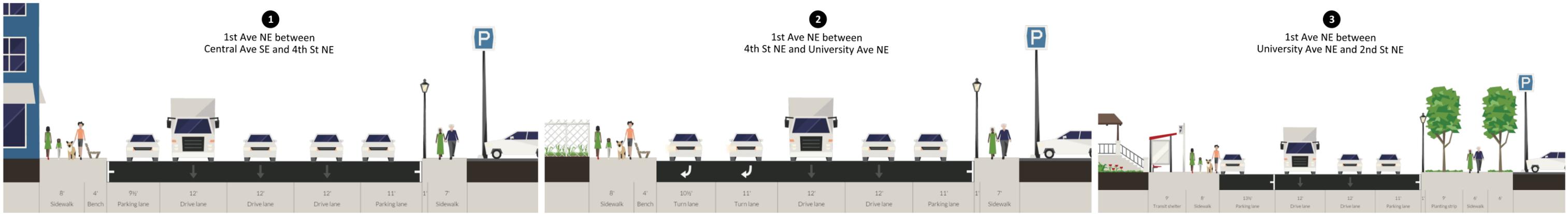
2.1 Street Network

Hennepin Avenue and 1st Avenue serve an important role as a part of the regional transportation system, which is supported by its functional classification as an A-Minor Augmenter Arterial. A-Minor Augmenters supplement and provide connectivity to the principal arterial system and as such they support access to major traffic generators, serve as primary transit corridors, carry higher volumes of general traffic, and mobility for people walking or biking. The City of Minneapolis defines these corridors as Activity Area Streets in Access Minneapolis, noting that these street types are unique in that they have many different design characteristics and capacities due to their location near Central Business District (CBD) and higher intensity land uses. It is understood that Activity Area Streets have higher levels of pedestrian, bicycle, transit, and motor vehicle activity due to adjoining land uses. This corridor is one of just a few streets (others include Central Avenue and Plymouth Avenue) that have direct connectivity via major river crossings between Northeast Minneapolis and the downtown CBD.

Hennepin and 1st Avenue are both one-way streets and generally consist of three travel lanes. On street parking is provided along both sides of the streets on most blocks. The parking in many locations is provided via a parking bay, which forms curb extensions (wider sidewalks) at the intersections. Sidewalks within the study area vary greatly in width from one block to the next. Street furniture, transit shelters and other obstacles are present in many locations resulting in narrow pedestrian through space. Currently, there are no dedicated bicycle facilities along Hennepin Avenue nor 1st Avenue. However, several on street bicycle facilities are provided within the study area along 5th Street, University Avenue, and Central Avenue. Figure 2 illustrates the existing roadway and corridor characteristics within the Hennepin and 1st Avenue study area and Figure 3 documents the sidewalk conditions along with widths, obstruction locations and furnishing zone components.

2.2 Roadway Safety

The number and locations of crashes in the study area were analyzed to help identify and address safety problem areas. Crash data can be analyzed to identify problem locations or segments, crash patterns, and probable causes. If root causes and locations can be identified, the means to reduce the number and severity of crashes may be developed. A review of the corridor crash records was conducted to evaluate the safety characteristics of the roadway. Historical crash data from the most recent 5 years, 2010 to 2014, was obtained from the City of Minneapolis.

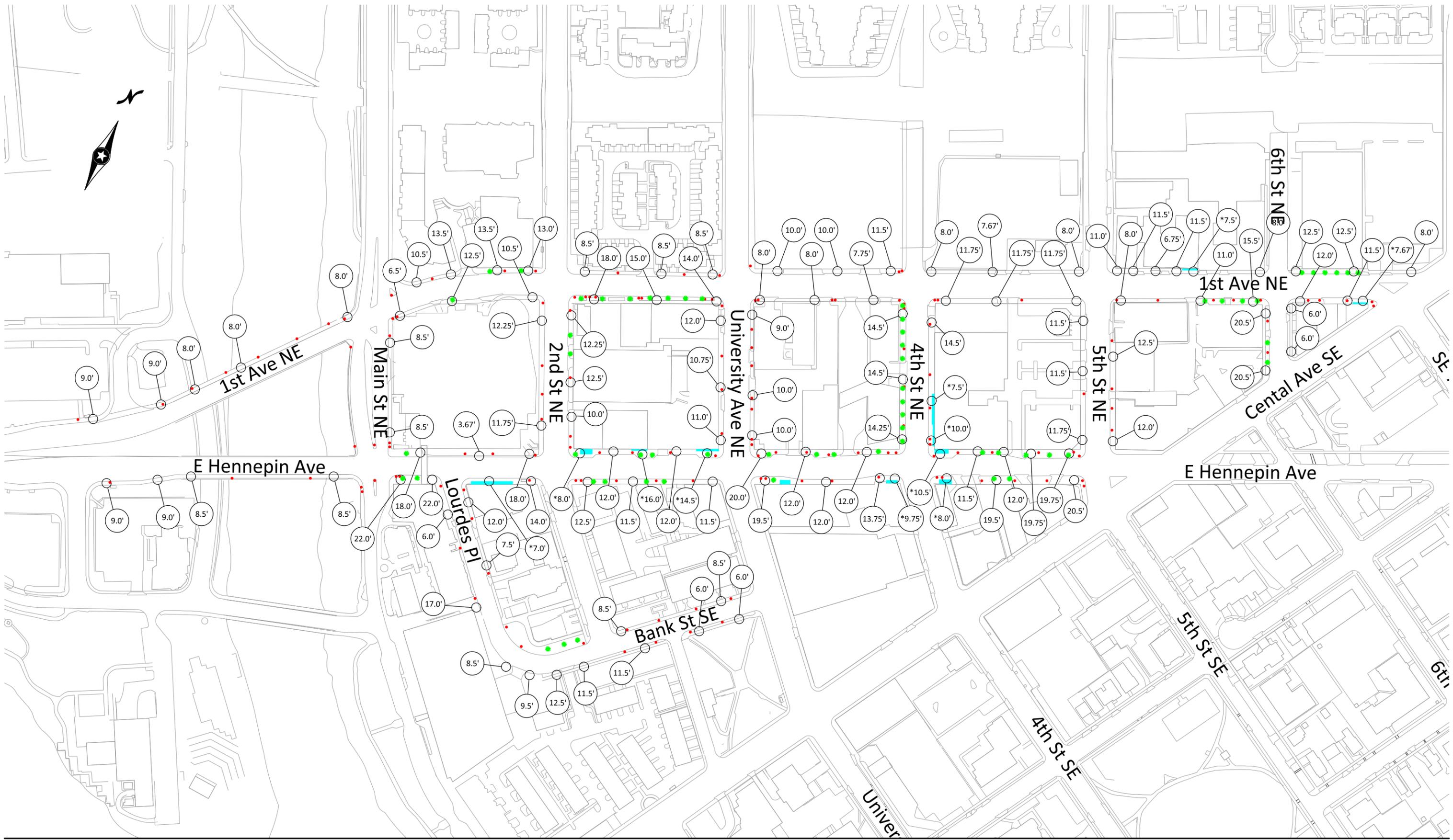


Hennepin and 1st Avenue Transportation Study



- Bus Stop
- Restricted Parking (See Notes for specific details)
- On Street Parking
- No Parking
- Existing Bike Lane
- Shared Bike Lane Facility
- XX.X' Street Width
(Face of Curb to Face of Curb)

Figure 2
Existing Street Network Characteristics



xx.x' Sidewalk Width (* Denotes width to obstruction)

● Power Poles, Lighting Poles and Signal Poles

★ Tree

■ Sidewalk Obstruction

Figure 3
Existing Sidewalk Conditions

Crash Rate

Crashes are a function of exposure. Roadways with higher traffic volumes experience more crashes than similar roadways with lower volumes. Rather than documenting the number of crashes that occur in a particular segment or at a particular intersection, the crash rate must be considered. Crash rates normalize different locations with varying traffic volumes, providing a useful tool in comparing the locations with respect to safety.

Critical Crash Rate

Crash occurrence is somewhat random by nature. Identifying every intersection with a crash rate above the average value in an analysis would produce a large amount of data that may not be statistically relevant with respect to safety deficiencies. The critical crash rate, the second key factor in safety analysis, identifies those locations that have a crash rate higher than similar facilities by a statistically significant amount. The critical crash rate is calculated by adjusting the system wide average based on the amount of exposure and a statistical constant indicating level of confidence. Although varying confidence levels are typically utilized, the 99.5 percentile confidence interval was selected for all safety calculations for this study. At locations where the actual crash rate exceeds the critical crash rate, it is 99.5 percent certain that the crashes are a result of deficiencies in the segment or intersection design.

The intersection crash characteristics, including crash rate, critical crash rate and distribution of crash types are illustrated on Figure 4. In general, most intersections are experiencing a crash rate, less than the critical crash rate. This is an indication that the number of crashes observed is somewhat expected and a specific safety issue is not present. However, The Hennepin/Central Triangle intersection is experiencing a very high crash rate, which may warrant further investigation. Overall, 178 crashes were reported during the 5 year study period. Eleven of these (approximately 6%) were bicycle and pedestrian related.

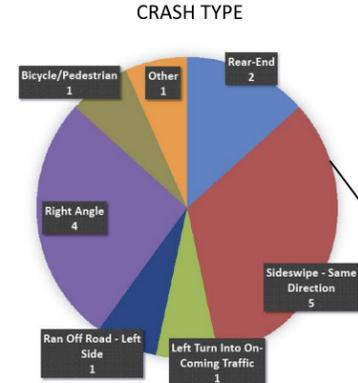
2.3 Transit

Hennepin Avenue and 1st Avenue serve as a vital link in facilitating bus service and route circulation for Metro Transit (revenue and non-revenue service). Buses operate in mixed traffic lanes. Buses stopping to pick up or drop off passengers block the right most moving traffic lane on most blocks. On a few blocks, the bus stops are located within the on street parking zone, and a dwelling bus is able to move out of the moving traffic lane.

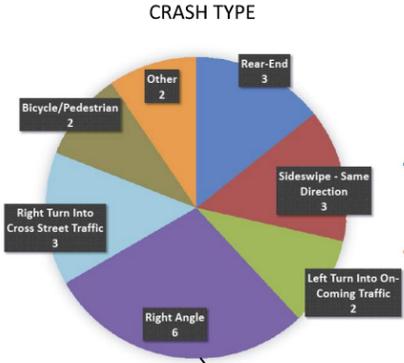
In October 2013, the City of Minneapolis selected a locally preferred alternative as a result of the Nicollet-Central Modern Streetcar Transit Alternatives Analysis and has since started work to complete an Environmental Assessment of the line. The current streetcar alignment identifies left-side operations across the Hennepin Avenue Bridge. This alignment is conducive to a left side operation within the Hennepin and 1st Avenue NE study area and extending further north on Central Avenue, but **does not preclude** the possibility of a right side streetcar alignment. The operations and maintenance facility site has not yet been determined, which will have to be taken into consideration when determining the streetcar alignment.

Figure 5 illustrates the Metro Transit bus service routes and trips traveling within and through the study area.

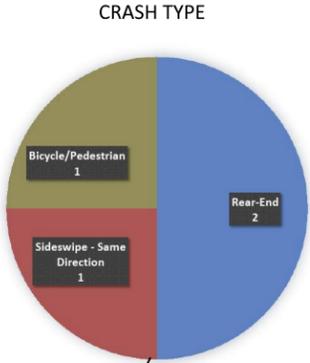
1st Ave & Main St
●15 Crashes



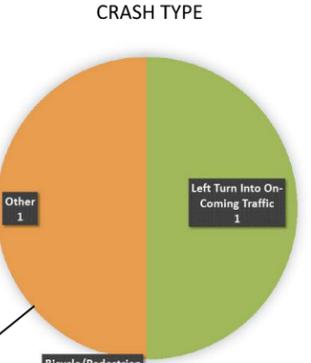
1st Ave & University Ave
●21 Crashes



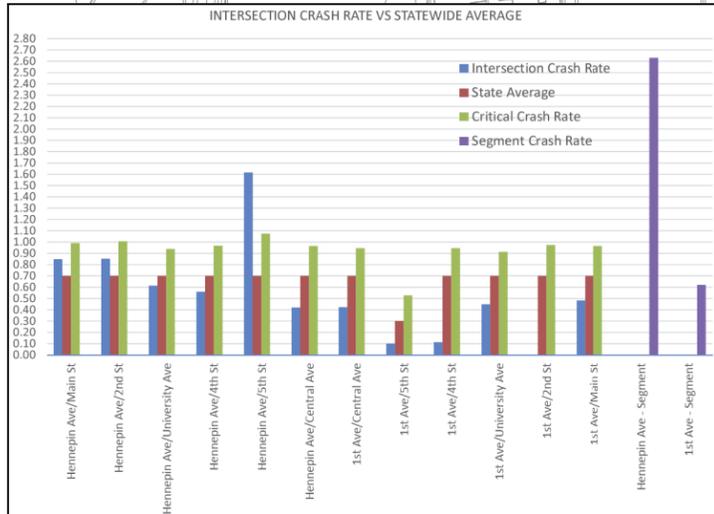
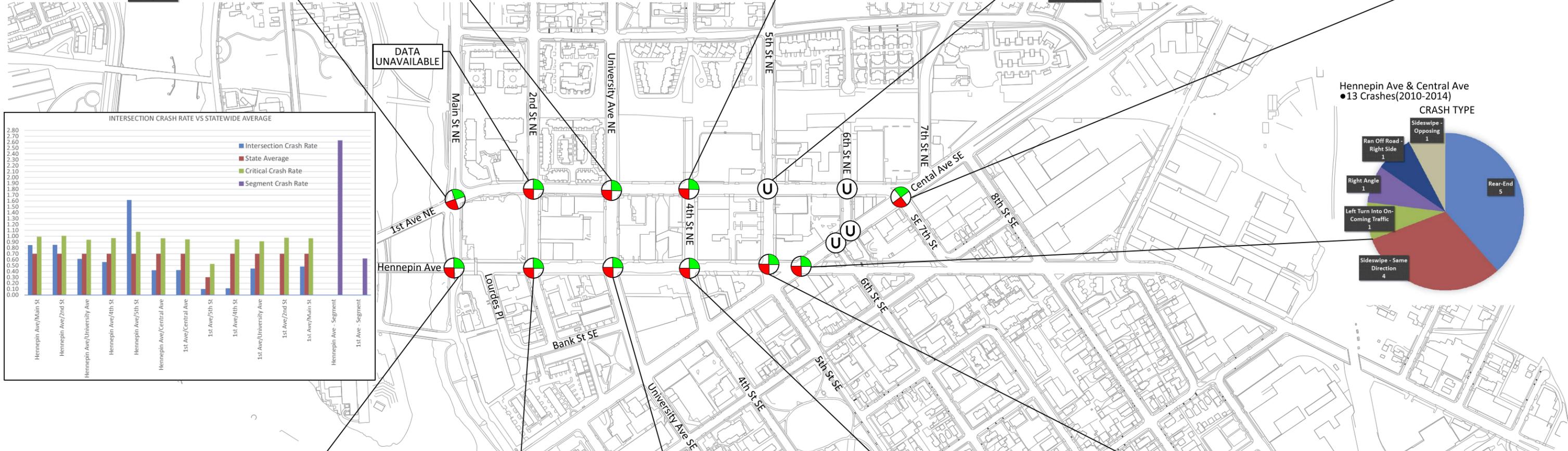
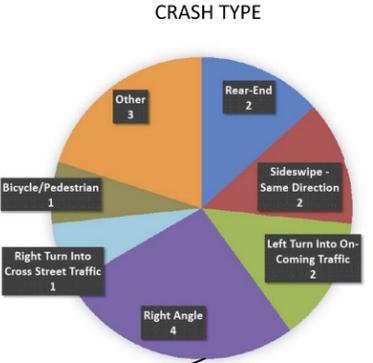
1st Ave & 4th St
●4 Crashes



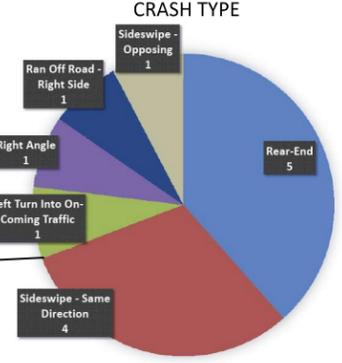
1st Ave & 5th St
●2 Crashes



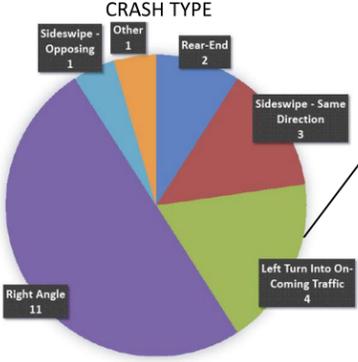
1st Ave & Central Ave
●15 Crashes



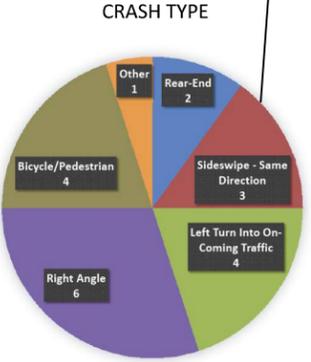
Hennepin Ave & Central Ave
●13 Crashes(2010-2014)



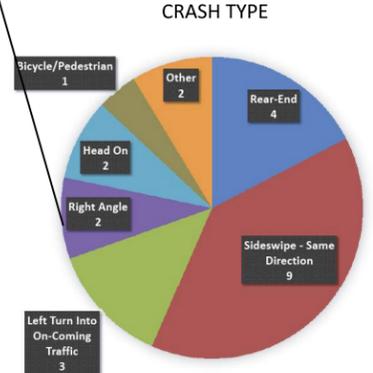
Hennepin Ave & Main St
●22 Crashes



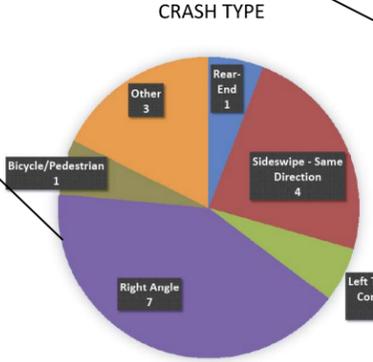
Hennepin Ave & 2nd St
●20 Crashes



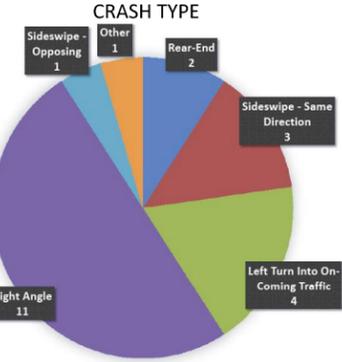
Hennepin Ave & University Ave
●23 Crashes



Hennepin Ave & 4th St
●17 Crashes



Hennepin Ave & 5th St
●26 Crashes



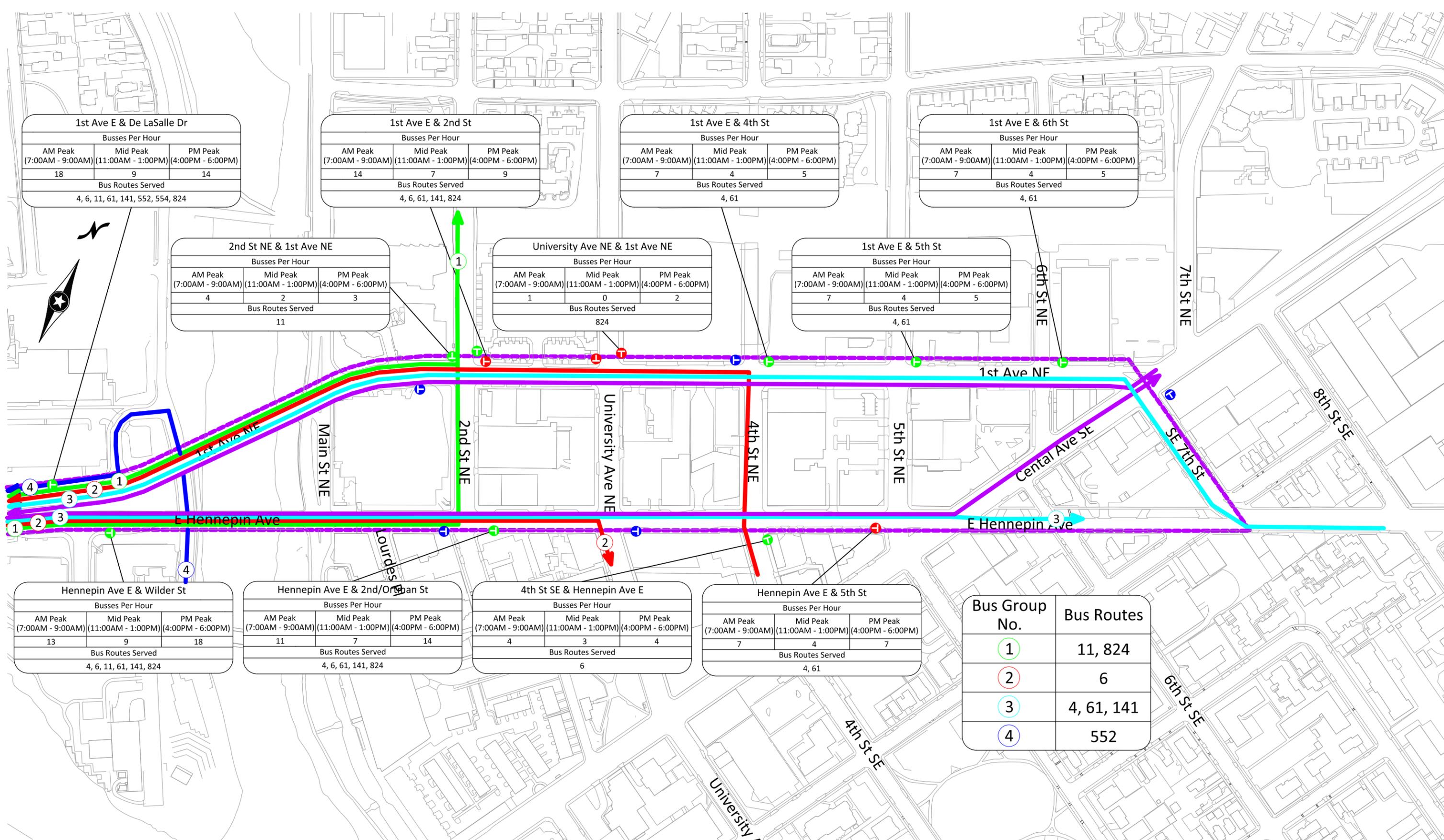
Hennepin and 1st Avenue Transportation Study



Traffic Signal

Sidestreet Stop Controlled Intersection

Figure 4
Crash History
(2010 - 2014)



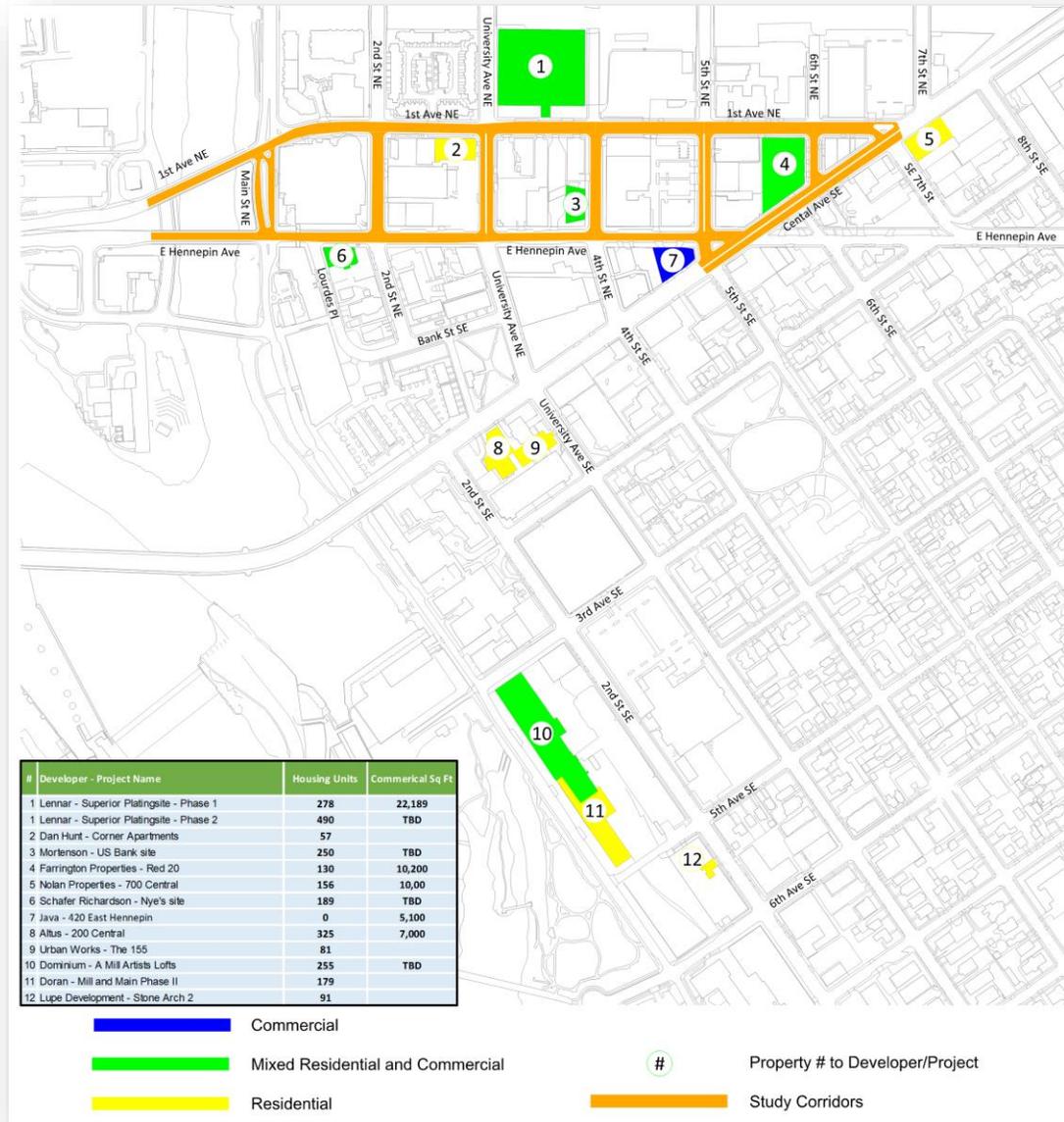
Hennepin and 1st Avenue Transportation Study



- T Bus Stop Out of Driving Lane
- T Bus Stop Obstructs Driving Lane
- T Streetcar Stop
- # Bus Routes
- Proposed Streetcar Alignment (Left Side)
- - - Proposed Streetcar Alignment (Right Side)

Figure 5
Transit Network

A key vision of the Nicollet Island-East Bank neighborhood is to be a vibrant pedestrian, bicycle and transit oriented neighborhood with a variety of land uses that draw people to the area at all times of the day. The addition of several new, high-density residential developments with ground floor commercial uses will substantially increase the population while enhancing the area as a thriving commercial district. Redevelopment within the study area is currently happening, with many additional properties anticipated to develop into the coming years helping to fulfill this vision. Figure 7 illustrates the location and type of know redevelopment parcels or projects currently under review or construction.



Source: City of Minneapolis Community, Planning and Economic Development

Figure 7. Potential Redevelopment Parcels

2.5 Parking

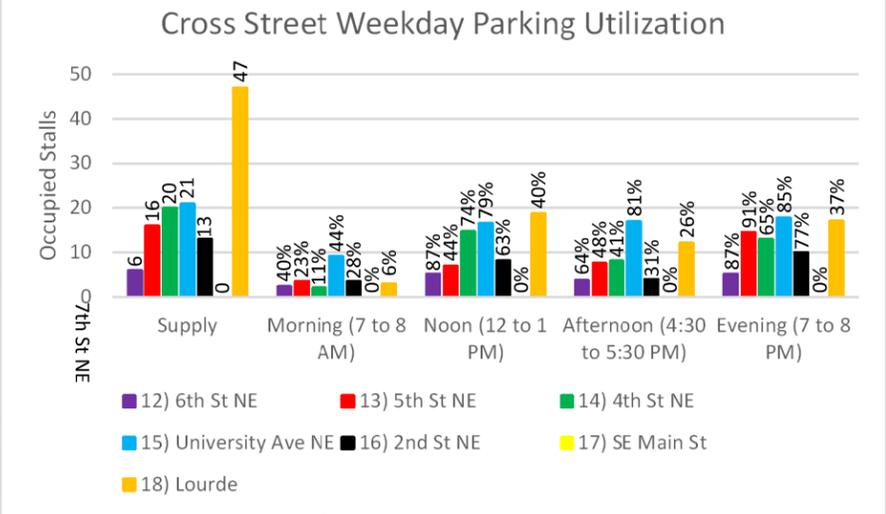
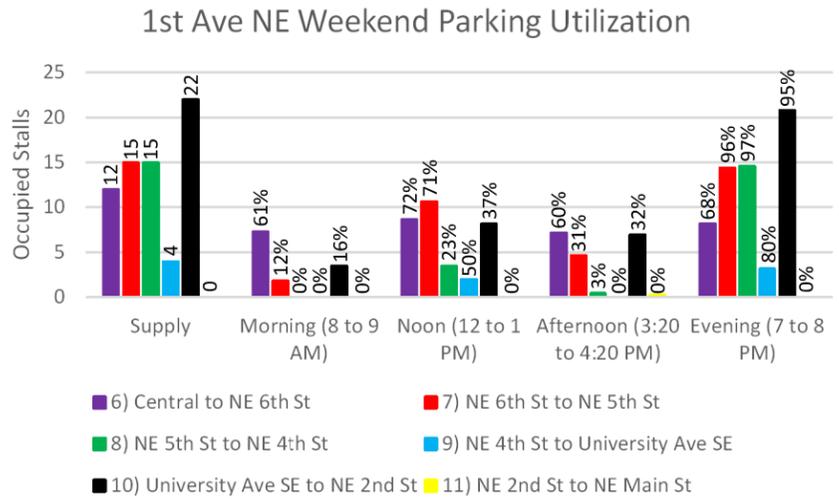
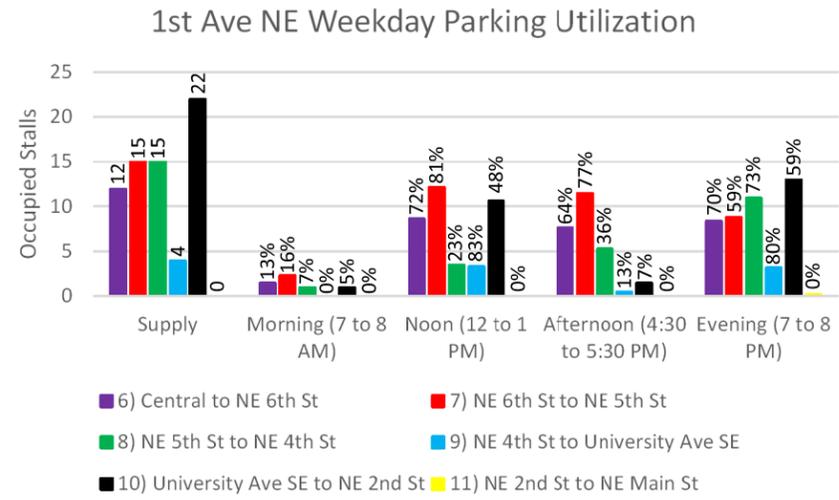
The availability of convenient on-street and off-street parking within the study area remains an important priority for residents and businesses. Commercial properties dominate much of the main thoroughfares including Hennepin Avenue, 1st Avenue, Central Avenue and University Avenue. Local businesses rely on, on and off street, public parking for their patrons. An understanding of the current parking supply (both on street and off street) and the existing utilization is an important consideration. A comprehensive on-street parking study was completed in June 2015 to collect this information during key time periods throughout the day on both weekdays and weekends. Figure 8 illustrates the parking supply and parking utilization data. As shown, the 2nd Street to University Avenue block is most heavily utilized. In general though, a substantial amount of available on-street parking spaces were found in the study area during most time periods evaluated.

2.6 Mobility

Motor vehicle mobility along Hennepin Avenue and 1st Avenue is also an important priority to stakeholders, while at the same time understanding their specific concerns related to vehicle travel speeds and circulation issues. Maintaining mobility will continue to serve the regional connection to the Downtown CBD, is important to the viability of the businesses through provision of reasonable access and circulation, and important to neighborhood for emergency access and commerce. Improving mobility of the non-motorized users is equally important and is a priority goal of this study. The roadway motor vehicle, bicycle and pedestrian volumes are an important consideration in determining the appropriate design, lane configuration alternatives and facility improvements.

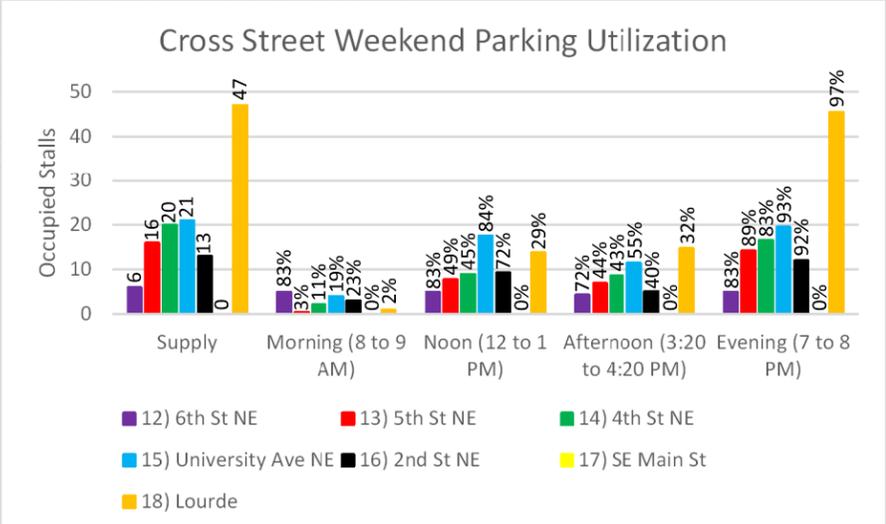
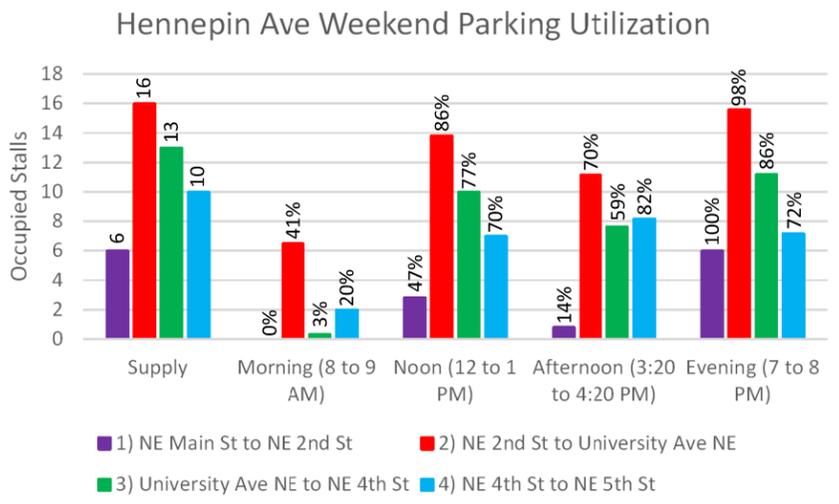
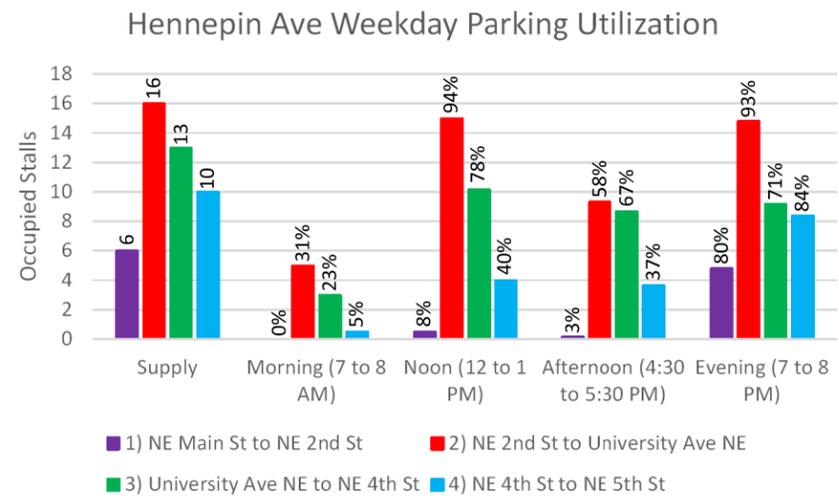
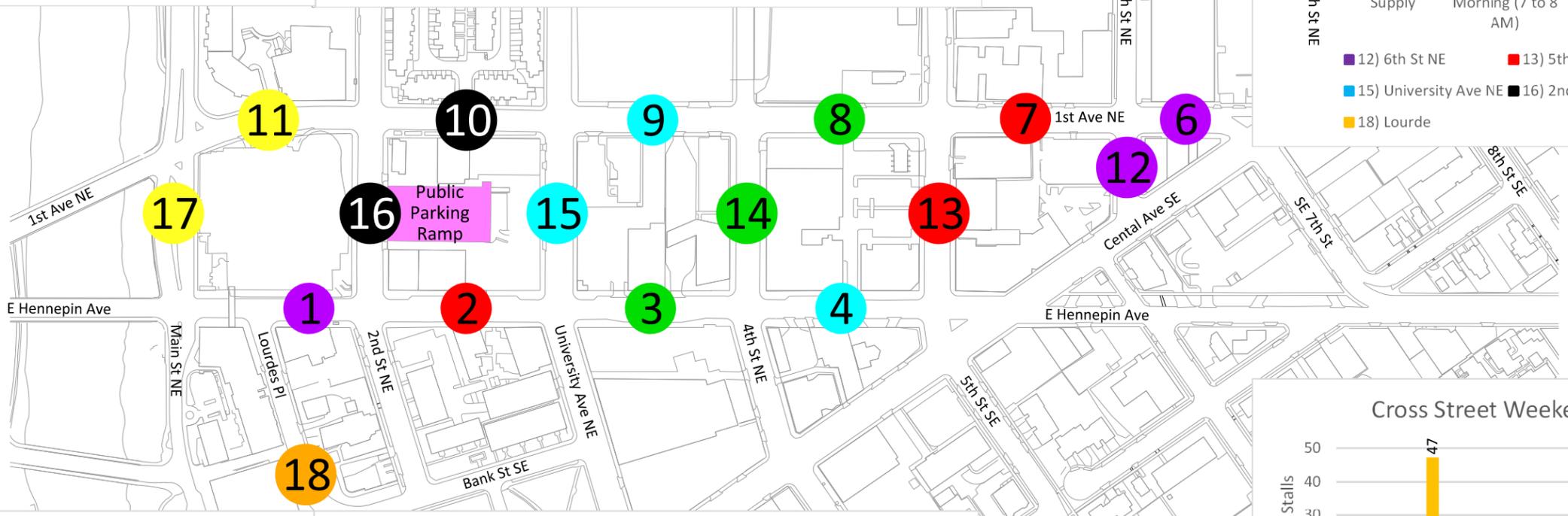
2.6.1 Bicycle and Pedestrians

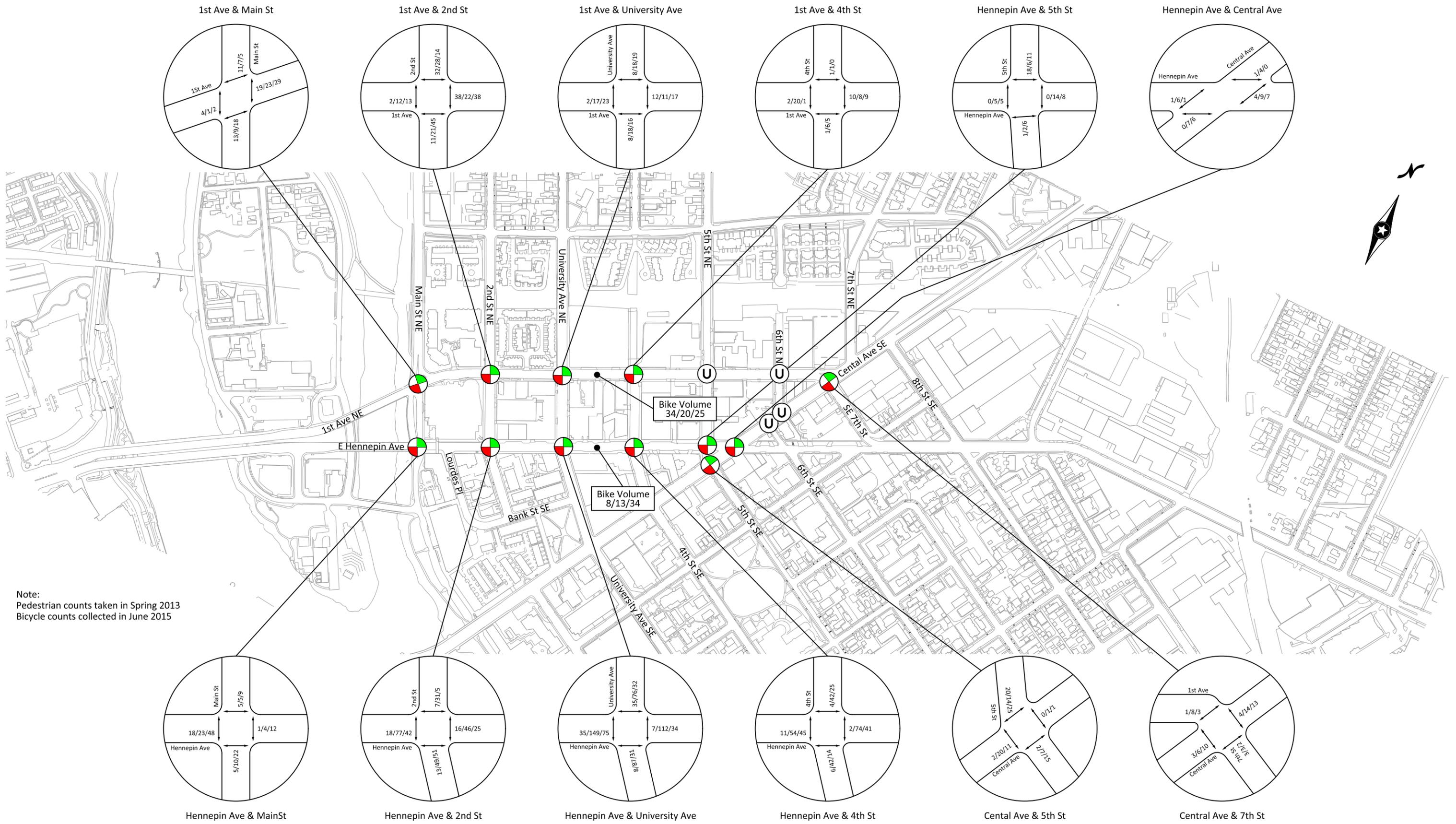
Existing pedestrian and bicycle volumes were field collected during the summer of 2013 (pedestrians) and the summer of 2015 (bicycles) and are illustrated in Figure 9. Most intersections within the core of the study area (2nd Street to 4th Street) experience more than 100 pedestrians an hour. Pedestrian activity is noticeably greater along Hennepin Avenue; however, it is expected this will change as redevelopment infills along 1st Avenue. Bicycle volumes along corridors show less than 50 per hour. The estimated daily number bicycles along Hennepin Avenue and 1st Avenue are 370 and 250, respectively. These bicycle volumes are occurring despite the fact there is not a dedicated bicycle facility. Bicyclists are traveling within mixed traffic, and it is expected that bicyclist volumes will increase with provision of a dedicated facility and the build-out of other facilities planned on intersecting streets.



Additional Off-Street Parking	
Public Parking Ramp*	Surface Lots**
263 Parking Stalls	413 Parking Stalls

Notes:
 * - Counts collected in July 2015
 ** - Counts collected in 2013





Note:
 Pedestrian counts taken in Spring 2013
 Bicycle counts collected in June 2015

Hennepin and 1st Avenue Transportation Study



Figure 9
Existing Pedestrian and Bicycle Volumes

XX/XX/XX Pedestrian - AM Peak Hour Volume/Off Peak Hour Volume/PM Peak Hour Volume

XX/XX/XX Bike - AM Peak Hour Volume/Off Peak Hour Volume/PM Peak Hour Volume

2.6.2 Motor Vehicles

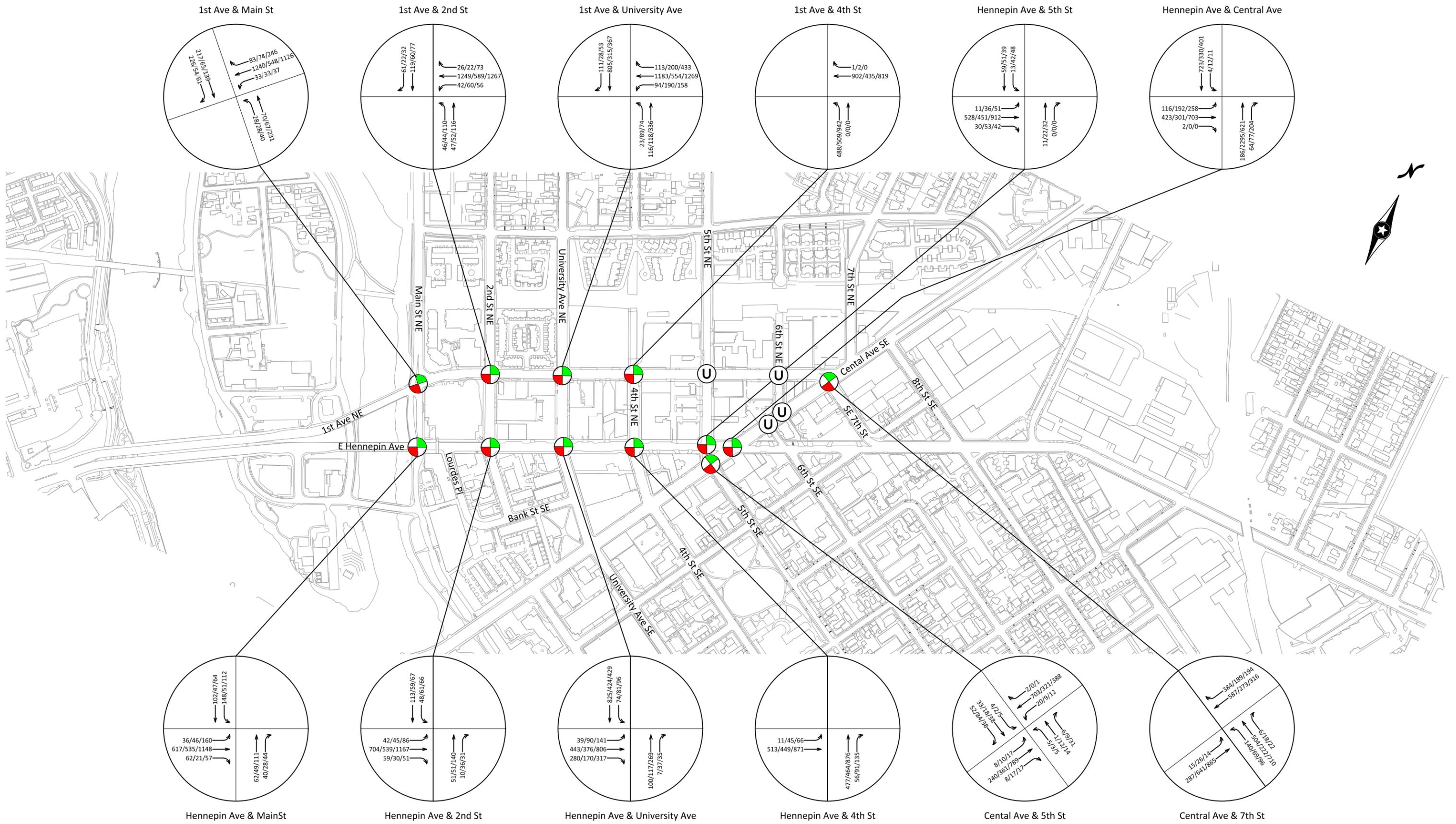
Existing motor vehicle traffic volumes were collected in the spring/summer of 2013 as part of Minneapolis' North/Northeast Traffic Signal Improvement project. The a.m., off (lunch hour) and p.m. peak hour traffic volumes are shown in Figure 10. The peak hour volumes are necessary to evaluate intersection capacity needs and/or assessment of impacts associated with any alternative lane configurations or street operation.

Traffic volumes within the study area are expected to change as redevelopment occurs. A trip generation assessment of the known development parcels (see Figure 7) was completed. Assuming a 50% non-motorized user trip reduction, an anticipated 8% increase in traffic volumes is expected with the redevelopment or addition of new properties in the study area. This equates to an approximate 0.4% per year growth rate when normalizing over a 20 year period. Minneapolis typically uses a 0.5% per year growth rate to account for redevelopment, traffic circulation changes and regional demand. Considering both Hennepin and 1st Avenue also serve a regional traffic function, the 0.5% growth rate (10% increase) is appropriate. Forecast year 2035 traffic volumes were obtained by increasing the existing traffic volumes by 10%. The existing and forecast year 2035 average daily traffic (ADT) volumes are shown for reference in Table 1.

Table 1. Existing and Forecast 2035 Motor Vehicle ADT

Count Location	Existing	Forecast 2035 (One Way)
Hennepin Avenue (Main Street to Lourdes Pl)	15,300	16,900
Hennepin Avenue (4th Street to 5th Street)	8,700	9,600
Hennepin Avenue (7th Street to 8th Street)	13,900	15,400
1st Avenue (5th Street to 4th Street)	10,300	11,400
1st Avenue (University Avenue to 2nd Street)	8,800	9,700
Central Avenue (4th Street to 5th Street)	14,600	16,100
2nd Street (Hennepin to 1st Avenue)	3,900	4,300
University Avenue (Hennepin to 1st Avenue)	11,700	12,900
4th Street (Central to Hennepin)	12,600	13,900
4th Street (Hennepin to 1st Avenue)	9,300	10,300
5th Street (Hennepin Avenue to 1st Avenue)	2,400	2,700

Source: Minneapolis Traffic Count Management System



Hennepin and 1st Avenue Transportation Study



Traffic Signal

Sidestreet Stop Controlled Intersection

Existing ADT

XX/XX/XX AM Peak Hour Volume/Off Peak Hour Volume/PM Peak Hour Volume

Figure 10
Existing Motor Vehicle Traffic Volumes
2013

2.6.3 Regional Traffic Demand

Another important consideration is to understand how much of the motor vehicle traffic volumes are traveling within or through the study area. To quantify the amount of regional traffic (motorist traveling through) versus destination traffic (motorists traveling to or from the study area) an origin-destination study was completed. The study used video recording to track motorists entering and exiting the study area, and the license plates recorded were then matched. As part of the license plate match, a time lag was assessed. Motorists that appeared at both the entering and exiting locations within a short period (few minutes) were considered through traffic. If a long time duration was observed these are considered destination trips. In many cases motorists were observed at only the enter and the exit points only, which are also considered destination trips. Figure 11 illustrates the results of the origin-destination study. As shown, approximately 60-65% of the motorists are traveling through the study area along the major arterials (Hennepin Avenue, 1st Avenue and University Avenue) during the a.m. peak period. During the p.m. peak period the through volume is slightly less, at approximately 50-55%. Approximately 2 to 12% of all the motorists recorded could be specifically traced to destinations within the study area.

2.6.4 Two-way Street Network

The neighborhood has expressed desire to consider the restoration of Hennepin and 1st Avenue to two-way street operation. This study will consider this alternative as it relates to other objectives; however, key elements such as the limits of the two-way street network and the anticipated change in motor vehicle traffic volumes need to be understood. A high level assessment considering existing and future constraints (e.g., roadway width, pedestrian realm and the Central/Hennepin Triangle complexity) was completed to determine the feasible limits of a two-way street network along Hennepin Avenue and 1st Avenue NE. Based on this assessment, it was concluded that for a variety of reasons, one-way street operation should be maintained along both corridors south of Main Street, and on Hennepin Avenue between 5th Street and 7th Street.

Table 2 illustrates the potential two-way street network and summarizes the pros and cons of the rationale for not extending Hennepin Avenue as a two-way beyond 5th Street.

Based on the potential two-way street network configuration, the motor vehicle traffic volumes were developed. As shown previously, there is a high volume of through motorists. This indicates that if two-way operation were to be realized, it is expected that the northbound volumes on Hennepin and the southbound volumes on 1st Avenue will be considerably higher than the opposite direction, as there is limited advantage for through motorists to change streets. The opposite direction does provide destination traffic circulation advantage and would be expected to attract motor vehicle volume. Figure 12 illustrates the estimated existing condition two-way traffic peak hour motor vehicle volumes. Similar to the one-way scenario, the forecast 2035 traffic volumes are obtained by applying a 0.5% per year growth rate (10% increase).

Table 2. Two-way Street Network Limits



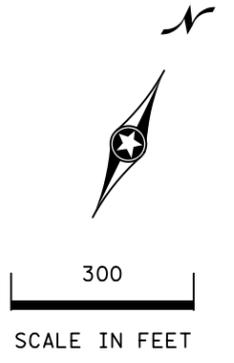
Rationale for Maintaining Hennepin Avenue One-Way (5th Street SE to 7th Street SE)

PROS

- Promotes non-motorized safety along and across streets
- Narrows street crossing distances for pedestrians and bicycles at the Central Triangle
- Improves safety and multimodal operations
- Reduces intersection footprint to provide more room for non-motorized modes of travel
- Supports corridor trip purposes and achieves better balance amongst travel modes
- Discourages regional traffic on southbound Hennepin
- Reduces conflicting motorized movements at Hennepin/Central intersection
- Increases transit reliability along Hennepin and Central
- Potential for additional green space (Major Strategic Goal – NIEBNA SAP)
- Expansion of space for pedestrian and bicycle infrastructure (Major Strategic Goal – NIEBNA SAP)
- Supports improved transit services (Top Priority – NIEBNA SAP)

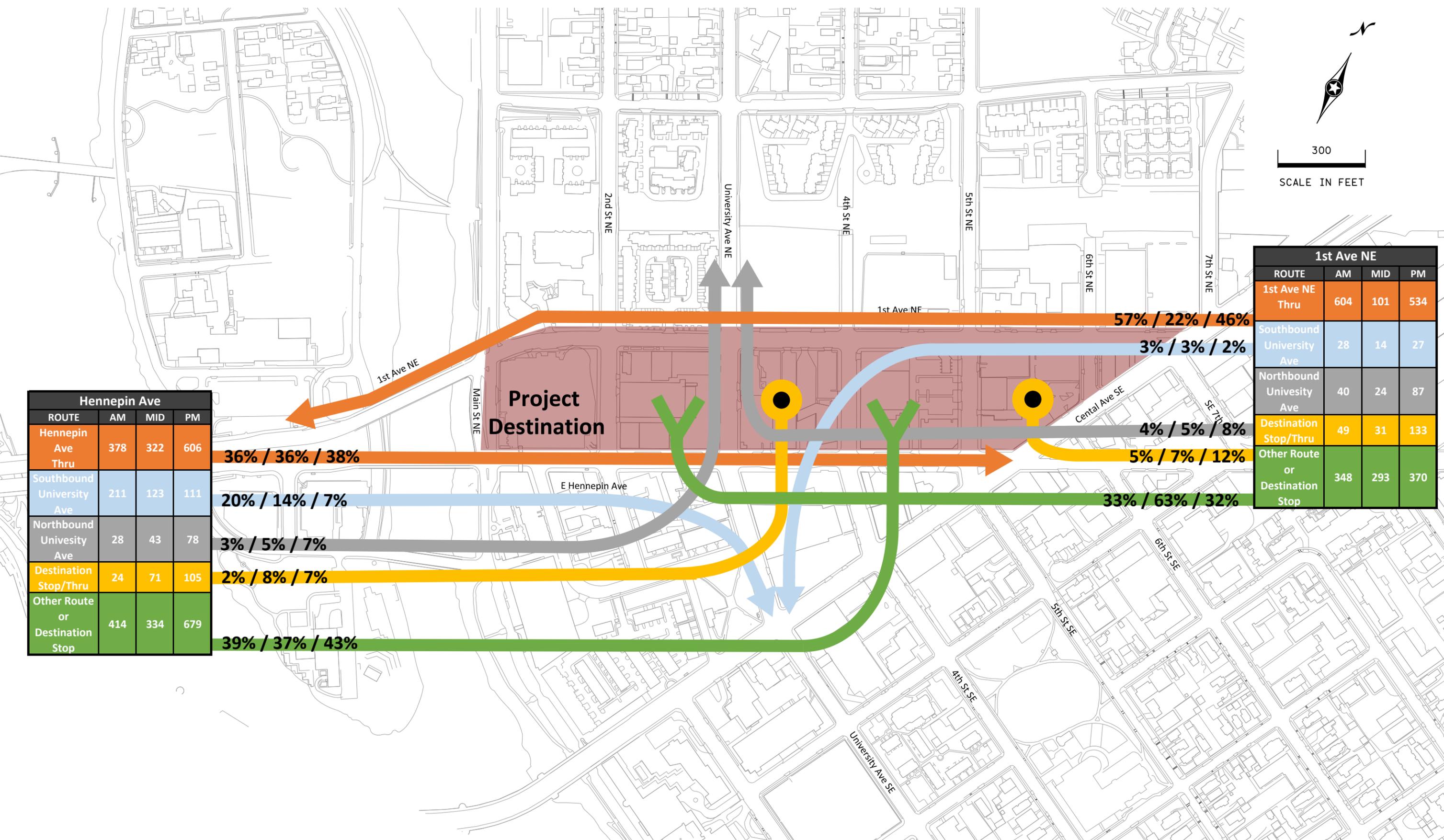
CONS

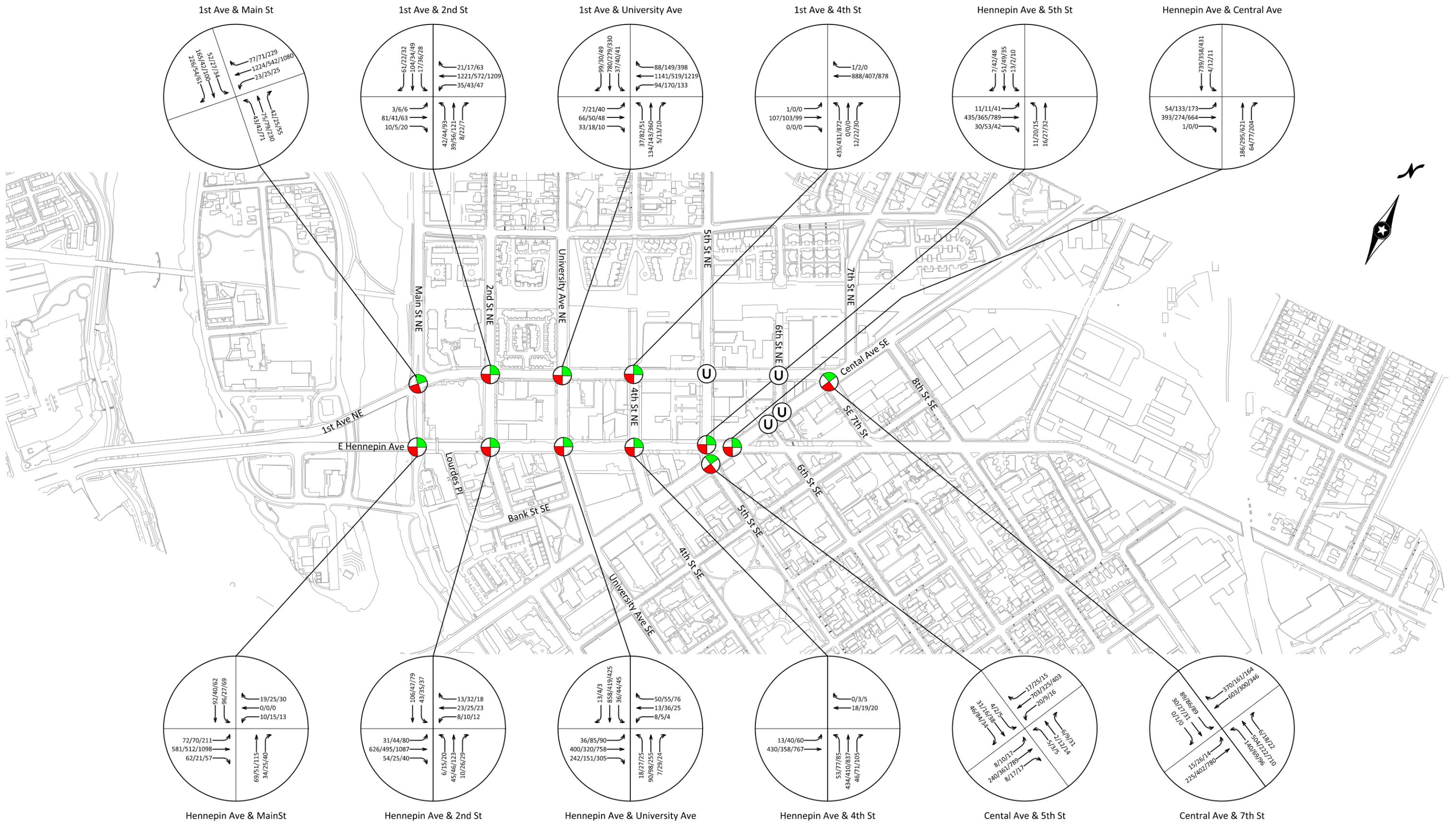
- Establishes short one-way segment that may create confusion
- Does not align with neighborhood expectations (Vision and Strategic Action – NIEBNA)
- May increase circuitry for access to Henn/Central/7th triangle (May be addressed during review of proposed development)



Hennepin Ave			
ROUTE	AM	MID	PM
Hennepin Ave Thru	378	322	606
Southbound University Ave	211	123	111
Northbound University Ave	28	43	78
Destination Stop/Thru	24	71	105
Other Route or Destination Stop	414	334	679

1st Ave NE			
ROUTE	AM	MID	PM
1st Ave NE Thru	604	101	534
Southbound University Ave	28	14	27
Northbound University Ave	40	24	87
Destination Stop/Thru	49	31	133
Other Route or Destination Stop	348	293	370





Hennepin Ave and 1st Avenue Transportation Study



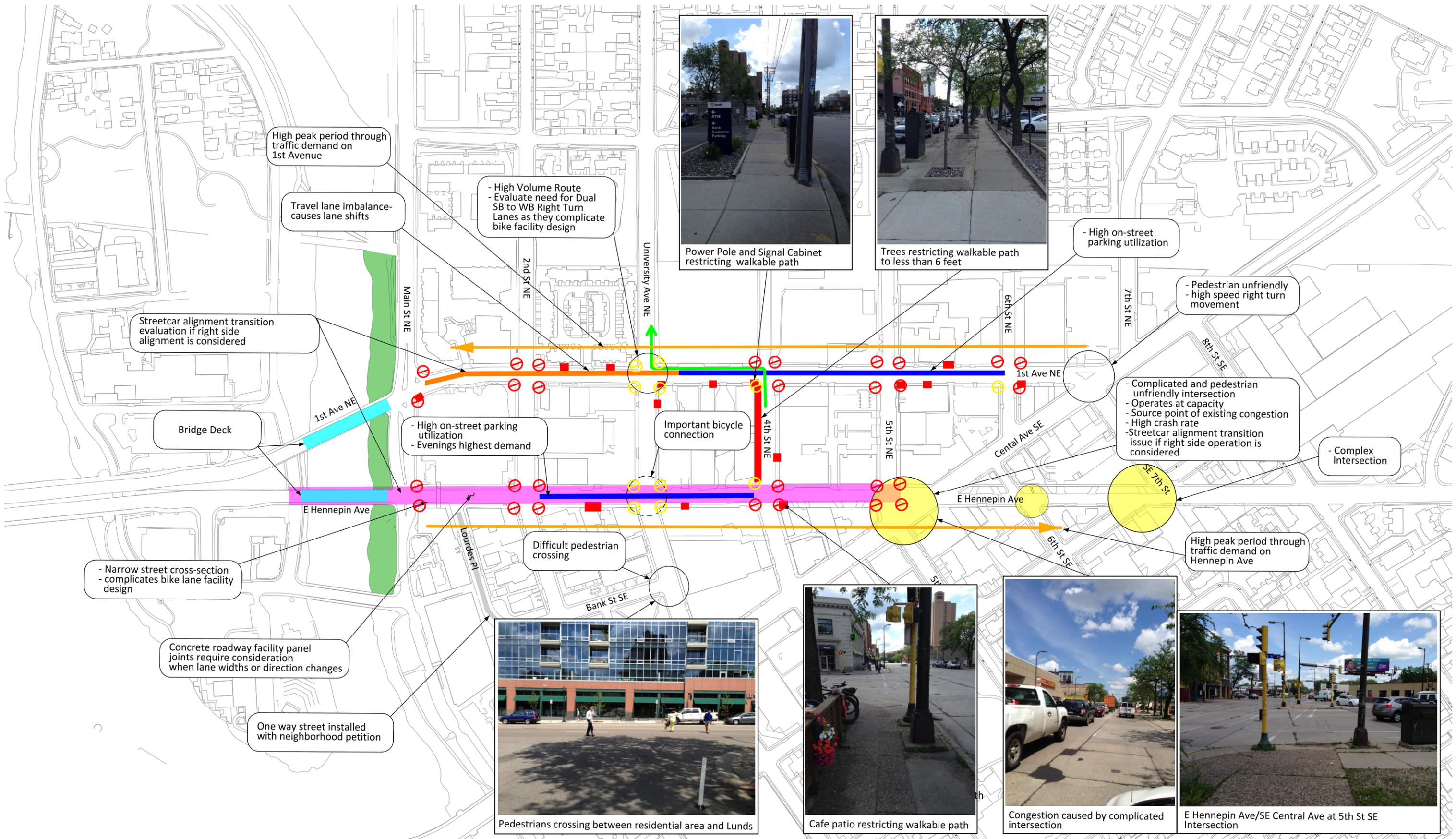
● Traffic Signal
U Sidestreet Stop Controlled Intersection
XXX Existing ADT XX/XX/XX AM Peak Hour Volume/Off Peak Hour Volume/PM Peak Hour Volume

Figure 12
Existing Two-way Street Network Motor Vehicle Volumes
2013

2.7 Issues and Constraints

The review of the existing and future transportation system characteristics found a number of areas or issues that illustrate the purpose and need and/or require consideration during the alternatives analysis. Figure 13 illustrates the key issues and constraints. A few considerations include:

- Narrow pedestrian realm with numerous obstructions and locations with inconsistent pedestrian through space.
- High motor through vehicle demands during the peak periods.
- A deficient and very complex intersection at the Central/Hennepin Triangle
- Planned streetcar operations and alignment transition if operating on the left side or right side through the study area.
- Planned bicycle connections.



Hennepin and 1st Avenue Transportation Study



Minneapolis Park Land
 Sidewalk area less than 6 feet

Traffic signal rebuild, ADA pedestrian ramps and APS systems are programmed for construction in 2016-2018 as part of a Minneapolis and MnDOT cooperative agreement project.

Non-compliant ADA Pedestrian ramp
 Potentially ADA compliant Pedestrian ramp

Figure 13
Issues and Constraints

3.0 Alternatives Development

The alternatives development identifies a multitude of transportation ideas and concepts based upon input from stakeholders and a review of the purpose and needs. From this range of alternatives, a screening evaluation is completed to evaluate each idea against key objectives. This process identifies the alternatives that best meet the project goals and are carried forward for further screening and evaluation. The goal is to arrive at a few feasible alternatives under both one-way and two-way street operation that best balance and meet the primary objectives of the stakeholders and neighborhood. An overview of the evaluation process is illustrated in Figure 14.



Figure 14. Alternatives Development Process

3.1 Key Objectives

The key objectives are based directly on the priorities and important considerations identified within adopted City planning documents, input from members of the Technical Advisory Committee (TAC), and voiced by the Study Advisory Committee (SAC). These objectives were developed into qualitative and quantitative technical metrics to be applied as part of the screening process and include five categories: Pedestrian/Biking, Mobility, Streetcar/Transit, Quality of Life, and Economic Development. The category “Operations” will be evaluated during phase II of the study. Table 3 summarizes the key objectives defined by the SAC.

Table 3. Alternatives Evaluation Objectives

Mobility/Safety

- Allow emergency access and truck operations for businesses
- Enhance non-motorized and motorized safety conflicts
- Reduce the number of complex intersection to increase safety
- Improve sight distances for non-motorized users
- Seek opportunities to address complex intersections (5th/Hennepin/Central, 7th/1st/Central, and 7th/Hennepin)
- Reduce complexity of the transportation network
- Address mixture of one-way and two-way streets
- Motorized throughput and congestion should not be driving factor
- Evaluate inconsistencies with parking bays and bump-outs

Pedestrian/Biking

- Improve connectivity for pedestrian, bicycling, and transit throughout the corridor
- Bicycle facilities should not be overlooked, part of greater network of connectivity to downtown, regional park system, and University of Minnesota campus
- Evaluate opportunities to address “free-flowing” right turns that encourage speeding and present conflicts with bicyclists and pedestrians

Streetcar/Transit

- Encourage transit use
- Streetcar is important improvement for the neighborhood and should be implemented in a way that maintain consistency with local and regional visions

Quality of Life

- Expand the pedestrian and bicycling facility
- Improve pedestrian and biking by using traffic calming techniques
- Influence travel behavior to reduce speeds before it enters the study area (e.g., Hennepin Bridge and Central Ave)
- Address signal timing that encourages speeding

Economic Development

- Parking will be accessible for residents and visitors
- Improve connections to businesses with access to and from destinations
- Limit speeding
- Promote traffic calming

3.2 Design Considerations

Best practice design standards and governing guidelines are considered to limit the range of potential configurations and alternatives. While numerous resources and documents are consulted, the key guidelines include the Municipal State Aid (MSA) Design standards (Chapter 8820) and Access Minneapolis Street and Sidewalk Design Guidelines⁴. Figure 15 illustrates a few of the key design parameters.

⁴ Access Minneapolis Ten Year Transportation Action Plan, Design Guidelines for Streets and Sidewalks, February 2008

Street Type	Travel Lane ¹	Left Turn Lane	Bicycle Lane ²	Typical Curb and Gutter	Parking Lane ³
Activity Center (MSA Sreet)	11 ft	10 ft	5-6 ft	2 ft	8 ft

1 May consider 10.83' lanes with State Aid Variance. A lane used by streetcar requires 12' travel lane if adjacent to parking or bicycle lanes

2 On street bicycle lanes. If protected bicycle lanes are considered a 7' bike lane with 3' buffer is desirable. If protected bicycle lanes are provided behind the curb an overall 9' width (including clearance zones) is preferred, but may be as narrow as 6.5' in constrained locations

3 A 10' parking lane is required with 10,000 ADT or greater. An 8' parking lane may be provided with a State Aid Variance.

Activity Center Street Type with High Pedestrian Priority*

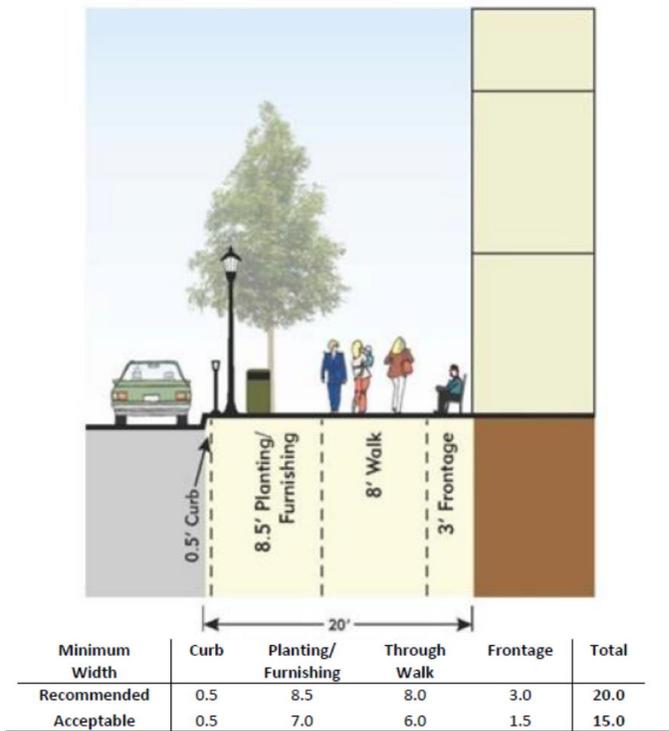


Figure 15. Key Design Parameters

3.3 Screening Evaluation Process

The screening evaluation process reviewed each alternative against the key technical and design standards and neighborhood objectives. Below is a list of technical and design “Fatal Flaws.”

- All day No Parking on Both Sides.
- Less than 2 Travel Lanes (One-way Concepts).

- Only 1 Travel Lane Each Direction (and No Turn Lane) – Two-way Concepts.
- Shared Bicycle Facilities Only.
- Less Than 11 Foot (10.83 foot lane may be considered) Travel Lane (Through Lane) .
- Hennepin and 1st Avenue One-way Pair Bridges Two-way Operation.
- Does not Maintain Streetcar “Couplet” alignment (northbound on Hennepin and southbound on 1st Avenue).
- Minimum Dimensions for All Modes of Travel (i.e., vehicle/transit, bicycle and parking).
- Reduction of Pedestrian Zone Space.

Table 4 summarizes the evaluation metrics for the key neighborhood objectives.

Table 4. Evaluation Metrics

CRITERIA	PERFORMANCE MEASURE			
Mobility and Safety	12' TRAVEL LANE	MORE THAN 12' TRAVEL LANE	12' TRAVEL LANE	11' TRAVEL LANE
	2 TRAVEL LANES		2 Travel Lanes	3 TRAVEL LANES
	7' PARKING	LESS THAN 8' PARKING	8' PARKING	7' PARKING
	ENHANCES NON-MOTORIZED AND MOTORIZED SAFETY	CONFLICTS WITH RIGHT SIDE TRANSIT LOADING	LESS CONFLICTS, GOOD SIGHTLINES	LESS CONFLICTS, GOOD SIGHTLINES
	EMERGENCY VEHICLE ACCESS AND TRUCK OPERATIONS	MORE CONGESTED ALTERNATIVES SCORE WORSE THAN LESS CONGESTED ALTERNATIVES	MORE CONGESTED ALTERNATIVES SCORE WORSE THAN LESS CONGESTED ALTERNATIVES	MORE CONGESTED ALTERNATIVES SCORE WORSE THAN LESS CONGESTED ALTERNATIVES
Pedestrian and Bicycles	5' BIKE LANE WIDTH	LESS THAN 5' LANE	6' LANE	GREATER THAN 6' LANE
	BUFFERED BIKE ZONE (MIN 2')	LESS THAN 2' BUFFERED BIKE ZONE	2' BUFFERED BIKE ZONE	GREATER THAN 2' BUFFERED BIKE ZONE
	12' OF PED REALM	12' OF PED REALM	15' PED REALM	20' PED REALM
	BUFFER FROM MOTOR VEHICLE	NO BUFFER	ON STREET PARKING	BIKE LANE
Transit	NO BIKE CONFLICT	BIKE CONFLICT WITH MOTORIZED OR TRANSIT VEHICLES		NO BIKE CONFLICTS
	10' RIGHT SIDE LOADING	LESS THAN 10' LOADING	10' LOADING	GREATER THAN 10' LOADING
	10' LEFT SIDE LOADING	GREATER THAN 10' LOADING	LESS THAN 10' LOADING	10' LOADING
	11' STREETCAR TRAVEL LANE	IF NOT DESIRABLE LANE WIDTH	MINIMUM LANE WIDTH IS 11' UNLESS ADJACENT TO ON STREET PARKING	12' IS PREFERRED
Quality of Life	PEDESTRIAN ACCESSIBILITY AND COMFORT	SHORTER CROSSING DISTANCES	SHORTER CROSSING DISTANCES	SHORTER CROSSING DISTANCES
	TRAFFIC CALMING	CURB EXTENSION, REFUGE ISLAND, OR OTHER FEATURES	CURB EXTENSION, REFUGE ISLAND, OR OTHER FEATURES	CURB EXTENSION, REFUGE ISLAND, OR OTHER FEATURES
	CONNECTIVITY	BIKE LANE CONFIGURATION I.E., SHARED, STANDARD, ONE DIRECTION BIKE TRAVE, ETC..	BIKE LANE CONFIGURATION I.E., SHARED, STANDARD, ONE DIRECTION BIKE TRAVE, ETC..	BIKE LANE CONFIGURATION I.E., SHARED, STANDARD, ONE DIRECTION BIKE TRAVE, ETC..
	PROVIDES OPTION FOR ALL MODES	OPTION ALLOWS FOR WIDE SIDEWALKS, BUFFERED BIKE LANES, SAFE TRANSIT ACCESSIBILITY	OPTION ALLOWS FOR WIDE SIDEWALKS, BUFFERED BIKE LANES, SAFE TRANSIT ACCESSIBILITY	OPTION ALLOWS FOR WIDE SIDEWALKS, BUFFERED BIKE LANES, SAFE TRANSIT ACCESSIBILITY
Economic Development	Maintain Parking	2 SIDE PARKING	PEAK HOUR RESTRICTED PARKING	PARKING ON 1-SIDE
	Complexity	LESS INTUITIVE OPERATION OR LESS UNDERSTOOD LANE CONFIGURATION	LESS INTUITIVE OPERATION OR LESS UNDERSTOOD LANE CONFIGURATION	LESS INTUITIVE OPERATION OR LESS UNDERSTOOD LANE CONFIGURATION
	TRAFFIC CIRCULATION AND CONGESTION	NO LEFT TURN LANE OR BUS STOPPING IN MOVING LANE	LEFT TURN LANE OR BUS STOPPING IN 3RD TRAVEL LANE	LEFT TURN LANE OR BUS STOPPING IN 3RD TRAVEL LANE

 BEST MEETS OBJECTIVES

 PARTIALLY MEETS OBJECTIVES

 DOES NOT MEET OBJECTIVES

3.4 Universe of Alternatives

Under both the one-way and two-way operation scenarios, numerous possible street, bicycle and pedestrian zone configurations can be created. The typical cross-sections developed followed a practical approach to the potential street width scenarios that allow for interim, retrofit or full reconstruction of Hennepin and 1st Avenue. Key street width scenarios include:

- 40 foot street width – maintains existing curbs.
- 40 foot street width – fills in the existing parking bays and maximizes the pedestrian zone through retrofit or reconstruction.
- 48 foot street width – maintains the pedestrian zone and allows retrofit reconstruction with removal of curb extension on one side.
- 50 foot street width – full reconstruction option to optimize the pedestrian realm and street uses.
- 56 foot street width – retrofit option (curb extension removal) to maximize the street space uses.

33 one-way alternatives and 55 two-way alternatives were developed and evaluated against the screening criteria and key objectives. The alternatives and high level screening evaluation results for the one-way and two-way scenarios are summarized in Table 5 and Table 6, respectively. An overall qualitative rating of “best meets objectives”, “partially meets objectives”, and “does not meet objectives” is listed for each typical section alternative.

Table 5. One-way Scenario Alternatives Screening Analysis

LIST OF ALTERNATIVES		EVALUATION METHOD		
				
Existing 40-ft Streetwidth - Restripe				
A1	Buffered Bike Lane, 2 Side Parking, 2 Travel Lanes			
A2	Shared Bike Lane, 2 Side Parking, 3 Travel Lanes			
A3	Standard Bike Lane, 2 Side Parking, 3 Travel Lanes			
A4	Buffered Bike Lane, 2 Side Parking, 3 Travel Lanes			
40-ft Streetwidth (20' Ped Zone) - Reconstruction				
B1	Shared Bike Lane, 2 Side Parking, 2 Travel Lanes			
B2	Standard Bike Lane, 2 Side Parking, 2 Travel Lanes			
B3	Standard Bike Lane, 1 Side Parking, 2 Travel Lanes			
B4	Standard Bike Lane, No Parking, 3 Travel Lanes			
B5	Protected Bike Lane, 1 Side Parking, 2 Travel Lanes			
B6	Protected Bike Lane, No Parking, 2 Travel Lanes			
B7	Landscape Protected Bike Lane, No Parking, 3 Travel Lanes			
B8	Shared Bike Lane, 1 Side Parking, 3 Travel Lanes			
B9	Protected Bike Lane, 1 Side Off Peak Parking, 3 Travel Lanes			
48-ft Streetwidth (12' Ped Zone) - Retrofit				
C1	Landscape Protected/Buffered Bike Lane, 1 Side Parking (East), 3 Travel Lanes			
C2	Buffered Bike Lane, 1 Side Parking (East), 3 Travel Lanes			
C3	Landscape Protected Bike Lane, 1 Side Parking (West), 3 Travel Lanes			
C4	Protected Bike Lane, 1 Side Parking (West), 3 Travel Lanes			
C5	Landscape Protected Bike Lane, 1 Side Parking (West), Off Peak Parking (East), 3 Travel Lanes			
C6	Protected Bike Lane, 1 Side Parking (West), Off Peak Parking (East), 3 Travel Lanes			
50-ft Streetwidth (15' Ped Zone) - Reconstruction				
D1	Buffered Bike Lane, 2 Side Parking, 2 Travel Lanes			
D2	Shared Bike Lane, 2 Side Parking, 3 Travel Lanes			
D3	Standard Bike Lane, 1 Side Parking, 3 Travel Lanes			
D4	Landscape Protected Bike Lane, No Parking, 3 Travel Lanes			
D5	Protected Bike Lane, 1 Side Parking, 3 Travel Lanes			
D6	Landscape Protected Bike Lane, Off Peak Parking (East), 3 Travel Lanes			
D7	Protected Bike Lane, 1 Side Parking (West), Off Peak Parking (East), 3 Travel Lanes			
56-ft Streetwidth (12' Ped Zone) - Retrofit				
E1	Landscape Protected/Buffered Bike Lane, 2 side Parking, 2 Travel Lanes			
E2	Buffered Bike Lane, 2 Side Parking, 2 Travel Lanes			
E3	Shared Bike Lane, 2 Side Parking, 3 Travel Lanes			
E4	Standard Bike Lane, 2 Side Parking, 3 Travel Lanes			
E5	Landscape Protected Bike Lane, 1 Side Parking, 3 Travel Lanes			
E6	Buffered Bike Lane, 2 Side Parking, 3 Travel Lanes			
E7	Landscape Protected Bike Lane, 1 Side Parking (West), Off Peak Parking (East), 3 Travel Lanes			

 BEST MEETS OBJECTIVES
 PARTIALLY MEETS OBJECTIVES
 DOES NOT MEET OBJECTIVES

Table 6. Two-way Scenario Alternatives Screening Analysis

LIST OF ALTERNATIVES		EVALUATION METHOD		
Existing 40-ft Streetwidth - Restripe				
A1	Standard Bike Lane, 2 Side Parking, 2 Travel Lanes, Left Side Transit Loading		●	
A2	Opposing Bike Lane, 2 Side Parking, 2 Travel Lanes, Left Side Transit Loading		●	
A3	Standard Bike Lane, 2 Side Parking, 2 Travel Lanes, CLTL, Right Side Transit Loading		●	
A4	Opposing Bike Lane, 2 Side Parking, 2 Travel Lanes, CLTL, Right Side Transit Loading		●	
A5	Opposing Bike Lane, 2 Side Parking, 3 Travel Lanes, Right Side Transit Loading,		●	
A6	Standard Bike Lane, 2 Side Parking, 3 Travel Lanes, Right Side Transit Loading,			●
40-ft Streetwidth (20' Ped Zone) - Reconstruction				
B1	Shared Bike Lane, 2 Side Parking, 2 Travel Lanes, Right Side Transit Loading	●		
B2	Shared Bike Lane, 1 Side Parking, 2 Travel Lanes, CLTL, Right Side Transit Loading	●		
B3	Buffered Bike Lane, 1 Side Parking, 2 Travel Lanes, Right Side Transit Loading	●		
B4	Standard Bike Lane, No Parking, 3 Travel Lanes, Right Side Transit Loading	●		
B5	Opposing/Buffered Bike Lane, No Parking, 2 Travel Lanes, Right Side Transit Loading	●		
B6	Opposing Bike Lane, 1 Side Parking, 2 Travel Lanes, Right Side Transit Loading	●		
B7	Opposing Bike Lane, No Parking, 3 Travel Lanes, Right Side Transit Loading	●		
B8	Standard Bike Lane, Off Peak Parking (West), 3 Travel Lanes, Right Side Transit Loading	●		
48-ft Streetwidth (12' Ped Zone) - Retrofit				
C1	Buffered Bike Lane, 1 Side Parking, 2 Travel Lanes, Left Side Transit Loading		●	
C2	Standard Bike Lane, 1 Side Parking, 3 Travel Lanes, Left Side Transit Loading	●		
C3	Standard Bike Lane, 1 Side Parking, 4 Travel Lanes, Right Side Transit Loading	●		
C4	Landscape Protected Bike Lane, 1 Side Parking, 3 Travel Lanes, Right Side Transit Loading			●
C5	Opposing/Buffered Bike Lane, 1 Side Parking, 3 Travel Lanes, Right Side Transit Loading		●	
C6	Opposing Buffered Bike Lane, 1 Side Parking, 3 Travel Lanes, Right Side Transit Loading		●	
C7	Opposing/Buffered Bike Lane, 1 Side Parking, 2 Travel Lanes, CLTL, Right Side Transit Loading		●	
C8	Buffered Bike Lane, 1 Side Parking, 2 Travel Lanes, CLTL, Right Side Transit Loading		●	
C9	Opposing Bike Lane, 1 Side Parking, 3 Travel Lanes, CLTL, Right Side Transit Loading		●	
C10	Standard Bike Lane, 1 Side Parking, 3 Travel Lanes, CLTL, Right Side Transit Loading		●	
C11	Buffered Bike Lane, 2 Side Parking, 3 Travel Lanes, Right Side Transit Loading			●
50-ft Streetwidth (15' Ped Zone) - Reconstruction				
D1	Buffered Bike Lane, 1 Side Parking, 2 Travel Lanes, Left Side Transit Loading		●	
D2	Standard Bike Lane, 1 Side Parking, 3 Travel Lanes, Right Side Transit Loading		●	
D3	Buffered Bike Lane, 1 Side Parking, 3 Travel Lanes, Right Side Transit Loading			●
D4	Buffered Bike Lane, 1 Side Parking, 2 Travel Lane, CLTL, Right Side Transit Loading		●	
D5	Landscape Protected Bike Lane, No Parking, 2 Travel Lanes, Right Side Transit Loading	●		
D6	Landscape Protected Bike Lane, No Parking, 2 Travel Lanes, CLTL, Right Side Transit Loading	●		
D7	Opposing/Buffered Bike Lane, No Parking, 2 Travel Lanes, CLTL, Right Side Transit Loading	●		
D8	Standard Bike Lane, No Parking, 3 Travel Lanes, CLTL, Right Side Transit Loading	●		
D9	Opposing/Buffered Bike Lane, No Parking, 2 Travel Lanes, Left Side Transit Loading	●		
D10	Buffered Bike Lane, No Parking, 3 Travel Lanes, Left Side Transit Loading	●		
D11	Standard Bike Lane, Off Peak Parking (West), 3 Travel Lanes, Left Turn Lane, Right Side Transit Loading	●		
56-ft Streetwidth (12' Ped Zone) - Retrofit				
E1	Buffered Bike Lane, 2 Side Parking, 3 Travel Lanes, Right Side Transit Loading			●
E2	Buffered Bike Lane, 2 Side Parking, 2 Travel Lanes, Left Side Transit Loading		●	
E3	Opposing/Standard Bike Lane, 1 Side Parking, 2 Travel Lanes, Left Side Transit Loading		●	
E4	Opposing/Buffered Bike Lane, 1 Side Parking, 2 Travel Lanes, Left Side Transit Loading		●	
E5	Standard Bike Lane, 1 Side Parking, 3 Travel Lanes, Left Side Transit Loading		●	
E6	Buffered Bike Lane, 2 Side Parking, 2 Travel Lane, CLTL, Right Side Transit Loading		●	
E7	Opposing/Buffered Bike Lane, 1 Side Parking, 2 Travel Lane, CLTL, Right Side Transit Loading		●	
E8	Opposing/Standard Bike Lane, 1 Side Parking, 2 Travel Lanes, CLTL, Right Side Transit Loading		●	
E9	Standard Bike Lane, 1 Side Parking, 3 Travel Lanes, CLTL, Right Side Transit Loading		●	
E10	Opposing/Buffered Bike Lane, 1 Side Parking, 2 Travel Lanes, CLTL, Right Side Transit Loading		●	
E11	Buffered Bike Lane, 1 Side Parking, 3 Travel Lanes, Right Side Transit Loading		●	
E12	Opposing/Standard Bike Lane, 1 Side Parking, 3 Travel Lanes, Right Side Transit Loading		●	
E13	Buffered Bike Lane, 1 Side Parking, 3 Travel Lanes, Right Side Transit Loading		●	
E14	Landscape Protected Bike Lane, 1 Side Parking, 3 Travel Lanes, Right Side Transit Loading			●
E15	Standard Bike Lane, 1 Side Parking (East), Off Peak Parking (West), 4 Travel Lanes, Right Side Transit Loading	●	●	
E16	Protected Bike Lane, Off Peak Parking (West), 3 Travel Lanes, Left Side Transit Loading		●	
E17	Opposing/Standard Bike Lane, Off Peak Parking (East), 3 Travel Lanes, Left Side Transit Loading		●	
E18	Protected Bike Lane, Off Peak Parking (West), 3 Travel Lanes, Left Side Transit Loading		●	
E19	Protected Bike Lane, Off Peak Parking (West), 3 Travel Lanes, CLTL, Right Side Transit Loading		●	

- BEST MEETS OBJECTIVES
- PARTIALLY MEETS OBJECTIVES
- DOES NOT MEET OBJECTIVES

3.5 Leading Typical Section Alternatives

Six (three one-way and three two-way) leading typical section alternatives that best met the key goals and objectives were identified through the screening analysis and discussion with the TAC. Interim implementation strategies were also identified. Each cross-section alternative was also presented to, discussed, and confirmed with the SAC. The leading one-way alternatives that will be carried forward for further analysis and investigation are shown in Table 7.

Table 7. Leading One-way Typical Cross Sections

<p>Concept 1-1B (B5)</p> <p>Bicycle: Buffer Protected Bike Lane</p> <p>Parking: 1 Side Parking (West)</p> <p>Sidewalk: 20 Feet</p> <p>Auto: 2 Travel Lanes</p> <p>Streetcar: Right Side Alignment</p>	<p>3' Bench 8' Sidewalk 2' 1' 4' 2' Sidewalk with tree 8' Parking lane 11' Drive lane 11' Auto / Streetcar 3' Bollard 7' Bike lane 2' 4' 1' 2' Sidewalk with tree 8' Sidewalk 3' Bench</p>
<p>Concept 1-2B (C3)</p> <p>Bicycle: Barrier Protected Bike Lane</p> <p>Parking: 1 Side Parking (West), Off Peak Parking (East)</p> <p>Sidewalk: 12 Feet</p> <p>Auto: 2 Travel Lanes (Off Peak), 3 Travel Lanes (PM Peak)</p> <p>Streetcar: Left Side Alignment</p>	<p>5' Sidewalk 2' 2' 2' 1' Sidewalk with tree 8' Parking lane 12' Auto / Streetcar 11' Drive lane 11' Drive lane 6' Planting strip 8' Bike lane 1' 2' 1' 2' Sidewalk with tree 6' Sidewalk</p> <p style="text-align: center;">Off-Peak Parking</p>
<p>Concept 1-2C</p> <p>Bicycle: Barrier Protected Bike Lane</p> <p>Parking: 1 Side Only</p> <p>Sidewalk: 12 Feet</p> <p>Auto: 3 Travel Lanes</p> <p>Streetcar: Right Side Alignment</p>	<p>6' Sidewalk 2' 1' 2' 1' Sidewalk with tree 8' Parking lane 11' Drive lane 11' Drive lane 11' Streetcar 7' Planting strip 8' Bike lane 1' 2' 1' 2' Sidewalk with tree 6' Sidewalk</p>

The leading two-way alternatives that will be carried forward for further analysis and investigation are shown in Table 8.

Table 8. Leading Two-way Typical Cross Sections

<p>Concept 2-1A</p> <p>Bicycle: On Street Standard Bike Lane</p> <p>Parking: 2 Sides</p> <p>Sidewalk: 12 Feet</p> <p>Auto: 2 Travel Lanes Primary Direction, 1 Travel Lane Opposing</p> <p>Streetcar: Right Side Alignment</p>	<p>6' Sidewalk 2' 1' 2' 1' 8' Parking lane 11' Drive lane 11' Drive lane 11' Drive lane 7' Bike lane 8' Parking lane 1' 2' 1' 2' 6' Sidewalk</p>
<p>Concept 2-1B (C4)</p> <p>Bicycle: Barrier Protected Bike Lane</p> <p>Parking: 1 Side Only</p> <p>Sidewalk: 12 Feet</p> <p>Auto: 2 Travel Lanes Primary Direction, 1 Travel Lane Opposing</p> <p>Streetcar: Right Side Alignment</p>	<p>6' Sidewalk 2' 1' 2' 1' 8' Parking lane 11' Drive lane 11' Drive lane 11' Streetcar 7' Planting strip 8' Bike lane 1' 2' 1' 2' 6' Sidewalk</p>
<p>Concept 2-1C</p> <p>Bicycle: Barrier Protected Bike Lane</p> <p>Parking: 2 Side Only</p> <p>Sidewalk: 11 Feet</p> <p>Auto: 2 Travel Lanes Primary Direction, 1 Travel Lane Opposing</p> <p>Streetcar: Right Side Alignment</p>	<p>6' Sidewalk 2' 1' 2' 1' 8' Parking lane 11' Drive lane 11' Drive lane 12' Streetcar 8' Parking lane 2' 5' 2' 2' 1' 6' Sidewalk</p> <p style="text-align: right;">Elevated Cyclotrack</p>

The leading alternatives shown above and identified through the screening process were slightly refined based on the following considerations:

Phasing/Staging of Concepts:

- Ability to align with a minimum 40 foot and maximum of 56 foot cross-section envelopes along Hennepin and 1st Avenue.

Smaller Scale Solutions:

- Potential for a short-term/interim project.
- Potential for a retrofit option to maintain the existing geometry with only pavement marking restriping.

Larger Scale Solutions:

- Potential for a mid to long term project.
- Full reconstruction to fill in parking bays, modify curb extensions, provided protected bikeway, sidewalk expansion and traffic signal modifications.

Balanced Approach:

- Provide a similar cross-section for Hennepin and 1st Avenue.
- Provide similar benefits to both corridors – quality of life, economic development, traffic calming, circulation and multimodal mobility.

4.0 Concept Design

The six leading cross-section configurations were developed into more refined corridor-level concept designs to illustrate how the cross-sections may be applied through the study area. The primary goal of each concept design is to balance the vision of the community, existing physical constraints, and the regional role Hennepin and 1st Avenue serve beyond the immediate neighborhood. The concepts achieve the key goals of the neighborhood, which are:

- Connect pedestrian, bicycle, and transit infrastructure to the River and to adjacent neighborhoods and districts, including downtown Minneapolis, the University of Minnesota, Dinkytown and the Northeast Arts District.
- Provide an exceptional urban pedestrian experience for people of all ages.
- Enhance the pedestrian and bicyclist experience and improve pedestrian and bicyclist safety and comfort.
- Achieve a better balance between pedestrian, bicycle, transit and automobile travel modes.
- Expand and improve pedestrian, bicycling, and transit infrastructure throughout the neighborhood.
- Improve multi-modal connections with existing transportation networks to improve access to and from destinations throughout Minneapolis and beyond.
- Parking will be conveniently accessible for residents and visitors who choose to travel by car.
- Support improved transit services and infrastructure including the Nicollet-Central Streetcar implementation, real time transit information signage and otherwise.

The design features included in each concept include; a protected bicycle facility, streetcar alignment (both left and right side alignments are illustrated), wider sidewalks and increased pedestrian space wherever feasible, shorter pedestrian crosswalks, on-street parking, opportunities for “greening,” and balanced motor vehicle travel lanes.

4.1 One-way Concepts

The one-way concepts are illustrated in Figure 16 (Concept 1-1B), Figure 17 (Concept 1-2C) and Figure 18 (1-2B). Potential implementation strategies may include:

Concept 1-1B:

- Potential Short-Term: Restripe roadway for one-way operation with two travel lanes and buffered bike lane (Concept 1-1A), while maintaining parking on both sides and existing pedestrian zone as shown in Table 9.
- Mid/Long-Term (1-1B): Reconstruct roadway for one-way operation with two travel lanes and parking on one side, which would accommodate a protected bike lane and an expanded pedestrian zone as shown in Figure 16.

Table 9. Interim Concept 1-1A



Concept 1-2B and 1-2C:

- Potential Short-Term: Restripe roadway for one-way operation with three travel lanes and standard bike lane, while maintaining parking on both sides and existing pedestrian zone (Concept 1-2A) as shown in Table 10.
- Mid/Long-Term (1-2B): Reconstruct roadway for one-way operation with two travel lanes, parking on one side, protected bike lane, and off-peak parking, which would allow one lane to serve as a travel lane at peak period as shown in Figure 17.
- Mid/Long-Term (1-2C): Reconstruct roadway for one-way operation with three travel lanes and parking on one side, which would accommodate a protected bike lane as shown in Figure 18.

Table 10. Interim Concept 1-2A



4.2 Two-way Concepts

The two-way concepts are illustrated in Figure 19 (Concept 2-1B) and Figure 20 (Concept 2-1C). Potential implementation strategies may include:

Concept 2-1B and 2-1C:

- Potential Short-Term: Restripe roadway for two-way operation with three travel lanes and standard bike lane (Concept 2-1A), while maintaining parking on both sides and existing pedestrian zone as shown in Table 11.
- Mid/Long-Term (2-1B): Reconstruct roadway for two-way operation with three travel lanes and parking on one side, which would accommodate a protected bike lane as shown in Figure 19.
- Mid/Long-Term (2-1C): Reconstruct roadway for two-way operation with three travel lanes and parking on both sides, which would accommodate a protected bike lane as shown in Figure 20.

Table 11. Interim Concept 2-1A



Draft Concept

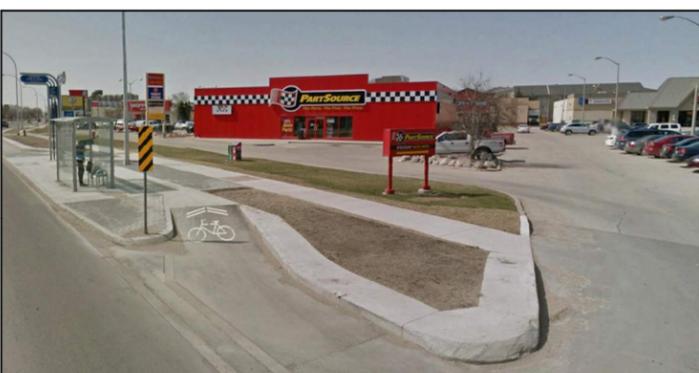
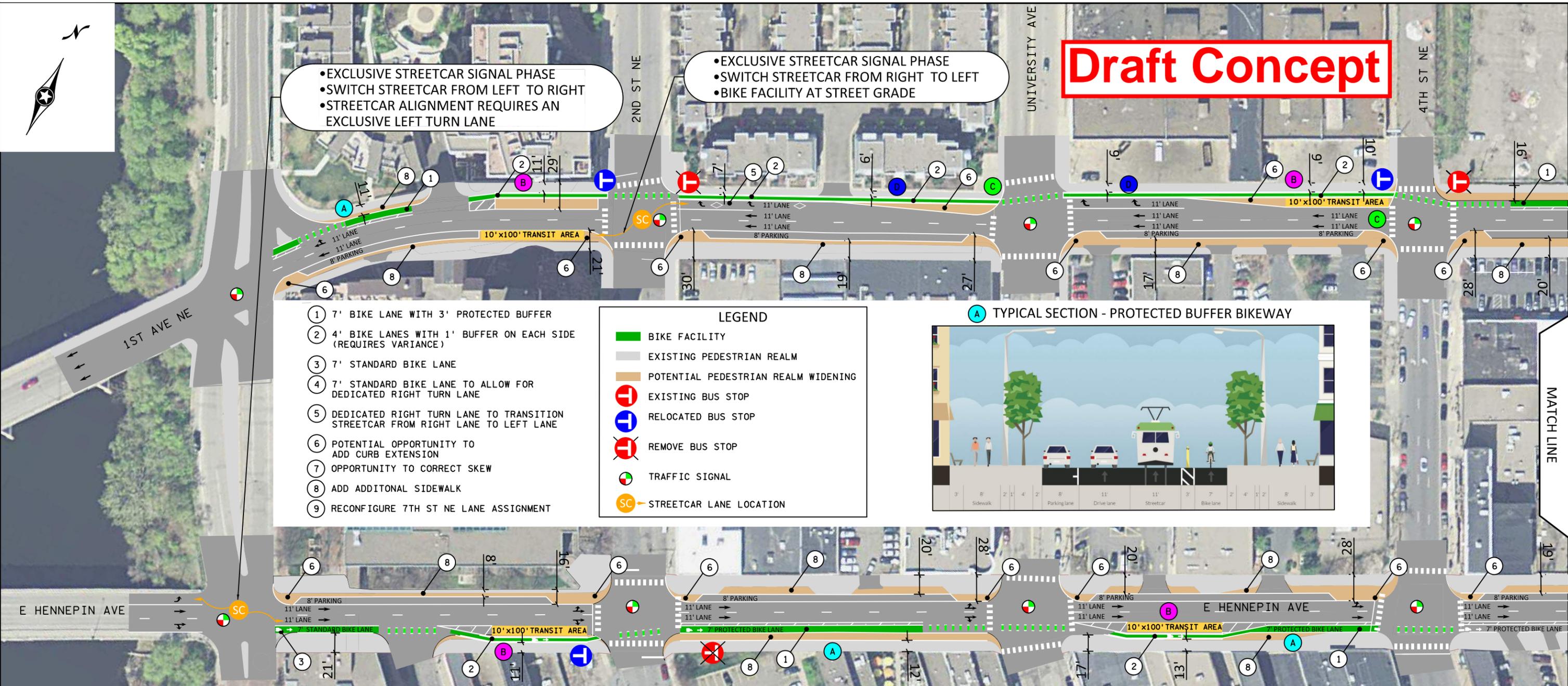
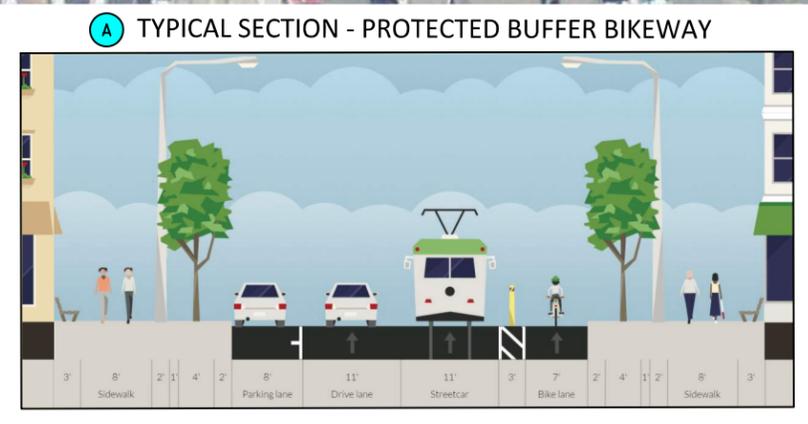
- EXCLUSIVE STREETCAR SIGNAL PHASE
- SWITCH STREETCAR FROM LEFT TO RIGHT
- STREETCAR ALIGNMENT REQUIRES AN EXCLUSIVE LEFT TURN LANE

- EXCLUSIVE STREETCAR SIGNAL PHASE
- SWITCH STREETCAR FROM RIGHT TO LEFT
- BIKE FACILITY AT STREET GRADE

- 1 7' BIKE LANE WITH 3' PROTECTED BUFFER
- 2 4' BIKE LANES WITH 1' BUFFER ON EACH SIDE (REQUIRES VARIANCE)
- 3 7' STANDARD BIKE LANE
- 4 7' STANDARD BIKE LANE TO ALLOW FOR DEDICATED RIGHT TURN LANE
- 5 DEDICATED RIGHT TURN LANE TO TRANSITION STREETCAR FROM RIGHT LANE TO LEFT LANE
- 6 POTENTIAL OPPORTUNITY TO ADD CURB EXTENSION
- 7 OPPORTUNITY TO CORRECT SKEW
- 8 ADD ADDITIONAL SIDEWALK
- 9 RECONFIGURE 7TH ST NE LANE ASSIGNMENT

LEGEND

- BIKE FACILITY
- EXISTING PEDESTRIAN REALM
- POTENTIAL PEDESTRIAN REALM WIDENING
- EXISTING BUS STOP
- RELOCATED BUS STOP
- REMOVE BUS STOP
- TRAFFIC SIGNAL
- STREETCAR LANE LOCATION



A TYPICAL SECTION - PROTECTED BUFFER BIKEWAY **B** EXAMPLE TRANSIT SHELTER/BIKE LANE FACILITY **C** EXAMPLE STREET TO SIDEWALK TRANSITION **D** OFFSTREET PROTECTED BIKE LANE

Note: Concepts are preliminary, and for planning purposes only. Concept will require more detailed engineering investigation, and evaluation and as such is subject to change.



Draft Concept

- ① 7' BIKE LANE WITH 3' PROTECTED BUFFER
- ② 4' BIKE LANES WITH 1' BUFFER ON EACH SIDE (REQUIRES VARIANCE)
- ③ 7' STANDARD BIKE LANE
- ④ 7' STANDARD BIKE LANE TO ALLOW FOR DEDICATED RIGHT TURN LANE
- ⑤ DEDICATED RIGHT TURN LANE TO TRANSITION STREETCAR FROM RIGHT LANE TO LEFT LANE
- ⑥ POTENTIAL OPPORTUNITY TO ADD CURB EXTENSION
- ⑦ OPPORTUNITY TO CORRECT SKEW
- ⑧ ADD ADDITIONAL SIDEWALK
- ⑨ RECONFIGURE 7TH ST NE LANE ASSIGNMENT

LEGEND	
	BIKE FACILITY
	EXISTING PEDESTRIAN REALM
	POTENTIAL PEDESTRIAN REALM WIDENING
	EXISTING BUS STOP
	RELOCATED BUS STOP
	REMOVE BUS STOP
	TRAFFIC SIGNAL
	STREETCAR LANE LOCATION

FURTHER INVESTIGATION IS NEEDED TO IDENTIFY POTENTIAL AND APPROPRIATE INTERSECTION IMPROVEMENTS

STREETCAR ONLY LANE TO ACCOMODATE LEFT TURN ONTO 7TH ST

• EXCLUSIVE STREETCAR PHASE REQUIRED
• NEW TRAFFIC SIGNAL SYSTEM

PARKING REMOVAL REQUIRED

PARKING REMOVAL REQUIRED

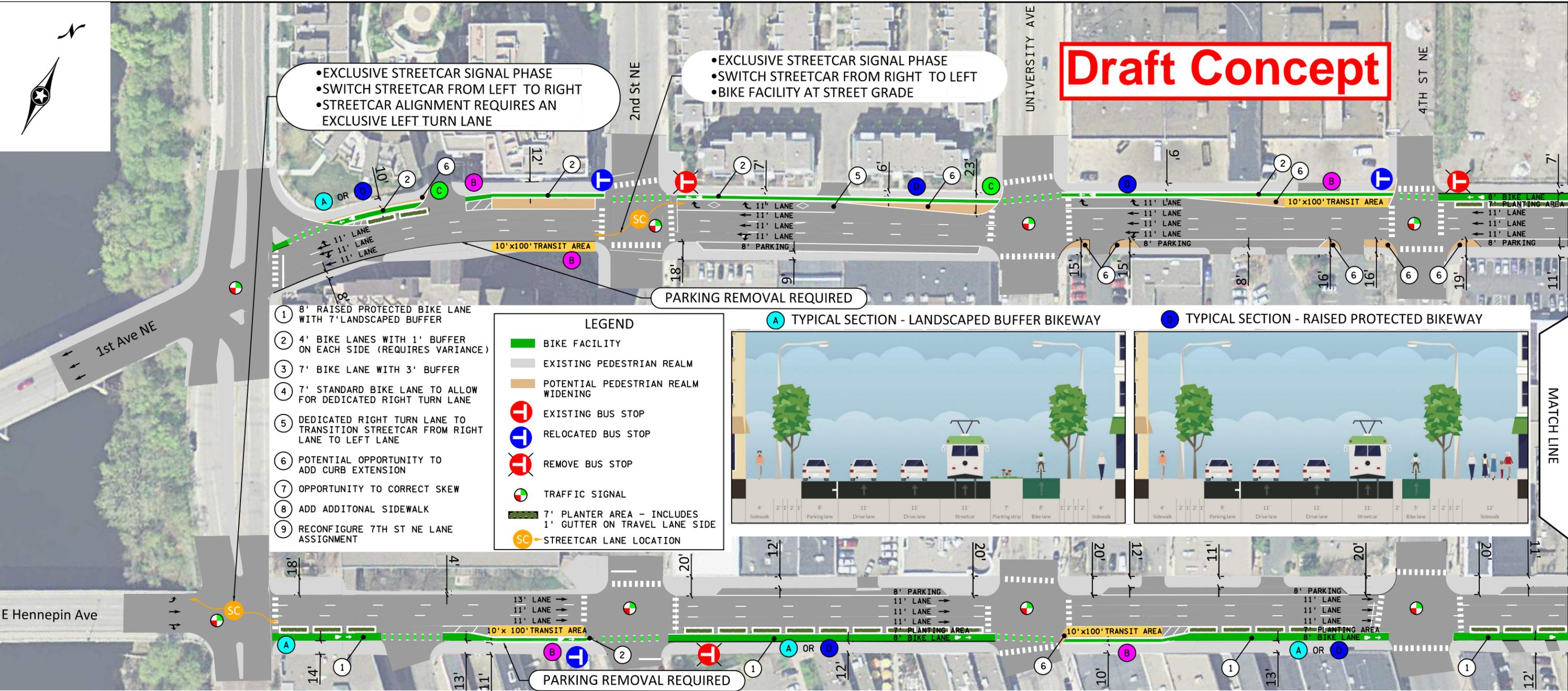
MATCH LINE

Ⓐ TYPICAL SECTION - PROTECTED BUFFER BIKEWAY Ⓑ EXAMPLE TRANSIT SHELTER/BIKE LANE FACILITY Ⓒ EXAMPLE STREET TO SIDEWALK TRANSITION Ⓓ OFFSTREET PROTECTED BIKE LANE



Note: Concepts are preliminary, and for planning purposes only. Concept will require more detailed engineering investigation, and evaluation and as such is subject to change.

Draft Concept



A TYPICAL SECTION - LANDSCAPED BUFFER BIKEWAY



B EXAMPLE TRANSIT SHELTER/BIKE LANE FACILITY

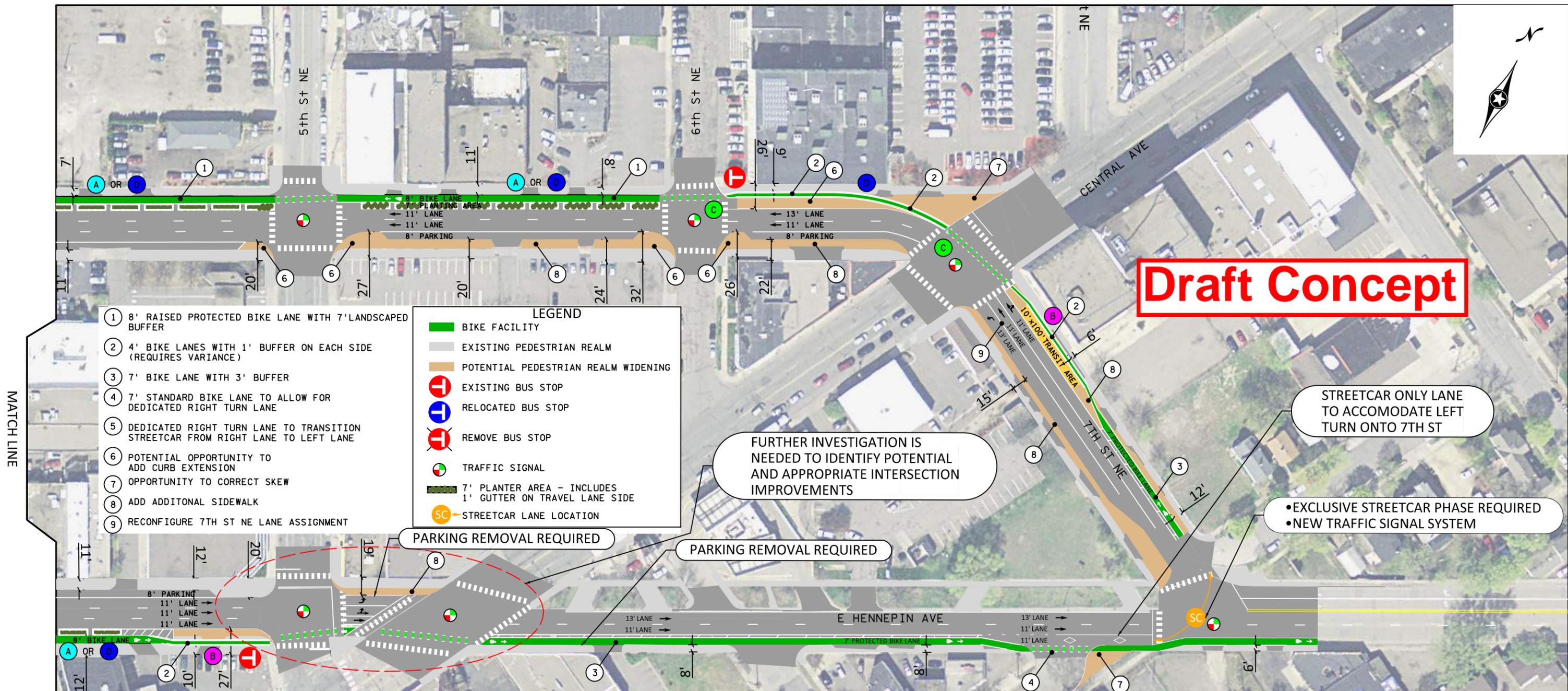


C EXAMPLE STREET TO SIDEWALK TRANSITION



D OFFSTREET PROTECTED BIKE LANE

Note: Concepts are preliminary, and for planning purposes only. Concept will require more detailed engineering investigation, and evaluation and as such is subject to change.



Draft Concept

- ① 8' RAISED PROTECTED BIKE LANE WITH 7' LANDSCAPED BUFFER
- ② 4' BIKE LANES WITH 1' BUFFER ON EACH SIDE (REQUIRES VARIANCE)
- ③ 7' BIKE LANE WITH 3' BUFFER
- ④ 7' STANDARD BIKE LANE TO ALLOW FOR DEDICATED RIGHT TURN LANE
- ⑤ DEDICATED RIGHT TURN LANE TO TRANSITION STREETCAR FROM RIGHT LANE TO LEFT LANE
- ⑥ POTENTIAL OPPORTUNITY TO ADD CURB EXTENSION
- ⑦ OPPORTUNITY TO CORRECT SKEW
- ⑧ ADD ADDITIONAL SIDEWALK
- ⑨ RECONFIGURE 7TH ST NE LANE ASSIGNMENT

LEGEND

	BIKE FACILITY
	EXISTING PEDESTRIAN REALM
	POTENTIAL PEDESTRIAN REALM WIDENING
	EXISTING BUS STOP
	RELOCATED BUS STOP
	REMOVE BUS STOP
	TRAFFIC SIGNAL
	7' PLANTER AREA - INCLUDES 1' GUTTER ON TRAVEL LANE SIDE
	STREETCAR LANE LOCATION

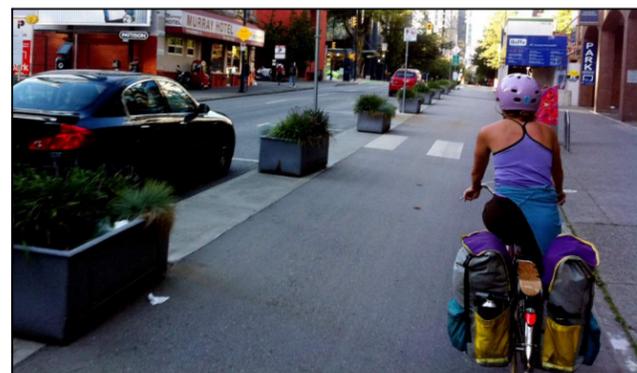
FURTHER INVESTIGATION IS NEEDED TO IDENTIFY POTENTIAL AND APPROPRIATE INTERSECTION IMPROVEMENTS

STREETCAR ONLY LANE TO ACCOMODATE LEFT TURN ONTO 7TH ST

- EXCLUSIVE STREETCAR PHASE REQUIRED
- NEW TRAFFIC SIGNAL SYSTEM

PARKING REMOVAL REQUIRED

PARKING REMOVAL REQUIRED



A TYPICAL SECTION - LANDSCAPED BUFFER BIKEWAY



B EXAMPLE TRANSIT SHELTER/BIKE LANE FACILITY



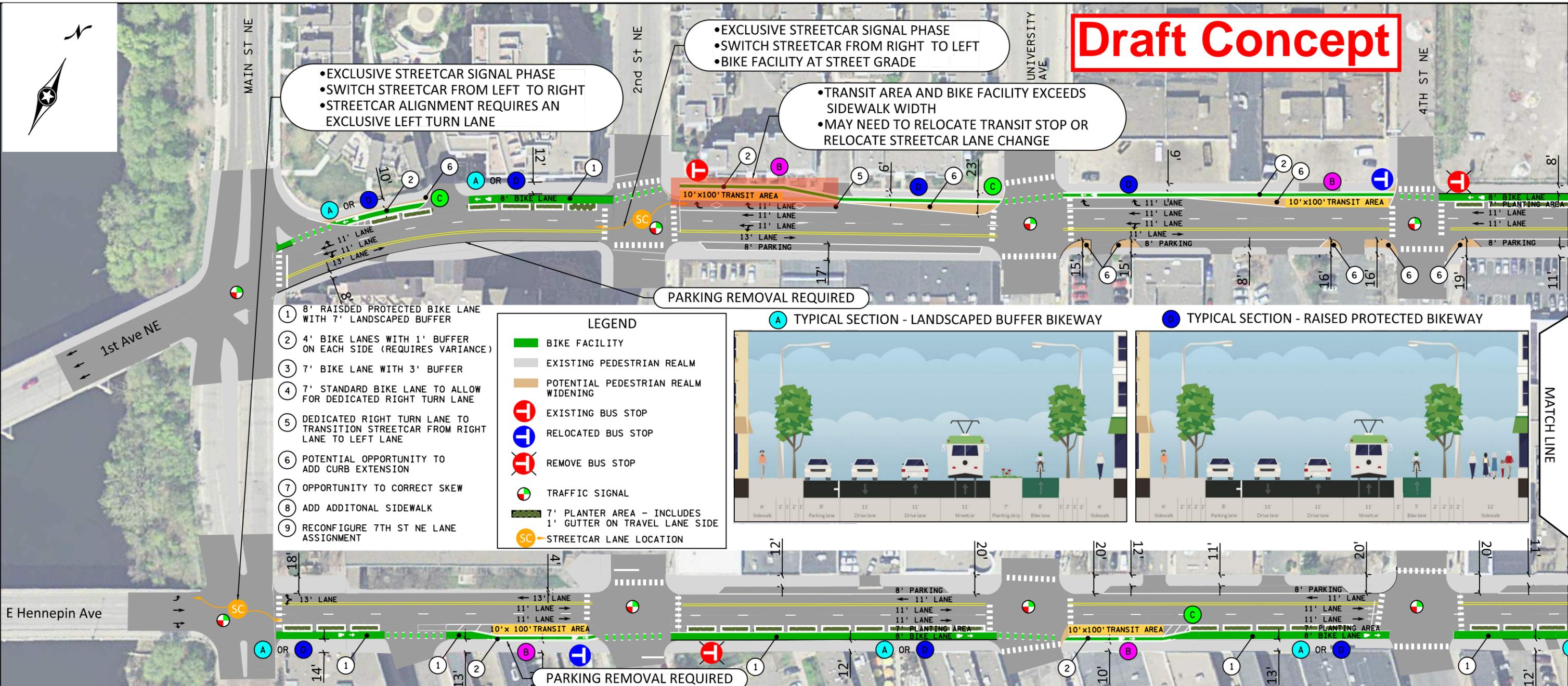
C EXAMPLE STREET TO SIDEWALK TRANSITION



D OFFSTREET PROTECTED BIKE LANE

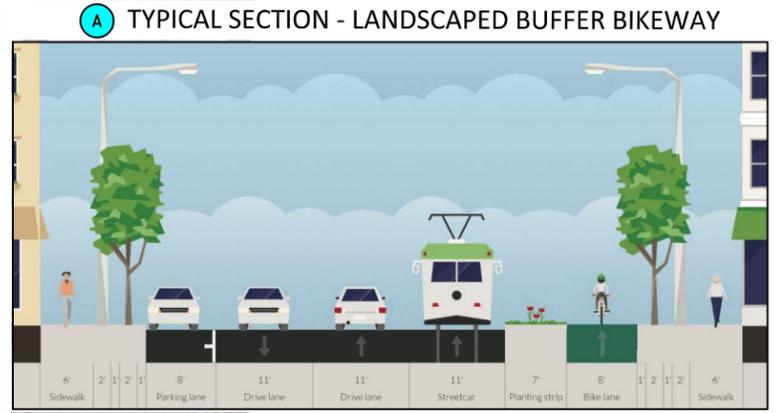
Note: Concepts are preliminary, and for planning purposes only. Concept will require more detailed engineering investigation, and evaluation and as such is subject to change.

Draft Concept



- 1 8' RAISED PROTECTED BIKE LANE WITH 7' LANDSCAPED BUFFER
- 2 4' BIKE LANES WITH 1' BUFFER ON EACH SIDE (REQUIRES VARIANCE)
- 3 7' BIKE LANE WITH 3' BUFFER
- 4 7' STANDARD BIKE LANE TO ALLOW FOR DEDICATED RIGHT TURN LANE
- 5 DEDICATED RIGHT TURN LANE TO TRANSITION STREETCAR FROM RIGHT LANE TO LEFT LANE
- 6 POTENTIAL OPPORTUNITY TO ADD CURB EXTENSION
- 7 OPPORTUNITY TO CORRECT SKEW
- 8 ADD ADDITIONAL SIDEWALK
- 9 RECONFIGURE 7TH ST NE LANE ASSIGNMENT

LEGEND	
	BIKE FACILITY
	EXISTING PEDESTRIAN REALM
	POTENTIAL PEDESTRIAN REALM WIDENING
	EXISTING BUS STOP
	RELOCATED BUS STOP
	REMOVE BUS STOP
	TRAFFIC SIGNAL
	7' PLANTER AREA - INCLUDES 1' GUTTER ON TRAVEL LANE SIDE
	STREETCAR LANE LOCATION



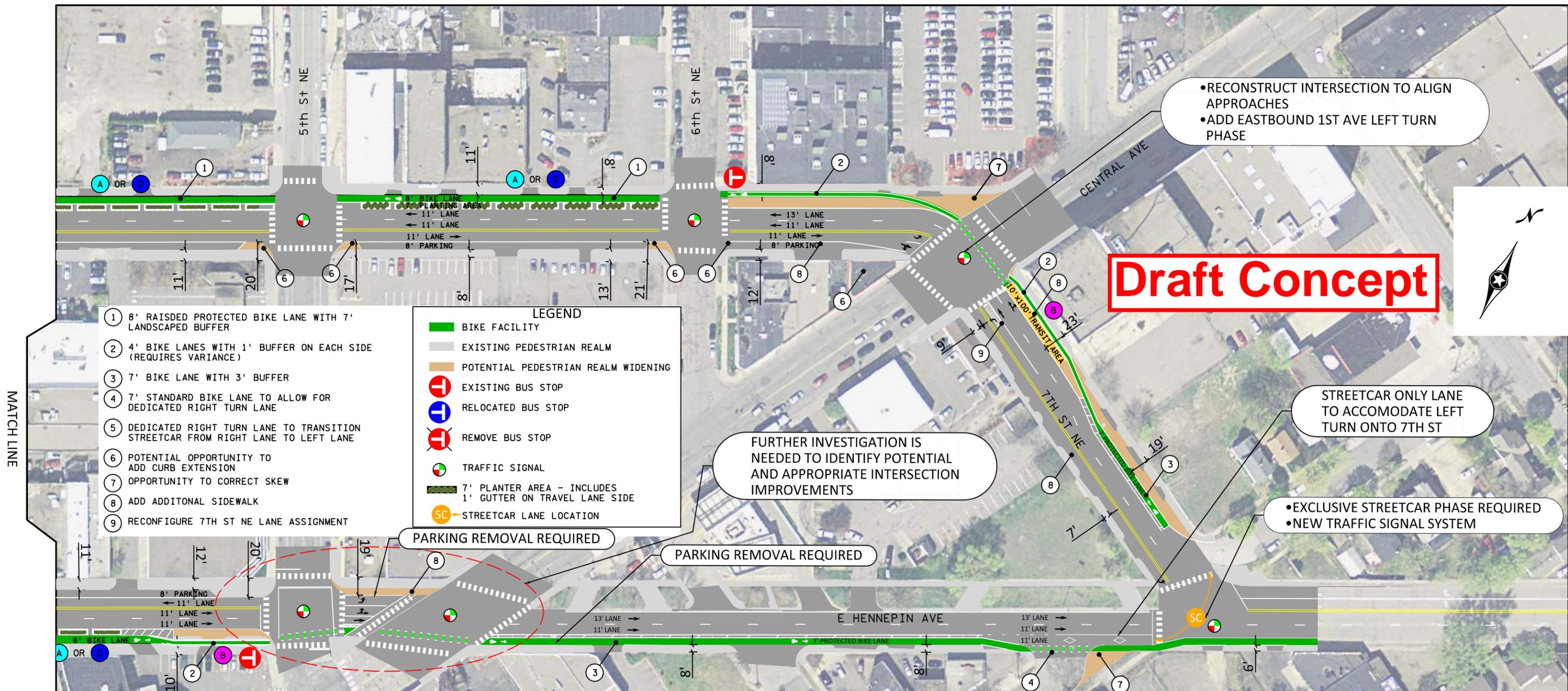
A TYPICAL SECTION - LANDSCAPED BUFFER BIKEWAY

B EXAMPLE TRANSIT SHELTER/BIKE LANE FACILITY

C EXAMPLE STREET TO SIDEWALK TRANSITION

D OFFSTREET PROTECTED BIKE LANE

Note: Concepts are preliminary, and for planning purposes only. Concept will require more detailed engineering investigation, and evaluation and as such is subject to change.



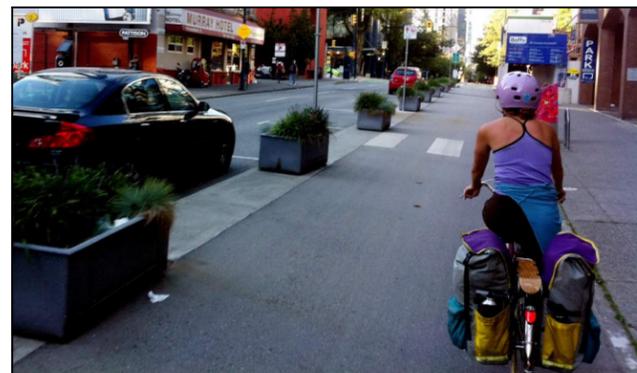
Draft Concept

- ① 8' RAISED PROTECTED BIKE LANE WITH 7' LANDSCAPED BUFFER
- ② 4' BIKE LANES WITH 1' BUFFER ON EACH SIDE (REQUIRES VARIANCE)
- ③ 7' BIKE LANE WITH 3' BUFFER
- ④ 7' STANDARD BIKE LANE TO ALLOW FOR DEDICATED RIGHT TURN LANE
- ⑤ DEDICATED RIGHT TURN LANE TO TRANSITION STREETCAR FROM RIGHT LANE TO LEFT LANE
- ⑥ POTENTIAL OPPORTUNITY TO ADD CURB EXTENSION
- ⑦ OPPORTUNITY TO CORRECT SKEW
- ⑧ ADD ADDITIONAL SIDEWALK
- ⑨ RECONFIGURE 7TH ST NE LANE ASSIGNMENT

LEGEND

	BIKE FACILITY
	EXISTING PEDESTRIAN REALM
	POTENTIAL PEDESTRIAN REALM WIDENING
	EXISTING BUS STOP
	RELOCATED BUS STOP
	REMOVE BUS STOP
	TRAFFIC SIGNAL
	7' PLANTER AREA - INCLUDES 1' GUTTER ON TRAVEL LANE SIDE
	STREETCAR LANE LOCATION

MATCH LINE



A TYPICAL SECTION - LANDSCAPED BUFFER BIKEWAY



B EXAMPLE TRANSIT SHELTER/BIKE LANE FACILITY



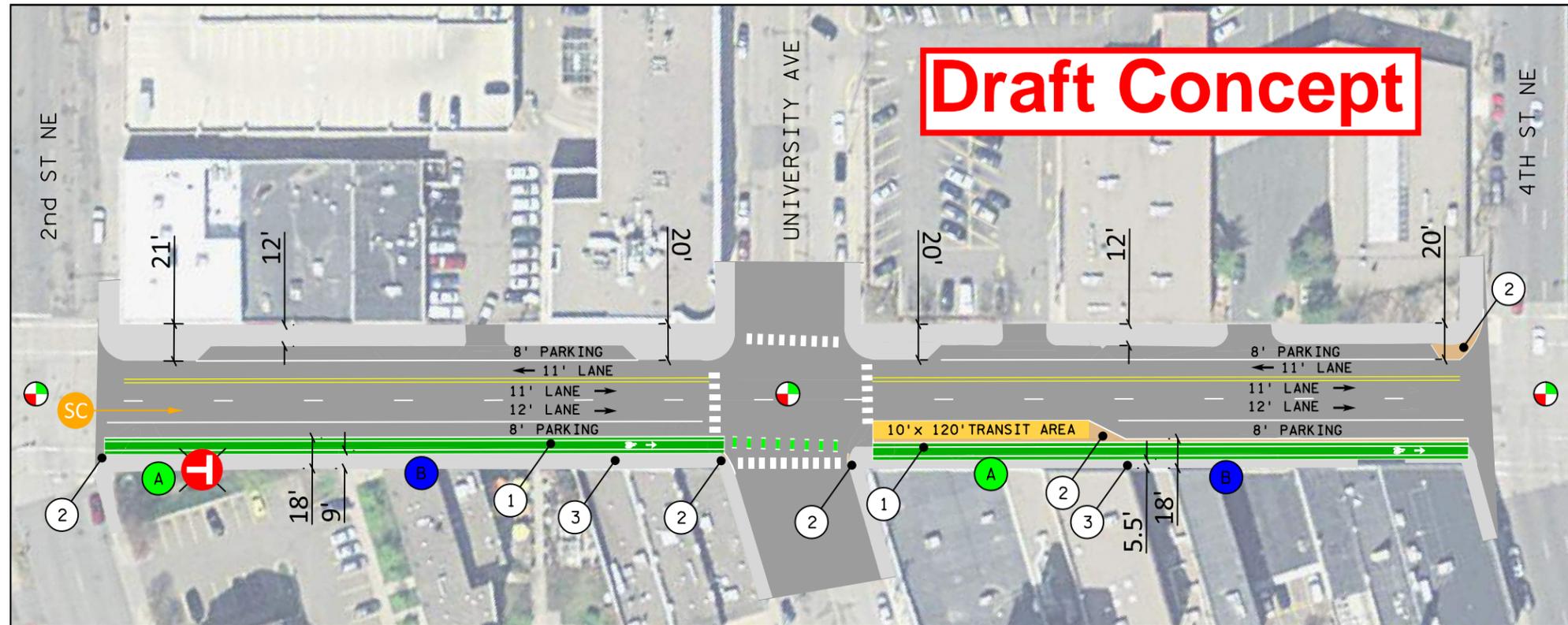
C EXAMPLE STREET TO SIDEWALK TRANSITION



D OFFSTREET PROTECTED BIKE LANE

Note: Concepts are preliminary, and for planning purposes only. Concept will require more detailed engineering investigation, and evaluation and as such is subject to change.

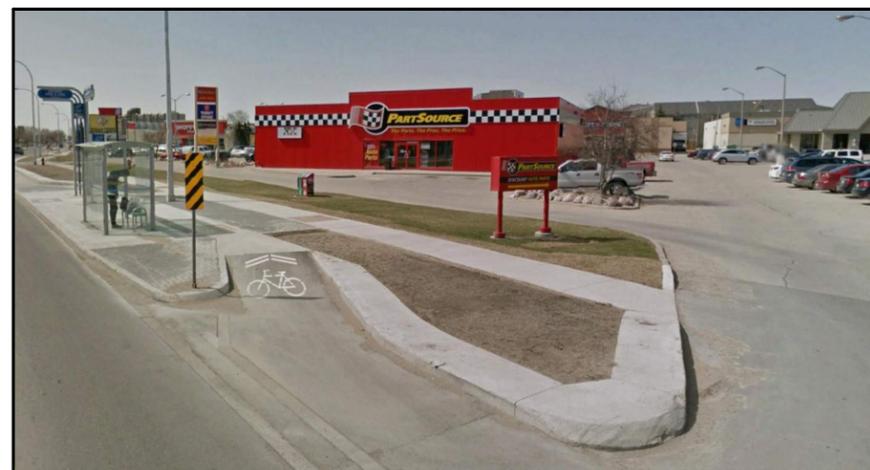
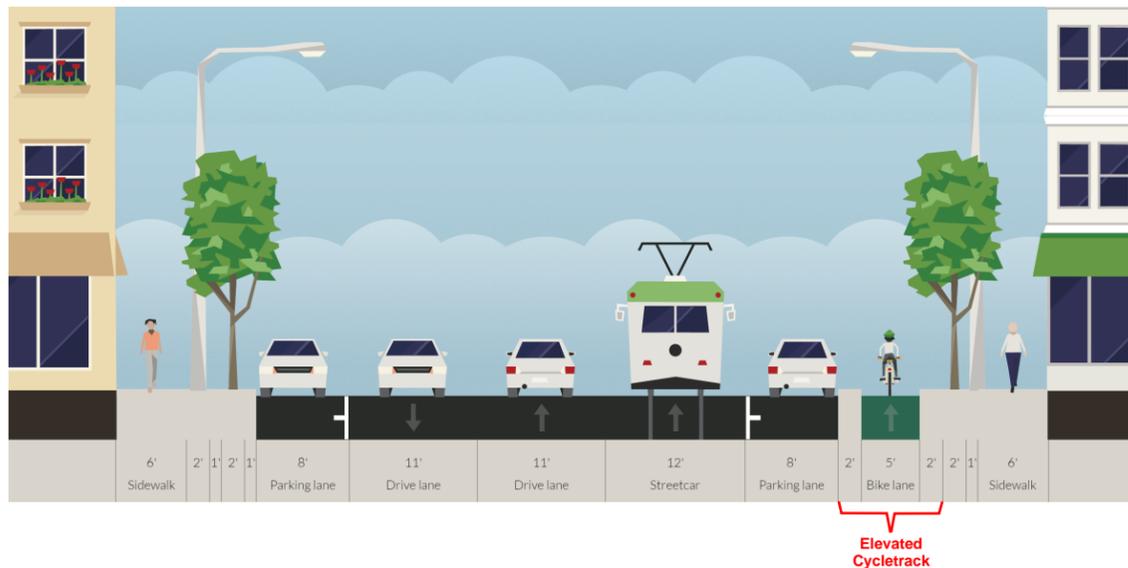
Concept 2-1C 2nd St to 4th St (2-Blocks)



LEGEND

- BIKE FACILITY
- EXISTING PEDESTRIAN REALM
- POTENTIAL PEDESTRIAN REALM WIDENING
- + REMOVE BUS STOP
- TRAFFIC SIGNAL
- STREETCAR LANE LOCATION

- NOTES:**
- ① 4' RAISED PROTECTED BIKE LANES WITH 1' BUFFER ON EACH SIDE
 - ② POTENTIAL OPPORTUNITY TO ADD CURB EXTENSION
 - ③ LOSS OF PEDESTRIAN SPACE



A EXAMPLE STREET TO SIDEWALK TRANSITION



B OFFSTREET PROTECTED BIKE LANE

Note: Concepts are preliminary, and for planning purposes only. Concept will require more detailed engineering investigation, and evaluation and as such is subject to change.

5.0 Evaluation of Alternatives

A comparison evaluation was conducted for the six corridor level concept designs to assess their individual benefits and impacts to the street system and users. The evaluation focuses on the key objectives and neighborhood priorities. A detailed traffic operation analysis documenting the quality of motor vehicle access and mobility, and the benefits and impacts (i.e., pros and cons) associated with any potential implementation of the concept designs is documented.

5.1 Concept Design Alternatives Evaluation Matrix

A comparison matrix summarizing a high level qualitative evaluation of the leading six corridor level concept designs (three one-way and three two-way) is shown in Table 12. The evaluation illustrates a qualitative rating of “best meets objectives”, “partially meets objectives”, and “does not meet objectives” for each of the five primary objective categories. Table 13 documents a summary comparison of each leading alternative against the primary tradeoffs – travel lanes, pedestrian space, transit, bicycle lanes, and on-street parking.

Table 12. Concept Design Alternatives Qualitative Evaluation Matrix

Criteria	One-Way			Two-Way		
	Concept 1-1B (B5)	Concept 1-2B (C3)	Concept 1-2C	Concept 2-1A	Concept 2-1B (C4)	Concept 2-1C
Mobility and Safety						
Pedestrian and Bicycles						
Transit						
Quality of Life						
Economic Development						

- BEST MEETS OBJECTIVES
- PARTIALLY MEETS OBJECTIVES
- DOES NOT MEET OBJECTIVES

Table 13. Concept Design Comparison Summary

One-way Alternatives

Concept 1-1B (B5)					
Type	Ped Realm	Bicycles	Transit	Travel Lanes	Parking
Reconstruct roadway for one-way operation with two travel lanes and parking on one side, which would accommodate a protected bike lane and an expanded pedestrian zone.	20'	Protected	Streetcar Compatible	2	One Side
					
Concept 1-2B (C3)					
Type	Ped Realm	Bicycles	Transit	Travel Lanes	Parking
Reconstruct roadway for one-way operation with two travel lanes, parking on one side, protected bike lane, and off-peak parking, which would allow one lane to serve as a travel lane at peak period.	12' - 19'	Protected	Streetcar Compatible	2 (Off-Peak) 3 (Peak)	One-Side (Peak) Both Sides (Off-Peak)
					
Concept 1-2C					
Type	Ped Realm	Bicycles	Transit	Travel Lanes	Parking
Reconstruct roadway for one-way operation with three travel lanes and parking on one side, which would accommodate a protected bike lane.	12' - 19'	Protected	Streetcar Compatible	3	One Side
					
	More Space		Less Space		No Change
	Varies				

Table 13. Concept Design Comparison Summary Continued

Two-way Alternatives

Concept 2-1A					
Type	Ped Realm	Bicycles	Transit	Travel Lanes	Parking
Restripe roadway for two-way operation with three travel lanes and standard bike lane, while maintaining parking on both sides and existing pedestrian zone.	12' - 19'	Standard	Streetcar Compatible	3	Both Sides
Concept 2-1B (C4)					
Type	Ped Realm	Bicycles	Transit	Travel Lanes	Parking
Reconstruct roadway for two-way operation with three travel lanes and parking on one side, which would accommodate a protected bike lane.	12'	Protected	Streetcar Compatible	3	One Side
Concept 2-1C					
Type	Ped Realm	Bicycles	Transit	Travel Lanes	Parking
Reconstruct roadway for two-way operation with three travel lanes and parking on both sides, while providing a protected bike lane.	11'	Protected	Streetcar Compatible	3	Both Sides

More Space
 No Change

Less Space
 Varies

5.2 Motor Vehicle Mobility and Access

Maintaining motor vehicle mobility, circulation and access is a key objective in evaluating the concept design alternatives for the Hennepin and 1st Avenue area. Equally important is determining the potential impacts (e.g., transit reliability, pedestrian and bicycle safety, air quality and motor vehicle safety) resulting from increased congestion levels through the corridor. A traffic operation analysis was conducted to compare the relative performance of the design concepts, quantify measures of effectiveness and generate key conclusions.

5.2.1 Approach

The Hennepin, Central, and 1st Avenue street network is a complex and dynamic system, including many variables that influence mobility. Due to the interaction of closely spaced traffic signals on a grid network system, the traffic mobility of the corridor was evaluated using micro-simulation traffic modeling. The traffic operation analysis was completed using VISSIM modeling software. Key elements accounted for include:

- Metro Transit bus routes, schedules and station stops
- Planned streetcar operation, alignment alternatives and station stops
- Bicycle and pedestrian interaction at intersections.

The VISSIM modeling allows for evaluation of detailed motor vehicle traffic assignment matrices, detailed bus route schedules and stop locations, streetcar operation and unique signal phasing, pedestrians and bicycles and a refined evaluation of lane configurations. VISSIM is a standard industry micro-simulation model that is used worldwide for similar applications and has been used on many projects throughout the City of Minneapolis. The model is calibrated to the existing traffic signal timings, traffic volumes; and replicates the existing real world traffic operations, vehicle flows and travel times along Hennepin and 1st Avenues. The use of a calibrated traffic simulation model produces reasonable results and is a useful tool to help inform the design and evaluation process; however, engineering judgement along with many other traffic operation variables and considerations are also made. Although there are some differences between the typical cross-sections as it relates to various styles of bicycle lane design, sidewalk widths and on street parking locations, these details are inconsequential to the traffic operation analysis. Therefore, several typical sections can be expected to generally have the same level of motor vehicle mobility and are evaluated as a single scenario. Table 14 below summarizes the traffic operation analysis scenarios along with the corresponding concept alternative.

Table 14. Traffic Operation Analysis Scenario Matrix

Facility	Typical Concept	Description	Traffic Volumes
One Way	Existing	Existing Conditions	2015
One Way	Existing	Nobuild - No Streetcar	2015
One Way	Existing & 1-2B	Nobuild - Left Side Streetcar	2035
One Way	1-2C	3 Travel Lanes, Right Side Streetcar	2035
One Way	1-1B	2 Travel Lanes, Right Side Streetcar	2035
Two Way	2-1A, 2-1B, 2-1C	3 Travel Lanes	2015
Two Way	2-1A, 2-1B, 2-1C	3 Travel Lanes	2035

5.2.2 Planned Streetcar

The operation and alignment of the planned modern streetcar system through the study area is an important consideration in the traffic operation analysis. The streetcar vehicle operational characteristics, alignment, station locations, and station dwell times may influence mobility. Key streetcar design and operation assumptions made are consistent with the Nicollet-Central Modern

Streetcar Environmental Assessment (Streetcar EA). Other considerations accounted for within the evaluation of each concept alternative include:

- **Streetcar Alignment.** The current streetcar alignment identifies left-side operations across the Hennepin Avenue Bridge. This alignment is conducive to a left side operation within the Hennepin and 1st Avenue NE study area and extending further north on Central Avenue, but **does not preclude** the possibility of a right side streetcar alignment. The operations and maintenance facility site has not yet been determined, which will have to be taken into consideration when determining the streetcar alignment
- **Alignment Transition.** The evaluation of the right side streetcar alignment assumes a dedicated traffic signal phase at intersections where an alignment transition occurs.
- **Station Locations.** The alignment (right or left side) and the station locations are generally consistent with the Council-approved locally preferred alternative. A dwell time of twenty (20) seconds was assumed for each station to account for passenger boarding and alighting. For those alternatives where a right side streetcar alignment is shown, the analysis concluded that a lane transition is problematic near the Central/Hennepin/1st Avenue Triangle. This resulted in a modified concept as compared to the current LPA alignment, which resulted in an alignment that continues northeast along Hennepin Avenue before routing back to 1st Avenue via 7th Street.

Evaluation of the planned modern streetcar components are estimated and are included to account for any mobility impacts related to the concept alternatives. Transit signal priority (TSP) operation is not evaluated in this analysis. Although TSP may have some limited travel time benefit, the delay impact to motor vehicle and non-motorized movements at critical intersections require evaluation. Within high pedestrian environments, the automatic recall (no pedestrian push button) for the pedestrian clearance intervals need to be maintained, which further limits the potential advantage of TSP. Further evaluation will be necessary to define design details, including the benefit and impact of TSP if and when the streetcar or the concepts developed within this study move forward.

5.2.3 Results

The quality of mobility is measured through the computation of Level of Service (LOS), estimation of motor vehicle and transit vehicle travel times, network performance analysis, and overall congestion assessment.

Level of Service

The concept of LOS is a method to estimate the quality of traffic flow through intersections and along segments of roadway. In general, the capacity of a street is a measure of its ability to accommodate a certain volume of moving vehicles. Typically, street capacity refers to the maximum number of vehicles that can be expected to be accommodated in a given time period under the prevailing roadway characteristics and conditions.

The LOS methodology is standardized by the Transportation Research Board (TRB) and is applied uniformly regardless of jurisdictional boundaries. The method uses algorithms that are based on delay and drivers' expectations of acceptable delay or traffic flow to assign a LOS for particular

conditions. The results are then categorized on an LOS A to LOS F scale. LOS A represents high quality traffic operations where motorists experience little or no delay (i.e. free flow conditions). Conversely, LOS F corresponds to low quality operations with higher delays or potentially congestion.

The LOS criteria as defined by the HCM for both signalized intersections and urban arterials is illustrated in Table 15.

Table 15. Level of Service Description

LOS	Description	Intersection Delay (Seconds / Vehicle)	Urban Street LOS
		Signalized Intersection	Base Speed (30 mph) Average Travel Speed (mph)
A	Free Flow. Low volumes and no delays.	0 - 10	>26
B	Stable Flow. Speeds restricted by travel conditions, minor delays.	>10 - 20	>20
C	Stable Flow. Speeds and maneuverability closely controlled due to higher volumes.	>20 - 35	>15
D	Stable Flow. Speeds considerably affected by change in operating conditions. High density traffic restricts maneuverability, volume near capacity.	>35 - 55	>12
E	Unstable Flow. Low speeds, considerable delay, volume at or slightly over capacity.	>55 - 80	>9
F	Forced Flow. Very low speeds, volumes exceed capacity, long delays with stop and go traffic.	> 80	<=9

Source: Highway Capacity Manual, 2010 Edition, Transportation Research Board, Exhibit 18-4 for Signalized Intersections and Exhibit 16-4 for Urban Street Facilities.

The overall intersection delay comparison for each scenario under the a.m., off peak (i.e., 9:00 a.m. to 3:00 p.m.) and p.m. peak periods is shown in Figure 21, Figure 22 and Figure 23, respectively.

The intersection LOS analysis indicates acceptable intersection operations, except that the p.m. peak period is expected to be most problematic. The Hennepin Avenue and Main Street intersection is expected to operate at LOS E during the p.m. peak period under both the one-way two lane and the two-way scenarios. This intersection will facilitate the streetcar left side to right side alignment transition and also serves as a bottleneck (three lanes exiting downtown transitioning to two lanes into Northeast). There are a number of factors that contribute to the conclusions found:

- The traffic patterns are generally directional, with high southbound 1st Avenue volumes during the morning (entering downtown) and high northbound volumes on Hennepin Avenue exiting the downtown.
- In addition to the high commuter traffic volume exiting the downtown, there is a much greater commercial destination and non-work based trips during the p.m. peak period.
- 1st Avenue generally operates better due to the traffic signal and intersection spacing. The traffic volume is effectively metered in by side streets and doesn't reach the highest volume level until entering downtown. In addition, the corridor is not impacted by the six legged Central Triangle intersection bottleneck.
- The highest traffic volumes on Hennepin Avenue are concentrated on the Hennepin Avenue Bridge, exiting downtown, and approach the first traffic signal system at their highest level. The Hennepin/Main Street intersection represents the bottleneck from 3-lanes to 2-lanes under certain concepts evaluated. Complicating the operation of the bottleneck are transit stops occurring in the right lane, which at times renders the corridor to operating with only one effective moving lane.
- The Hennepin/Central/5th Triangle is a complex six-legged intersection that introduces an additional bottleneck.

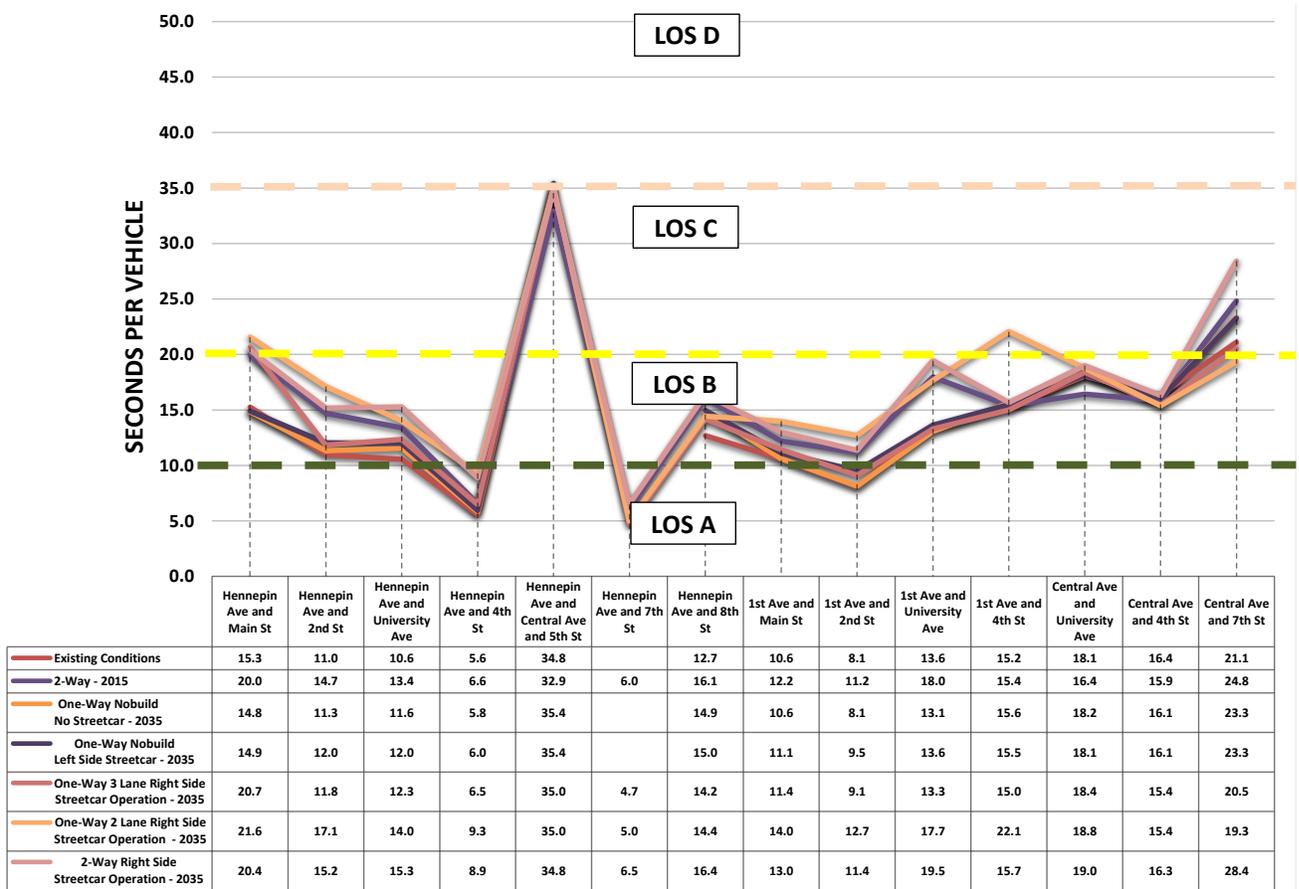


Figure 21. Overall Intersection Delay (seconds/vehicle) Comparison – AM Peak Period

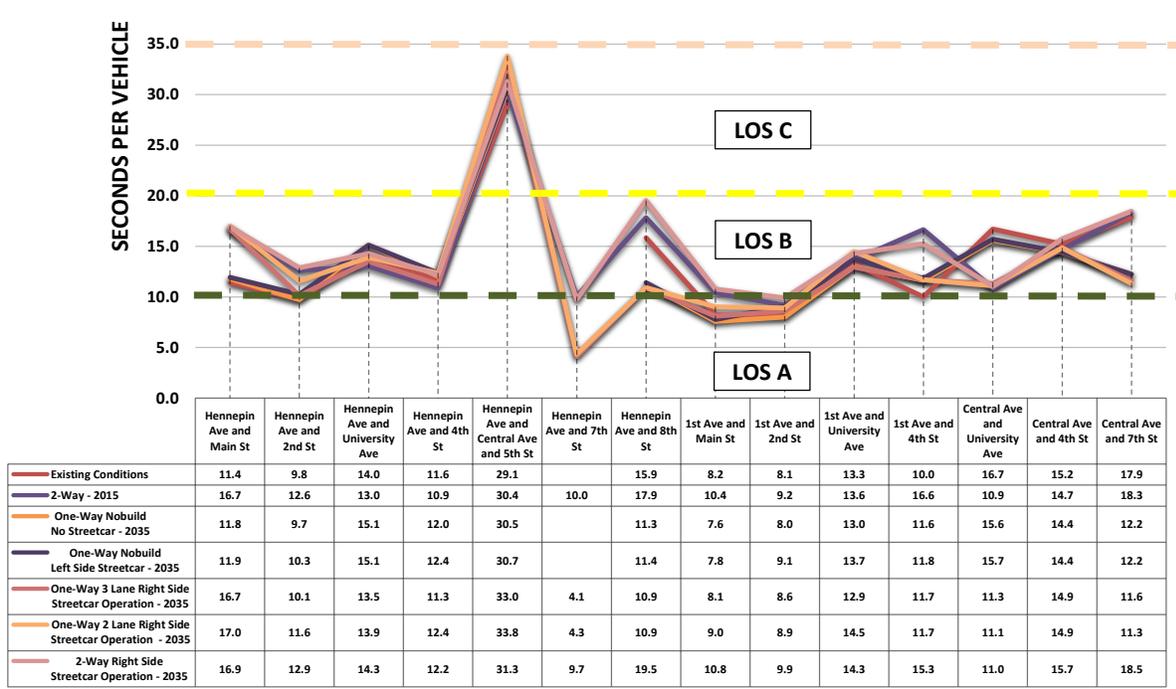


Figure 22. Overall Intersection Delay (seconds/vehicle) Comparison – Off Peak Period

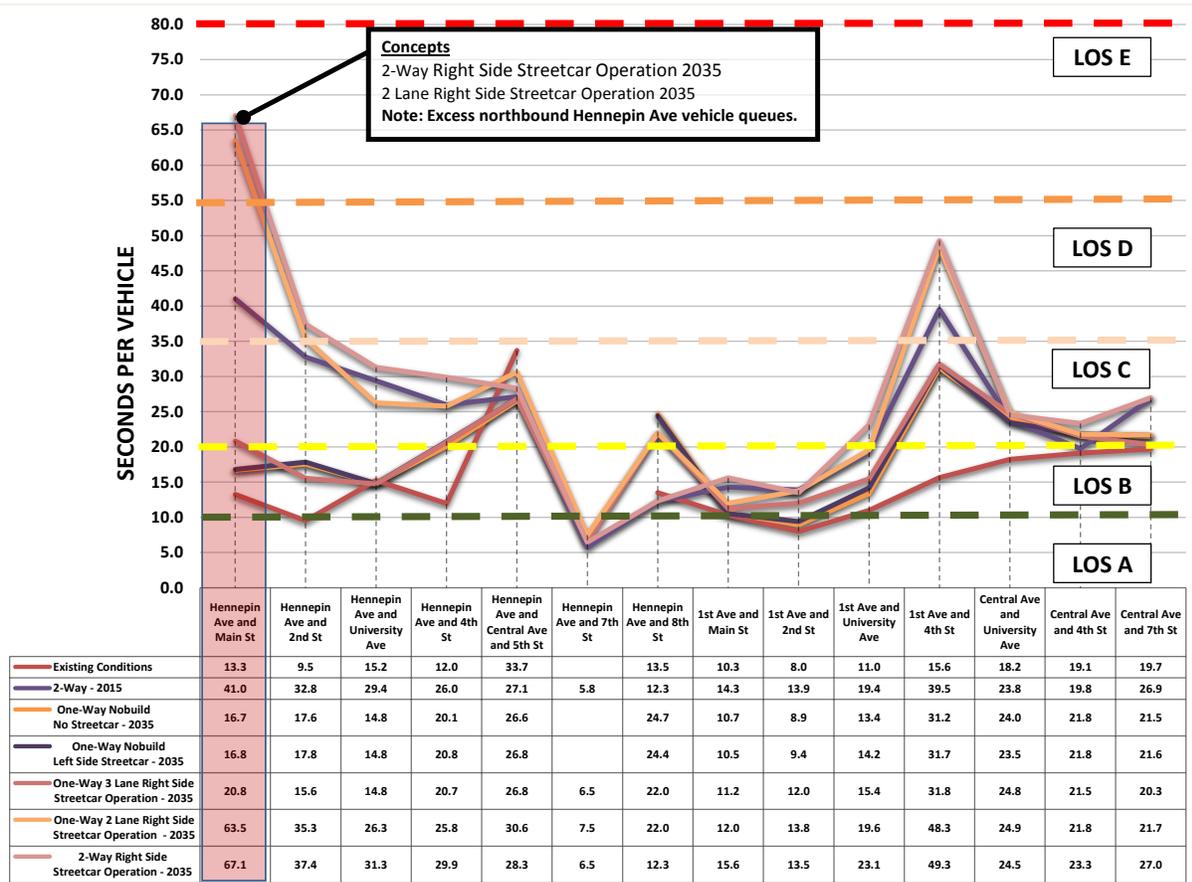


Figure 23. Overall Intersection Delay (seconds/vehicle) Comparison – PM Peak Period

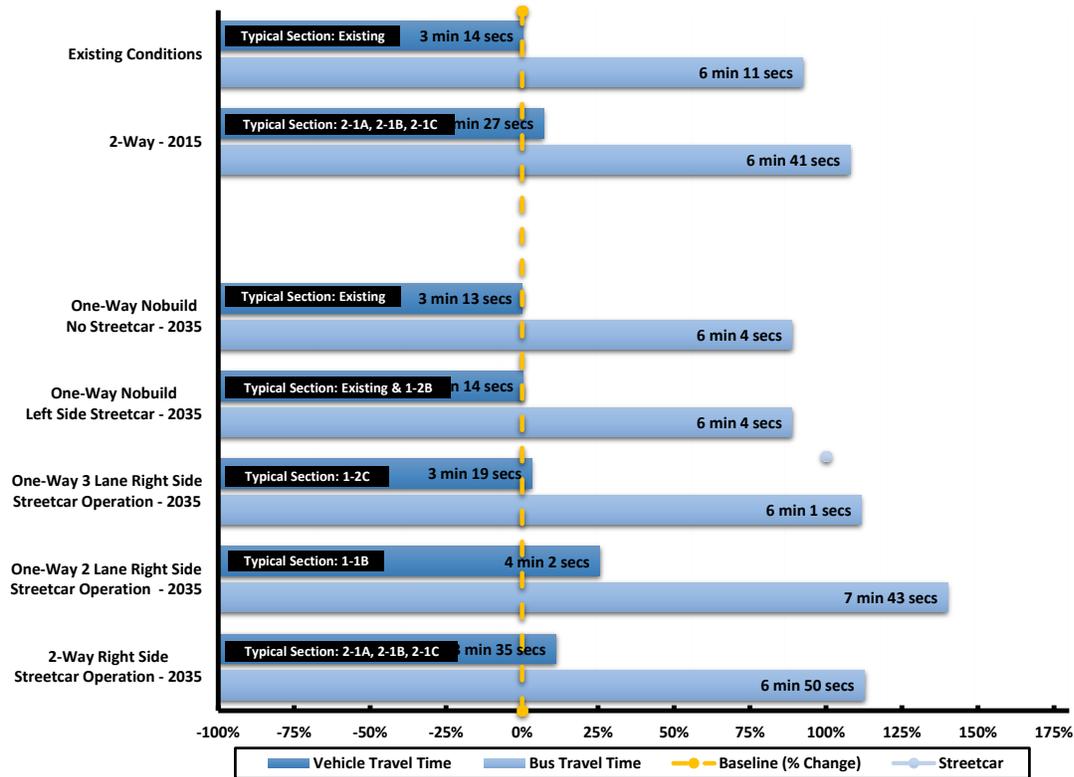
5.2.4 Motor Vehicle and Transit Vehicle Travel Times

One-way to measure the magnitude of the congestion, or delay, can be measured through motor vehicle, bus transit, and streetcar vehicle travel times. The estimated motor vehicle, bus transit, and streetcar vehicle travel times on Hennepin Avenue and 1st Avenue for each scenario under the a.m., off peak and p.m. peak periods are shown in Figure 24, Figure 25 and Figure 26, respectively. The primary use of this data is to provide a relative comparison between scenarios and to help assess the estimated change. The travel time data also gives a good indication of anticipated delay expected with any projected congestion. Travel times are only reported for the Hennepin and 1st Avenue corridors. The start and end points for motor vehicle, bus transit and streetcar vary between the corridors to ensure all delay that may be expected with any alternative is measured. Hennepin Avenue travel time segment begins at 1st Street S (CBD) and is recorded through Hennepin Avenue/8th Street and the 1st Avenue travel time segment begins at Central Avenue/7th Street and ends at the bridge just south of Main Street.

The streetcar travel times are expected to be similar to the bus transit travel times during the a.m. and off peak periods; therefore, were only reported separately for the p.m. peak period. Under the two congested scenarios (one-way two-lane and two-way operation), the streetcar will be in the left lane along Hennepin Avenue and given a dedicated signal phase at Main Street to make the alignment transition. This will be advantageous to the streetcar travel time.

The travel time analysis shows that all the three-lane, one-way scenarios, are expected to operate similarly and are also expected to be similar to present conditions. The northbound Hennepin Avenue travel time is expected to nearly triple (from a little over 3 minutes to nearly 9 minutes) with the reduction from three lanes to two lanes on the one-way scenario. The two-way scenario is expected to result in minimal additional travel time, compared to the one-way two lane scenario since the vehicle congestion on the Hennepin Avenue Bridge is similar. The bus transit vehicles are expected to follow the same trend. Streetcar travel times are expected to be more uniform across the scenarios, since the streetcar will be in the left lane along Hennepin Avenue and given a dedicated signal phase at Main Street to make the alignment transition. As a result, the streetcar traveling in the left lane will be less impacted by queued passenger motorists in the middle and right lanes on Hennepin Avenue. Vehicle and bus transit travel times are expected to experience minimal changes along 1st Avenue.

Hennepin Avenue



1st Avenue

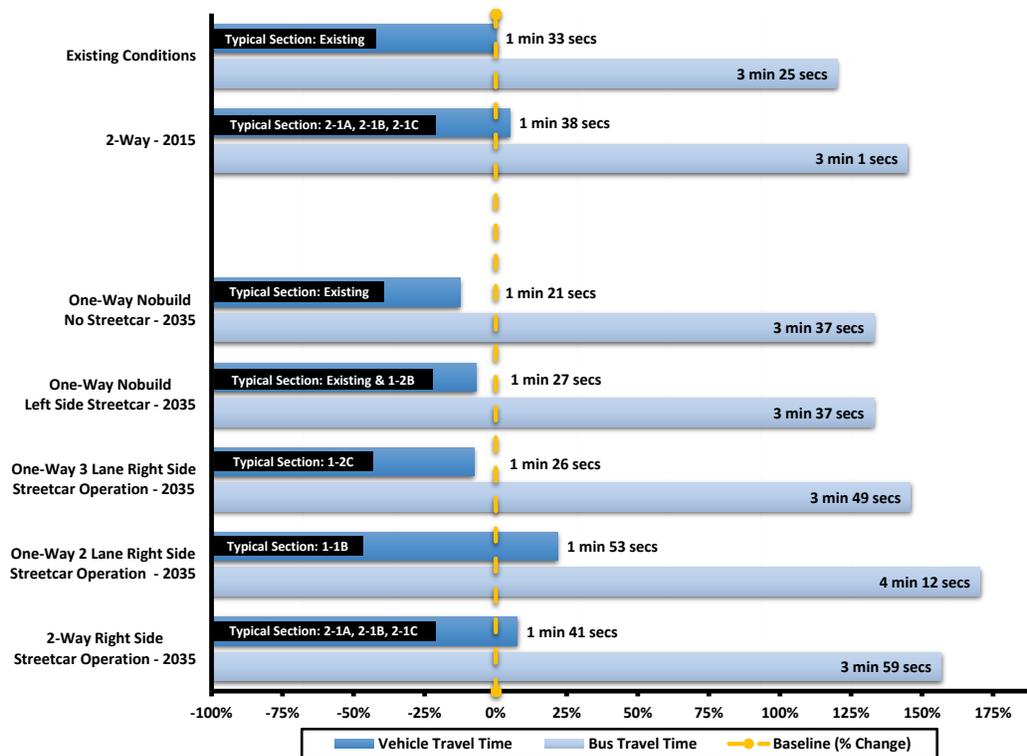
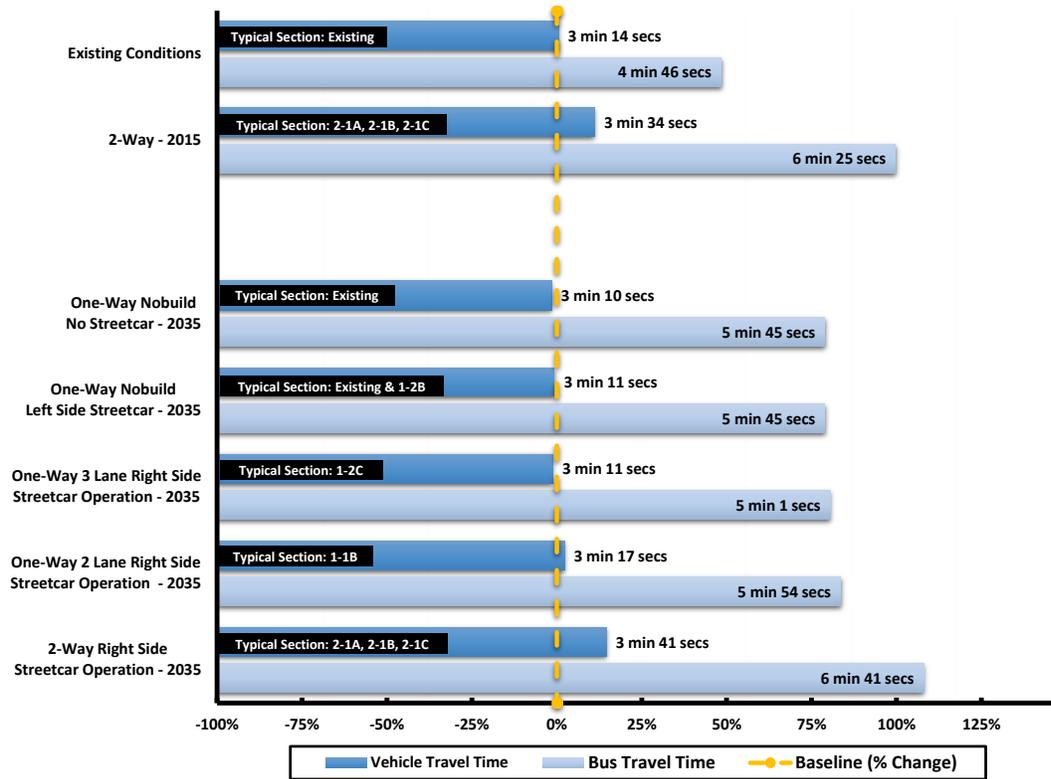


Figure 24. Hennepin Avenue and 1st Avenue Travel Time Comparison – AM Peak Period

Hennepin Avenue



1st Avenue

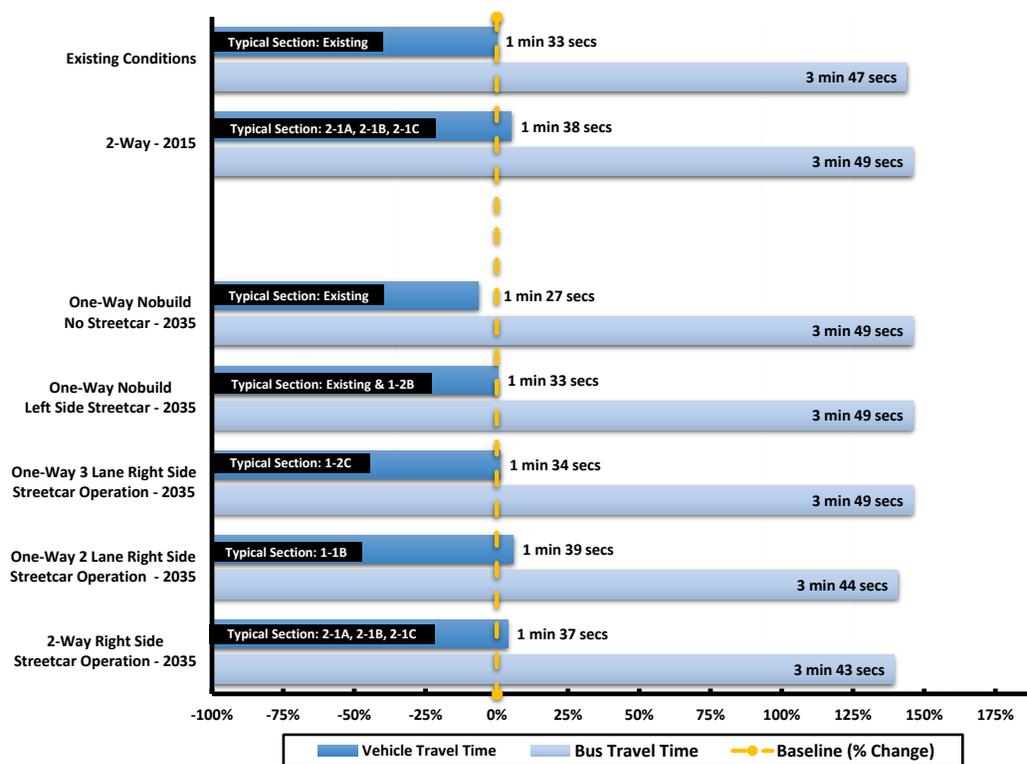
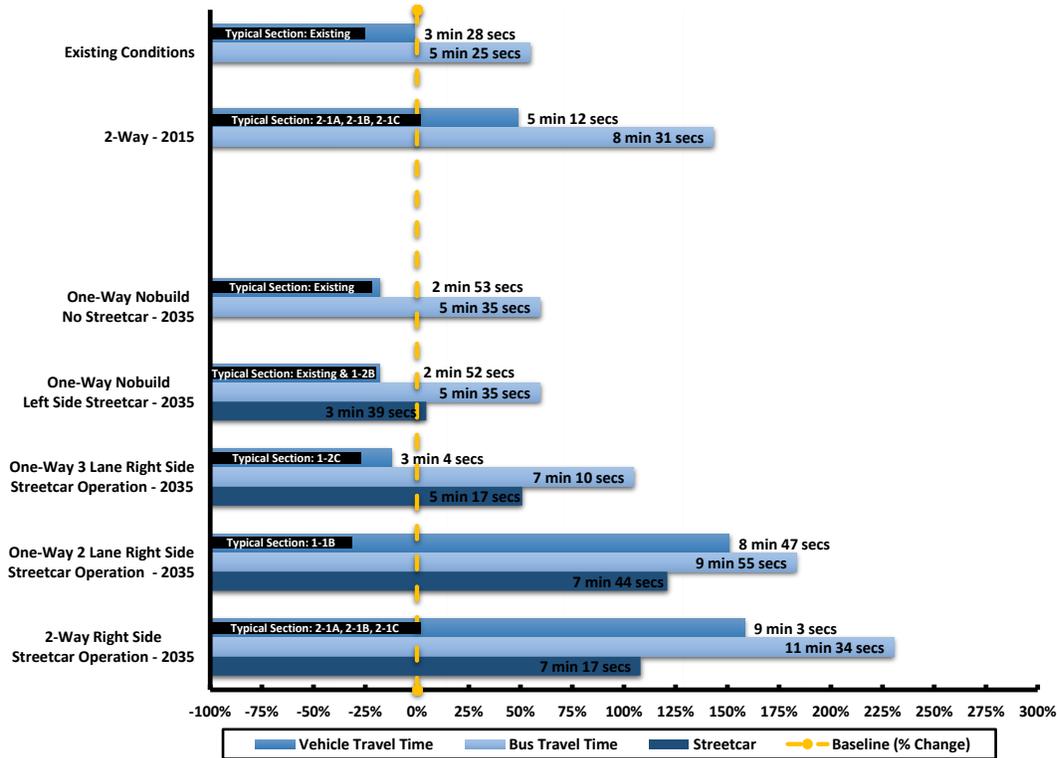


Figure 25. Hennepin Avenue and 1st Avenue Travel Time Comparison – Off Peak Period

Hennepin Avenue



1st Avenue

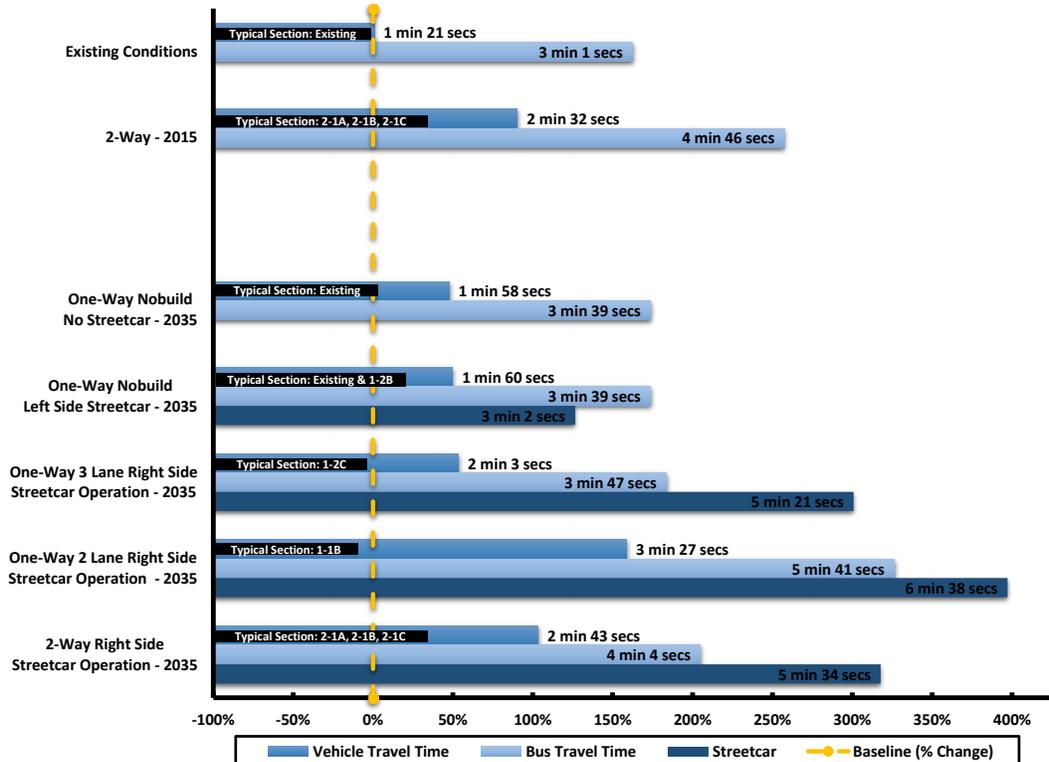


Figure 26. Hennepin Avenue and 1st Avenue Travel Time Comparison – PM Peak Period

Total Network Delay

Another useful comparison is to evaluate the overall network performance. The network delay comparison captures delay incurred at other intersections in the study area that may be impacted by signal timing strategies used to improve mobility along Hennepin or 1st Avenue, or from residual congestion within the network. Figure 27 illustrates the overall network delay and percent changes from the existing or nobuild scenarios.

The analysis indicates that during the p.m. peak period, the one-way (2-lane) and the two-way scenario are expected to experience a large increase in overall delay. Compared to the existing 2015 conditions, an estimate 37% and 52% increase in delay is expected. When comparing the forecast 2035 one-way, 2-lane, and two-way scenarios, the overall network delay is expected to be nearly double that of present conditions.

AM Peak Hour

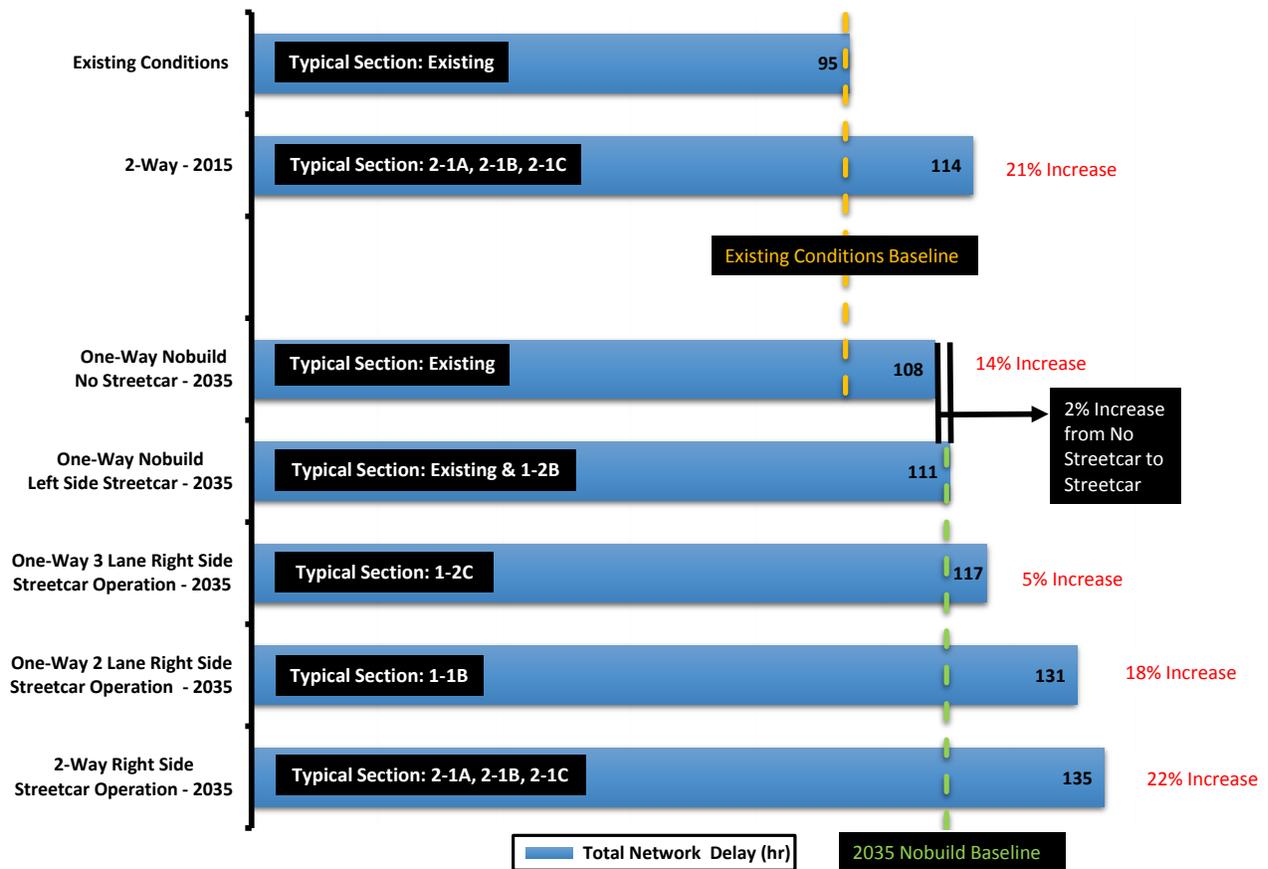
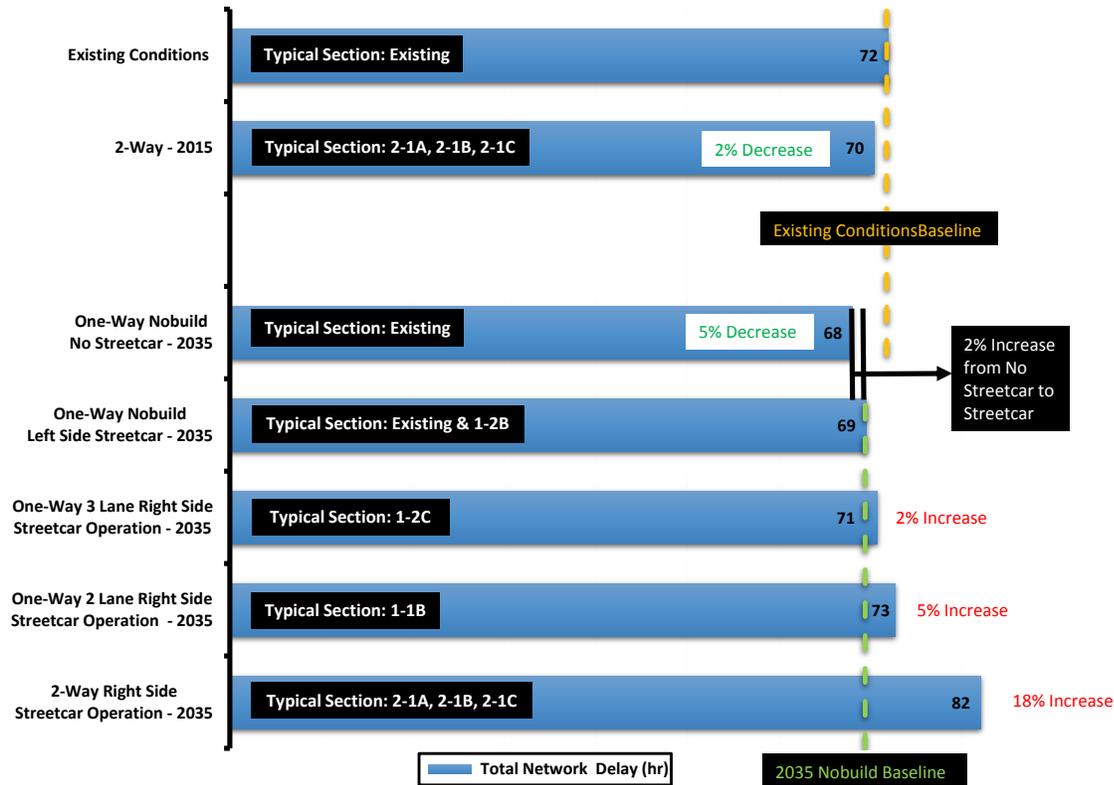


Figure 27. Total Network Delay Comparison

Off Peak Hour



PM Peak Hour

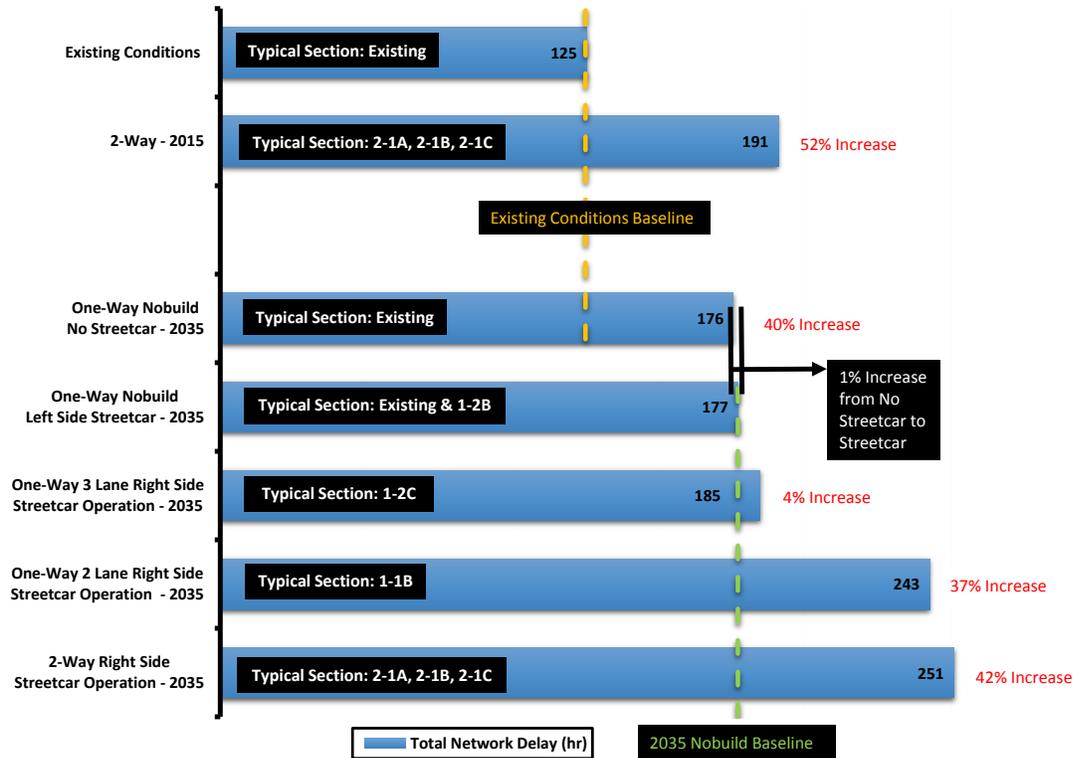


Figure 27. Total Network Delay Comparison Continued

Congestion Map

To help illustrate and compare the expected congestion level with each scenario, a color coded congestion map was developed. The key measure is average motorist operating speed and the graph is color coded maroon, red, and orange for congested segments, consistent with metro wide traffic maps. Low motorist speeds (maroon) may be indicative of congestion, whereas higher operating speeds (no color) occur with smoother traffic flow. Multiple consecutive blocks that are color coded maroon or red indicate stopped congestion, or slow moving block length vehicle queues that may impact traffic flow on cross-street roadways, parking ramps or adjacent streets. A comparison of the critical p.m. peak period scenarios, showing only the changes to the congested blocks (orange, red, and maroon) are illustrated in Figure 28.

5.2.5 Mobility Analysis Conclusions

Key conclusions of the traffic operation are as follows:

- Acceptable traffic operations are expected during the a.m. and off peak time periods for all of the scenarios evaluated.
- The two travel lane alternatives along 1st Avenue are expected to operate at an acceptable level during all scenarios.
- The alternatives with two travel lanes along Hennepin Avenue (one-way or two-way scenarios) are expected to experience congestion at the first traffic signal into the network (Main Street). The congestion is the result of the combined impact from a reduction to two travel lanes, additional signal phases at Main Street and transit operations (dwelling transit vehicles) in the right lane. The two-way scenario adds one additional complication with the potential for the left lane to be blocked by a yielding motorist waiting to turn left. A queue length extending over the Hennepin Avenue Bridge is expected. This may impact the operation of the West River Parkway and Nicollet Island bus stops and streetcar stations.
- The overall travel time impact as result of this congestion is expected to triple the motor vehicle and double bus transit travel times under the two travel lane scenarios.
- In terms of total network delay, an expected 40-50% increase in total motor vehicle delay during the p.m. peak period is expected with the two lane, one-way, or two-way operation alternatives on Hennepin Avenue.

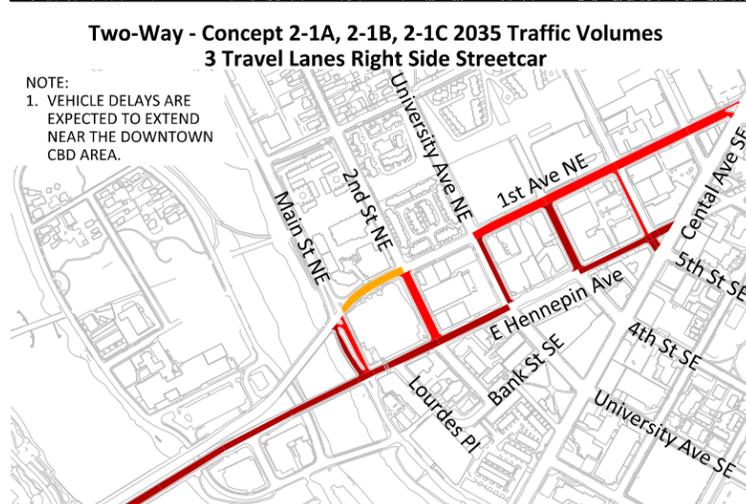
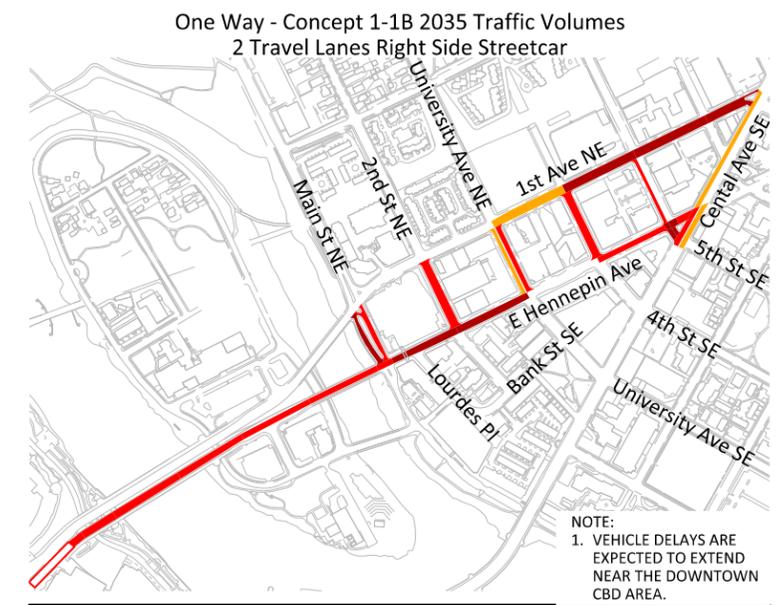
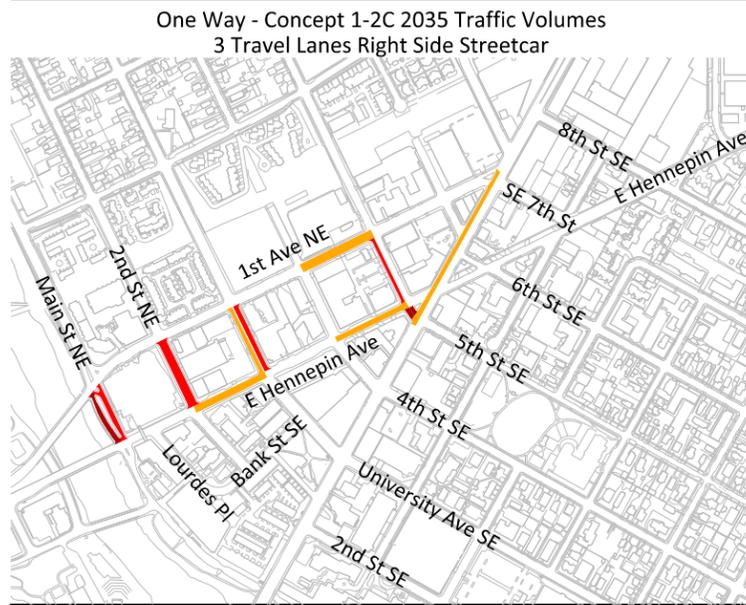
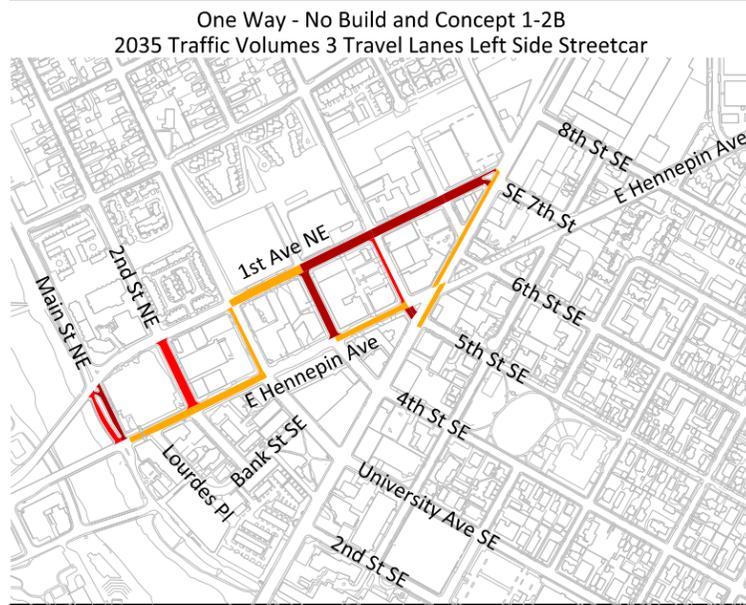
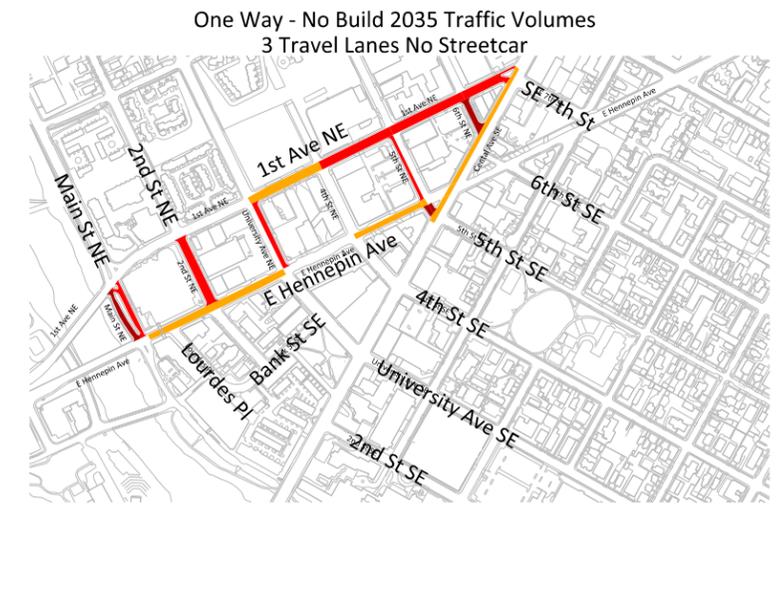
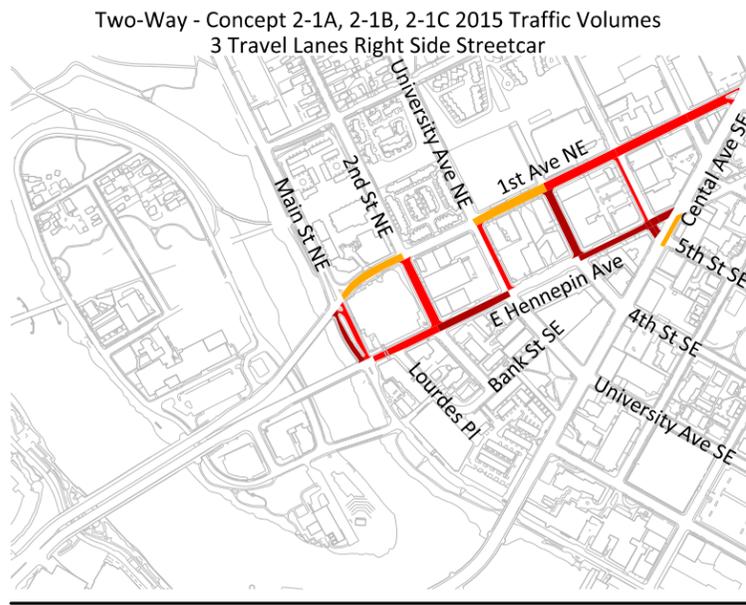
The analysis indicates there may be negative mobility and access impacts under forecasted p.m. peak period conditions with the design concept that reduce the number of northbound travel lanes on Hennepin Avenue. The concepts with two travel lanes along Hennepin Avenue (one-way or two-way scenarios) are expected to experience congestion at the first couple traffic signals into the network (Main Street to University Avenue). The congestion is the result of the combined impact from a reduction to two travel lanes, additional signal phases at Main Street, and transit operations (dwelling transit vehicles) in the right lane. The two-way scenario introduces complication with the potential for the left lane to be blocked by a yielding motorist waiting to turn left and dwelling transit vehicles in the right lane. A queue length extending over the Hennepin Avenue Bridge is expected. This may impact the operation of the West River Parkway and Nicollet Island bus stops and streetcar stations. The overall travel time impact as result of this congestion is expected to triple the motor vehicle and double bus transit travel times under the two travel lane scenarios. It may be reasonable to assume motorists may divert to other travel routes or the demand may spread to time periods outside of the peak period. A macro-level travel demand modeling analysis was

not conducted to estimate the potential diversion to other routes in downtown and near-downtown neighborhoods.

5.2.6 Design Considerations

In addition to estimating potential capacity concerns and quality of motor vehicle and bus transit mobility, the traffic operation analysis identified several important design considerations:

- Streetcar alignment transition locations (left side to right side). The Hennepin Avenue/Main Street and the 1st Avenue/2nd Avenue intersections were identified as the best locations for the addition of the exclusive streetcar phase to accommodate the streetcar transition.
- The southbound transit station (streetcar or bus transit) in the vicinity of 4th Street is best situated on the near side approach to the 4th Street intersection. In other words, it is best to not locate a transit station between University Avenue and 4th Street if reducing 1st Avenue from three travel lanes to two.



Speed	
All Intervals	
Color	mph
	9 to 12
	6 to 9
	< 6

5.3 Concept Design Benefit and Impact Evaluation

A comprehensive qualitative evaluation of the benefit and impact (i.e., pros and cons) was completed for each concept design with respect to the key objectives as summarized in Table 16 through Table 21. The pros and cons provide a valuable means of comparing trade-offs and ensuring a balance between transportation modes and the stakeholder and neighborhood objectives are best met.

Table 16. Concept Design Evaluation – One-way Concept 1-1B

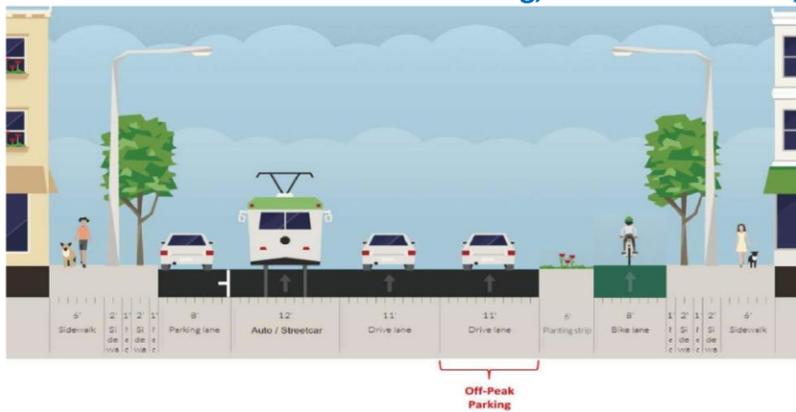


Description:

Reconstruct roadway for one-way operation with two travel lanes and parking on one side, which would accommodate a protected bike lane and an expanded pedestrian zone.

Category	Pros	Cons
Mobility and Safety	<ul style="list-style-type: none"> • Minimum 11' lanes. • Design speed reflects desired traffic speed. • Reduce travel speeds and traffic calming • Bus and streetcar will operate as one effective lane with high transit activity. 	<ul style="list-style-type: none"> • Restricts roadway with two travel lanes. • Increase response time for emergency vehicles and trucks during peak hour/direction.
Bicycle and Pedestrian	<ul style="list-style-type: none"> • Delineated protected bikeway adds additional separation with travel lane. • Increases the sidewalk space from 12' to 20'. • Prioritizes pedestrian experience. • Reduces street crossing distance 	<ul style="list-style-type: none"> • Requires bicyclists to shift behind bus shelters.
Transit	<ul style="list-style-type: none"> • Less bike conflict with transit loading • Meets 10' loading area requirement. • All Transit loading on one side of the street. • Shared transit stops 	<ul style="list-style-type: none"> • Conflict with bike lane and transit loading area requires special design treatments • Increased transit times and reduced transit service reliability
Quality of Life	<ul style="list-style-type: none"> • Greatest emphasis on pedestrians and shortest crossing distance of all concepts evaluated. • Largest pedestrian zone of all concepts. • Option to add curb extension on parking side. • Provides options for all modes of transit. • May result as greatest speed reduction of all concepts considered. • Improves pedestrian experience and offers streetscape opportunities. • Offers better balance between all modes. 	<ul style="list-style-type: none"> • Extended periods of congestion during evening rush hour.
Economic Development	<ul style="list-style-type: none"> • Slows traffic through area and increases visibility of businesses. 	<ul style="list-style-type: none"> • Increased congestion expected by removing 3rd travel lane. • Removes parking on one side.

Table 17. Concept Design Evaluation – Concept 1-2B

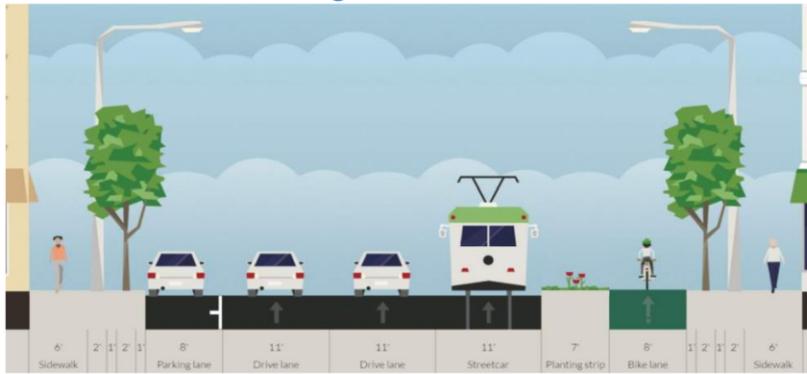


Description:

Reconstruct roadway for one-way operation with two travel lanes, parking on one side, protected bike lane, and off-peak parking, which would allow one lane to serve as a travel lane at peak period.

Category	Pros	Cons
Mobility and Safety	<ul style="list-style-type: none"> • Minimum 11' lanes. • Maintains 3 travel lanes during peak hour/ direction. • Reduce travel speeds and traffic calming. • Best access for emergency vehicles and trucks. 	<ul style="list-style-type: none"> • Requires travel lane width for off-peak parking • May promote higher vehicle speeds during off peak periods.
Bicycle and Pedestrian	<ul style="list-style-type: none"> • Protected bikeway adds physical barrier between bike lane and travel lane. • Less bike conflict with transit loading • Protected bike lane design may provide additional space in pedestrian realm based upon facility design. 	<ul style="list-style-type: none"> • Removes east side curb extensions (west side curb extensions remain).
Transit	<ul style="list-style-type: none"> • Will meet 10' transit loading area requirement. • More reliable transit service and predictable travel times 	<ul style="list-style-type: none"> • Transit loading on both sides of roadway. May cause bus and streetcar station confusion for riders.
Quality of Life	<ul style="list-style-type: none"> • Option to add curb extension on parking side • Provides options for all modes of transit • Median provides pedestrian refuge and sense of increased pedestrian zone • May offer streetscape additional opportunities with larger pedestrian realm • Operates as two travel lanes for the majority • Offers better balance between all modes 	<ul style="list-style-type: none"> • Longer effective crossing distance than existing • Maintains existing sidewalk widths.
Economic Development	<ul style="list-style-type: none"> • Maintains one side permanent parking and provides a second parking lane during non-peak hours/direction. • Slows traffic through area and increases visibility of businesses. 	<ul style="list-style-type: none"> • Removes parking on one side during peak period/direction.

Table 18. Concept Design Evaluation – Concept 1-2C



Description:

Reconstruct roadway for one-way operation with three travel lanes and parking on one side, which would accommodate a protected bike lane.

Category	Pros	Cons
Mobility and Safety	<ul style="list-style-type: none"> • Minimum 11' lanes. • Maintains 3 travel lanes. • Reduce travel speeds and traffic calming. • Best access for emergency vehicles and trucks. 	<ul style="list-style-type: none"> • May promote higher vehicle speeds during off peak periods.
Bicycle and Pedestrian	<ul style="list-style-type: none"> • Protected bike lane adds physical barrier between travel lane. • Protected bike lane design may provide additional space in pedestrian realm based upon facility design. 	<ul style="list-style-type: none"> • Requires bicyclists to shift behind bus shelters. • Removes east side curb extensions (west side curb extensions remain).
Transit	<ul style="list-style-type: none"> • Will meet 10' transit loading area requirement. • At a minimum, maintains existing 12' pedestrian zone at loading areas • All Transit loading on one side of the street. • More reliable transit service and predictable travel times 	<ul style="list-style-type: none"> • Conflict with bike lane and transit loading area requires special design treatments
Quality of Life	<ul style="list-style-type: none"> • Option to add curb extension on parking side • Provides options for all modes of transit • Median provides pedestrian refuge and sense of increased pedestrian zone • Offers better balance between all modes 	<ul style="list-style-type: none"> • Longer effective crossing distance than existing. • Maintains existing sidewalk widths.
Economic Development	<ul style="list-style-type: none"> • Slows traffic through area and increases visibility of businesses. 	<ul style="list-style-type: none"> • Removes parking on one side.

Table 19. Concept Design Evaluation – Concept 2-1A



Description:

Restripe roadway for two-way operation with three travel lanes and standard bike lane, while maintaining parking on both sides and existing pedestrian zone.

Category	Pros	Cons
Mobility and Safety	<ul style="list-style-type: none"> Two northbound through lanes of traffic Minimum 11' lanes. Incorporates traffic calming and reduced travel speeds. Increases local circulation with one southbound lane. 	<ul style="list-style-type: none"> Added congestion and delays in peak hour/direction expected with removing a travel lane and added conflicting movements. Increased number of vehicle and pedestrian conflict points.
Bicycle and Pedestrian	<ul style="list-style-type: none"> Provides dedicated bicycle space with striped lane. Maintains existing 12' pedestrian zone and curb extensions on both sides. 	<ul style="list-style-type: none"> Standard bike lane offers minimum level of separation from travel lane. Conflicts at bus stops.
Transit	<ul style="list-style-type: none"> Travel lane configuration will be maintained and facilitates future streetcar implementation. 	<ul style="list-style-type: none"> Bus stop and bike lane conflict requires shared space or special design treatment at stops. Increased transit times and reduced transit service reliability
Quality of Life	<ul style="list-style-type: none"> Curb extensions can be maintained on both sides. Shortest crossing distance of all two-way preferred concepts. Provides options for all modes of transit. Offers better balance between all modes. 	<ul style="list-style-type: none"> Maintains existing sidewalk widths. Extended periods of congestion during evening rush hour.
Economic Development	<ul style="list-style-type: none"> Striping retrofit option without full construction. Offers interim phase before streetcar is added. Maintains two sided parking. 	<ul style="list-style-type: none"> Extended periods of congestion during evening commute period may limit activity during evening rush hour.

Table 20. Concept Design Evaluation – Concept 2-1B

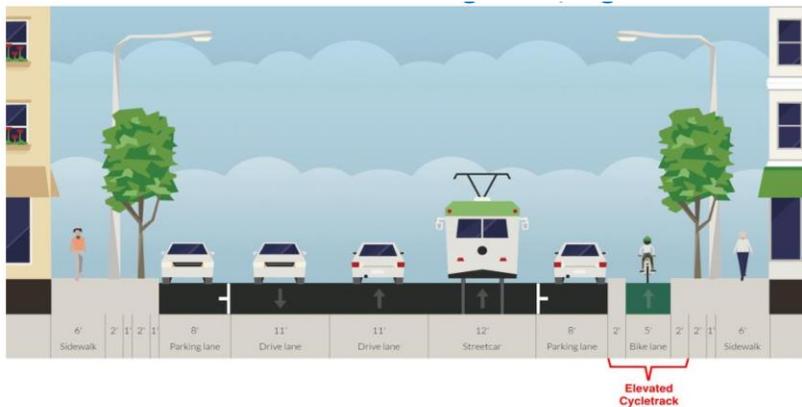


Description:

Reconstruct roadway for two-way operation with three travel lanes and parking on one side, which would accommodate a protected bike lane.

Category	Pros	Cons
Mobility and Safety	<ul style="list-style-type: none"> Two northbound through lanes of traffic. Minimum 11' lanes. Incorporates traffic calming and reduced travel speeds. Increases local circulation with one southbound lane. 	<ul style="list-style-type: none"> Added congestion and delays in peak hour/direction expected with removing a travel lane and added conflicting movements. Increased number of vehicle and pedestrian conflict points.
Bicycle and Pedestrian	<ul style="list-style-type: none"> Protected bikeway adds physical barrier between bike and vehicle lane. Protected bike lane design may provide additional space in pedestrian realm based upon facility design. 	<ul style="list-style-type: none"> Requires bicyclists to shift behind bus shelters. Removes curb extensions on east side (west side extensions remain).
Transit	<ul style="list-style-type: none"> Will meet 10' transit loading area requirement. At a minimum, maintains existing 12' pedestrian zone at loading areas All Transit loading on one side of the street. Provides space to address bike/transit loading conflicts. 	<ul style="list-style-type: none"> Conflict with bike lane and transit loading area requires special design treatments. Increased transit times and reduced transit service reliability
Quality of Life	<ul style="list-style-type: none"> Option to add curb extension on parking side. Provides options for all modes of transit Median provides pedestrian refuge and sense of increased pedestrian zone May offer streetscape additional opportunities with larger pedestrian realm Offers better balance between all modes. 	<ul style="list-style-type: none"> Longer effective crossing distance than existing. Maintains existing sidewalk widths. Extended periods of congestion during evening rush hour.
Economic Development	<ul style="list-style-type: none"> Slows traffic through area and increases visibility of businesses. 	<ul style="list-style-type: none"> Removes parking on one side. Extended periods of congestion during evening commute period may limit activity during evening rush hour.

Table 21. Concept Design Evaluation – Concept 2-1C



Description:

Reconstruct roadway for two-way operation with three travel lanes and parking on both sides, while providing a protected bike lane.

Category	Pros	Cons
Mobility and Safety	<ul style="list-style-type: none"> • Two northbound through lanes of traffic. • Minimum 11' lanes. • Incorporates traffic calming and reduced travel speeds. • Increases local circulation with one southbound lane. 	<ul style="list-style-type: none"> • Added congestion and delays in peak hour/direction expected with removing a travel lane and added conflicting movements. • Increased number of vehicle and pedestrian conflict points.
Bicycle and Pedestrian	<ul style="list-style-type: none"> • Adds protected bike lane. • May provides opportunity to have some curb extensions on both sides of the roadway. 	<ul style="list-style-type: none"> • Pedestrian/Bicycle conflicts at intersections require special design treatments. • Reduces existing 12' pedestrian zone. Curb extension on east may require removal (west side extensions remain). • Limited space to add bike facility meeting design standards and requires reducing pedestrian space.
Transit	<ul style="list-style-type: none"> • Will meet 10' transit loading area requirement. • Maintains a 12' pedestrian zone at loading areas at station areas • All Transit loading on one side of the street. • Provides space to address bike/transit loading conflicts. 	<ul style="list-style-type: none"> • Conflict with bike lane and transit loading area requires special design treatments. • Increased transit times and reduced transit service reliability
Quality of Life	<ul style="list-style-type: none"> • Option to add curb extension on parking side without bicycle facility. • Provides options for all modes of transit. 	<ul style="list-style-type: none"> • Maintains existing sidewalk widths. • Limits balance between all modes. • Extended periods of congestion during evening rush hour.
Economic Development	<ul style="list-style-type: none"> • Slows traffic through area and increases visibility of businesses. 	<ul style="list-style-type: none"> • Extended periods of congestion during evening commute period may limit activity during evening rush hour.

6.0 Cost Estimate

Planning level construction cost estimates were prepared to help assess the funding requirements. For planning purposes, full reconstruction is expected with a long term implementation of any of the alternatives. Although it may be most practical to reconstruct Hennepin and 1st Avenue concurrent with the streetcar alignment implementation, the streetcar components are not included in the cost estimate. As identified previously both the one-way and two-way alternatives could be implemented on an interim basis, accomplished mostly through pavement markings and traffic signal modifications.

6.1 Long Term Implementation

A full reconstruct of Hennepin and 1st Avenue from building face to building face would best accommodate the full implementation of any concept. Although the features between the buildings may vary, at a planning level, the total reconstruction cost is assumed to be similar. Based on historical reconstruction costs for Minneapolis streets, the cost ranges from approximately \$15 million to \$18 million per mile for bituminous and concrete streets, respectively. Table 22 details the estimated reconstruction cost of the Hennepin Avenue and 1st Avenue corridors.

Table 22. Planning Level Reconstruction Cost Estimate

Segment	Surface	Cost / Mile	Length (Mile)	Estimated Reconstruction Cost (\$)
Hennepin Avenue - Main Avenue to Central Avenue	Concrete	\$18 Million	0.3	\$ 6,180,000
Hennepin Avenue - Central Avenue to 7th Street	Concrete	\$18 Million	0.2	\$ 2,950,000
1st Avenue - Central Avenue to Main Avenue	Bituminous	\$15 Million	0.4	\$ 6,680,000
7th Street - Central Avenue to Hennepin Avenue	Bituminous	\$15 Million	0.1	\$ 1,500,000
Total Reconstruction Cost			1.1	\$ 17,310,000

6.2 Interim Implementation

A preliminary construction cost has been estimated for the major components of an interim implementation for the limits of Hennepin and 1st Avenue between 7th Street and Main Street. The cost does not include pavement resurfacing or renovation, but does include seal coating of the bituminous. Either the one-way or two-way travel lane alternatives could be implemented with modifications to the pavement markings and roadway signing. The two-way alternative would require traffic signal modifications to add the overhead mast arm signal indications in the opposing direction. Table 23 provides the preliminary construction cost estimate, including the estimated contingency, engineering and administration costs.

Table 23. Preliminary Construction Cost – Interim Implementation

Construction Elements	One Way Alternative	Two Way Alternative
Pavement Markings / Signing	\$ 306,700	\$ 306,700
Traffic Signal Modifications	\$ -	\$ 360,000
Seal Coat (Bituminous Only)	\$ 21,600	\$ 21,600
Subtotal	\$ 328,300	\$ 688,300
Mobilization (8%)	\$ 26,300	\$ 55,100
Traffic Control (5%)	\$ 16,500	\$ 34,500
Subtotal	\$ 42,800	\$ 89,600
Contingency (30%)	\$ 111,400	\$ 233,400
Preliminary and Final Design (15%)	\$ 72,400	\$ 151,700
Administration/Inspection (8%)	\$ 38,600	\$ 81,000
Subtotal	\$ 111,000	\$ 232,700
Project Total	\$ 593,500	\$ 1,244,000

7.0 Next Steps

The objective of this study was to develop and evaluate several potential concept design configurations for Hennepin and 1st Avenue that meet to varying degrees the primary goals of the stakeholders and neighborhood. This information in this study frames the pros and cons and design considerations; however, does not make recommendation of the preferred concept. Information included in this study will help inform future design decisions and set the foundation for a more detailed engineering and design evaluation.

Any efforts related to advancing a full reconstruction of the corridors would require more detailed engineering, investigation, and stakeholder engagement. Upon determining the long-term operations of the Hennepin and 1st Avenue corridors, a detailed study of the Central/Hennepin/5th intersection will be required to identify and evaluate potential intersection improvement solutions to address the mobility, safety, multimodal deficiencies, greening, and the potential development of special service districts.

Appendix A:
Neighborhood Study Advisory Committee Meeting Minutes

Agenda

Hennepin/First Avenue Transportation Study Study Advisory Committee – Meeting #1 October 22, 2015 4:00 - 5:30 p.m.

Attendees

SAC: Barry Clegg (Chair), Peter Goelzer (NIEBNA), Jack Schneeman (NIEBNA), Marcus Mills (Marcy Holmes), Adam Gardner (Marcy Holmes), Michael Guncheon (NEBA), Nell Rueckl (NEBA), Christine Kim (Ward 3 Appointee), Dore Mead (Ward 3 Appointee), Tom Barrett (District 4 Appointee), Kevin Upton (District 4 Appointee)

Staff: Nathan Koster, Bob Byers, Allan Klugman, and Kelley Yemen

Introductions (15 Minutes)

- Role of Study Advisory Committee

Study Overview (20 Minutes)

- Key Tasks and Elements
- Data Collection and Inventory
- Existing Conditions Analysis
- Issues and Constraints
- Next Steps

Committee Input (45 Minutes)

- Discuss Study Goals
- Understanding Problems
- Multimodal Measures of Effectiveness

Next Steps (10 Minutes)

- Develop Alternatives
- Establish Screening Criteria
- SAC Meeting #2

Meeting Minutes

Hennepin/First Transportation Study Study Advisory Committee Meeting #1 October 22, 2015 - City of Lakes Room 101

Meeting attendees: See Attached

Introductions

Committee member introduced themselves and indicated their association affiliation and primary mode transportation they use in the study area. City staff provided a brief overview of the role of the Study Advisory Committee (SAC), which included an outline of meeting expectations and responsibilities.

Study Overview

An overview of the study and activities conducted to date was provided by staff. SAC members asked for confirmation that all one-way streets within the study area will be evaluated and Nathan confirmed they were. It was requested by SAC members that the existing conditions graphics presented be provided electronically to the group for further review. A number of members asked if traffic violations or enforcement issues were evaluated or tracked, while noting that driver confusion is often the leading factor incorrect turns on the one-way streets. Staff noted that traffic violations and enforcement was not evaluated, but crash data was summarized by crash type to determine if drive confusion is a contributing factor in crashes.

ACTION: Provide inventory and existing conditions materials to SAC members.

Committee Input

Staff guided a discussion that focused on identifying the values, goals, and visions for the study area corridors. The key themes and input received from the TAC would serve as a guide for the development of screening criteria that will be used to narrow down a wide range of potential concepts to a smaller subset that will be considered for more detailed evaluation. Each SAC member was provided an opportunity to offer their input, after which the meeting was opened up for general discussion from all members. Below is a brief summary of the input and guidance provided by SAC members.

- Encourage economic vitality (limit speeding)
- Promote traffic calming
- Reduce the amount of bicycle and pedestrian conflicts with cars
- Reduce complexity of the transportation network
- Provide enhanced pedestrian environment, offering opportunities for art, bus shelters, etc.

- Provide a safer pedestrian environment for pedestrians (e.g., 1st Ave: 4th St to 7th St)
- Consider more equitable transportation system, with equal emphasis for modes
- Offer space for bicycle and pedestrian mobility
- Influence travel behavior to reduce speeds before it enters the study area (e.g., Hennepin Bridge and Central Ave)
- Reduce confusion and address dangerous intersection to promote livability (i.e., consistency in street grid)
- Enhance the comfort and convenience of non-motorized travel
- Provide protection and buffer from motorized travel
- Address mixture of one-way and two-way streets
- Encourage transit use
- Prioritize safe bicycle and pedestrian street crossings
- Address signal timing that encourages speeding
- Improve sight distances for non-motorized users
- Understand that the area will increasingly grow a destination, not just a “cut-through”
- Infrastructure and opportunities for motorized travel must still be provided for local residents and businesses
- Accommodations for trucks, buses, and emergency vehicles must be maintained
- Evaluate inconsistencies with parking bays and bump-outs
- Bicycle facilities should not be overlooked, part of greater network of connectivity to downtown, regional park system, and University of Minnesota campus
- Traffic calming will enhance opportunities for place-making
- Streetcar is important improvement for the neighborhood and should be implemented in a way that maintain consistency with local and regional visions
- Motorized throughput and congestion should not be driving factor
- Seek opportunities to address complex intersections (5th/Hennepin/Central, 7th/1st/Central, and 7th/Hennepin)
- Evaluate opportunities to address “free-flowing” right turns that encourage speeding and present conflicts with bicyclists and pedestrians
- Identify gaps in the bicycle/pedestrian network (e.g., Main St: 1st Ave to Hennepin)
- Evaluate best location for dedicated bicycle facilities

Next Steps

Staff discussed the study’s next steps and indicated that the next meeting would likely occur in early December. SAC members asked for clarification for the anticipated topics that will be presented at the next meeting and staff stated that the study team would use the committee’s input to aid in the creation of screening criteria that would be applied to narrow down a range of concepts to be presented for discussion. The SAC also requested that meeting materials be provided in advance so that committee members would have adequate time for review and preparation.

ACTION: Set next SAC meeting date as early as possible to accommodate schedules.

ACTION: Provide meeting materials in advance of next SAC meeting to facilitate participation.

Agenda

Hennepin/First Avenue Transportation Study Study Advisory Committee – Meeting #2 December 21, 2015 5:30 - 7:00 p.m.

Attendees

SAC: Barry Clegg (Chair), Peter Goelzer (NIEBNA), Jack Schneeman (NIEBNA), Marcus Mills (Marcy Holmes), Adam Gardner (Marcy Holmes), Michael Guncheon (NEBA), Nell Rueckl (NEBA), Christine Kim (Ward 3 Appointee), Dore Mead (Ward 3 Appointee), Tom Barrett (District 4 Appointee), Kevin Upton (District 4 Appointee)
Staff: Nathan Koster, Bob Byers, Allan Klugman, and Kelley Yemen

Introductions (10 Minutes)

- Agenda Review
- Meeting #1 Minutes
- Study Questions

Study Overview (5 Minutes)

Evaluation Process (15 Minutes)

- SAC Objectives
- Fatal Flaws and Screening Evaluation

Concept Development (55 Minutes)

- Approach and Phasing/Staging
- Design Considerations
- One-Way Concepts
- Two-Way Concepts

Next Steps (5 Minutes)

- Develop Corridor Alternatives
- Detailed Evaluation and Summary
- SAC Meeting #3

Meeting Minutes

Hennepin/First Avenue Transportation Study Study Advisory Committee Meeting #2 December 21, 2015 - City of Lakes Room 101

Introductions

City staff provided Study Advisory Committee (SAC) members with a brief outline of meeting's agenda.

Study Overview

An overview of the study and activities to date was provided to the SAC by staff.

Evaluation Process

Staff presented the components of the evaluation process, which included the input provided directly from the SAC, technical and design "fatal flaws", and the screening process. Below are a list of questions, comments, and responses related to the evaluation process.

- Staff clarified that "Less than 2 travel lanes" eliminates concepts that provide one travel lane under one-way operations and two travel lanes under two-way operations.
- Shared bicycle facilities are commonly referred to as sharrows, but the intent of the criteria is to provide bicycles with dedicated travel space in the public right-of-way.
- Travel lanes vary based upon street type and function, varying from 9-12 feet across the City. The 11 foot travel lanes were selected to accommodate buses and other large vehicles, while also maximizing right-of-way space to promote traffic calming.
- Technical staff reviewed bridge operations and concluded that modifying the Hennepin/First Avenue Bridge to two-way configuration/operations would result in too many additional technical, safety, and operational problems.
- Streetcar (and transit) couplet refers to directional service on proximate parallel corridors, regardless of one-way or two-way operation, which in this case would represent transit service on Hennepin Avenue (northbound) and First Avenue (southbound).
- A balanced approach was taken to provide benefits to both corridors and considered planned development along First Avenue, preventing a "Main Street" and "Bypass Route".
- Phasing was considered to identify mutual interim and long-term concepts, while accounting for inconsistent street widths along Hennepin Avenue.
- Transit and bicycle interactions were considered as part of concept development to understand how concepts would address intersections and mixing zones.
- A wide variety of bicycle facility designs were considered to identify context-sensitive solutions.

ACTION: Provide higher resolution SAC objectives matrix.

Concept Development

Staff presented leading one-way and two-way concepts identified by study's Technical Advisory Committee (TAC), composed of City, Hennepin County, Metro Transit, and MnDOT staff. Below are a list of questions, comments, and responses related to the evaluation process.

- Any loss of parking will be detrimental to economic development.
- Streetcar is planned to operate in mixed traffic.
- A pedestrian zone along this type of corridor should be a minimum of 12 feet, while the City's sidewalk design guidelines indicate 15 feet is acceptable and 20 feet is recommended.
- One-way concepts with three lanes of travel are not desired and would not calm traffic as much as neighborhood desires. Traffic calming measures should start outside of the neighborhood and continue through. County indicated the bridge may be restriped in 2016.
- Flexible off-peak parking is often confusing and awkward, with compliance and enforcement problems. Avoid design similar to First Avenue N in downtown where pedestrian, bicycle, and parking conflicts create an undesirable conflict zones.
- The corridors do not necessarily have to be identical, variations or components could be incorporated during more detailed design.
- Traffic volumes and patterns indicated offsetting lane geometry for two-way operations would balance mobility and circulation, matching in with traffic volumes and patterns to/from the Hennepin/First Avenue Bridge.
- Center turn lane concept was considered, but not carried forward due to existing travel patterns and lack of mid-block access points requiring a continuous turn lane. This option will be re-evaluated during the detailed traffic analysis.
- Group discussed routing all bicycle facilities to First Avenue to/from the Hennepin/First Avenue Bridge. This concept introduces more intersection conflicts, circuitous and confusing bicycle routes, inconsistency with adopted bicycle plans, modal inequity, and would result in bicycles still riding on Hennepin Avenue's sidewalks.
- Clear preference for protected bicycle facilities, particularly facilities incorporating physical separation with "greening" or other stormwater management elements.
- Evaluate and consider access modification to "half streets" along the Hennepin Avenue and Central Avenue corridors (i.e., 5th St, 6th St, etc.)
- Consider new two-way concept ("2-1C") with three travel lanes, parking on both sides, and a raised cycletrack.

ACTION: Develop new concept "2-1C" and distribute updated materials.

ACTION: Confirm the concepts to be carried forward for more detailed analysis.

Next Steps

Staff discussed the study's next steps and indicated that the next meeting would likely occur in early part of 2016. Staff confirmed that meeting materials will be provided in advance so that committee members would have adequate time for review and preparation.

ACTION: Set next SAC meeting date as early as possible to accommodate schedules.

ACTION: Provide meeting materials in advance of next SAC meeting to facilitate participation.

Agenda

Hennepin/First Avenue Transportation Study Study Advisory Committee – Meeting #3 May 2 and 9, 2016 5:30 - 7:00 p.m.

Attendees

SAC: Barry Clegg (Chair), Peter Goelzer (NIEBNA), Jack Schneeman (NIEBNA), Marcus Mills (Marcy Holmes), Adam Gardner (Marcy Holmes), Michael Guncheon (NEBA), Nell Rueckl (NEBA), Christine Kim (Ward 3 Appointee), Dore Mead (Ward 3 Appointee), Tom Barrett (District 4 Appointee), Kevin Upton (District 4 Appointee)
Staff: Nathan Koster, Bob Byers, Allan Klugman, and Kelley Yemen

Introductions (5 Minutes)

- Agenda Review
- Meeting #2 Minutes
- Study Questions

Study Overview (5 Minutes)

Traffic Analysis (15 Minutes)

Evaluation Summary and Conceptual Layouts (60 Minutes)

- Overview
- One-Way Concepts
- Two-Way Concepts

Next Steps (5 Minutes)

- Present Study Findings to City/County Officials
- Neighborhood, NEBA, and Advisory Committee Outreach

Meeting Minutes

Hennepin/First Avenue Transportation Study Study Advisory Committee Meeting #3 (Part I and II) May 2 and 9, 2016 - City of Lakes Room 101

Introductions

City staff provided Study Advisory Committee (SAC) members with a brief outline of meeting's agenda.

Study Overview

An overview of the study and activities to date was provided to the SAC by staff.

Traffic Analysis

Staff presented the components of the traffic analysis, which was conducted for both existing and future conditions. This analysis included evaluation of the "no build" conditions, as well as the six leading concepts using VISSIM traffic modeling software to account for multimodal operations (i.e., transit, bike, and ped). Below are a list of questions, comments, and responses related to the evaluation process.

- Attendees sought clarification of future traffic volumes and assumptions, noting that recent improvements (e.g., 4th Street I-35W ramp) may relieve traffic volumes in the neighborhood.
 - Staff clarified that future traffic volumes were developed with consideration of active and proposed development proposals, current traffic patterns, planned roadway improvements, and an understanding of downtown traffic patterns.
- Attendees asked if large mode shifts were assumed to account for potential reduction of motor vehicle demand.
 - Staff indicated that transit ridership data was incorporated as a part of the development of future traffic volumes, understanding that this information provides insight into future modal demands. This analysis did not assume major changes to the way transportation is delivered (i.e., automated vehicles, etc.) or significant mode share changes. None of the concepts brought forward expanded capacity or specifically prioritized motorized vehicle throughput, which could lead to induced demand.
- Motorized vehicle traffic must be slowed as to not induce more demand in the future and incentivize driving over transit, walking, or biking.
 - Staff noted that transit must remain competitive from a travel time perspective to attract riders who would otherwise travel by way of single occupancy vehicle. Transitway investments developed along congested corridors (e.g., Seattle's South Lake Union Streetcar) may have difficulties attracting riders due to unreliable service and unpredictable travel times.
- Attendees indicated that future traffic volumes may overstate demand in area based upon lessons learned from I-35W bridge collapse, noting that commuters will always find routes.
- Evaluation summary indicates that congestion along the corridor is both a "pro" and a "con" for the neighborhoods and businesses, indicating that it should not be assumed as all bad.
- Congestion may negatively impact businesses, but vehicles traveling through the neighborhood at speeds approaching or exceeding 40 miles per hour does not support business either.

- Attendees indicated that current and future residents choose to live in the area to live a (more) car-free lifestyle, noting that most parking garages are relatively full during normal work hours.
- Would the bottleneck at Hennepin/Main be eliminated if the Hennepin Bridge were converted to two-lanes in each direction?
 - Staff indicated that this would most likely move the bottleneck across the river into downtown.
- There was a concern that the conversion to two-way would result in more turning movement in the neighborhood and that a “real world” test would be needed to fully understand the operations of the corridor.
 - Staff indicated that traffic volumes were estimated for two-way operations by evaluating existing volumes and relying upon the origin-destination data collected in the June 2015. There are still concerns about two-way operations and the negative impact of vehicle congestion on transit service within and through the neighborhood.
- Why are the afternoon operations so much worse than the morning operations?
 - Larger afternoon traffic volumes and more non-work based trips during this period
 - Highest volumes concentrated on bridge out of downtown, whereas southbound morning commute builds from side streets and maxes out across bridge into downtown
 - 1st Ave provides better intersection spacing, effectively meters in traffic from side streets, better intersection spacing, has one less intersection, and does not have a six-legged intersection
 - Hennepin Ave at Main St represents bottleneck from 3-Lanes to 2-Lanes under certain concepts evaluated
 - Hennepin/Central/5th intersection is a complex six-legged intersection that introduces a bottleneck at Hennepin Ave and Central Ave
- Attendees presented the following questions related to the traffic modeling:
 - Has the 2015 (existing) traffic analysis been proven with real world timings? Has somebody driven the routes at particular times to see if it measures up?
Models were calibrated to the existing conditions and validated with existing controller signal timings, and traffic volumes. Field observations were performed to match observed queue lengths with the model.
 - Has that input data for 2015 been changed to see if the analysis is accurate calculating times?
The AM, PM and Off peak were modeled. The models included the existing signal timing and traffic volumes for those time periods. A weekend analysis was not completed, however based on observations and experience on many other corridors in Minneapolis, the weekend volumes are similar to a weekday off peak time period.
 - Has this analysis software been used in other projects (Mpls. or otherwise) where its accuracy has been verified?
The VISSIM software has been used on many projects within Minneapolis and is a standard industry traffic operation analysis tool used worldwide. Traffic modeling programs are a tool used to inform decisions and help with the evaluation process. Engineering judgement and many other factors/variables were also considered.
 - What was the method of estimating future traffic volumes and has this been verified in other projects?
There are 12 proposed or currently under construction redevelopment parcels in the study area. Future traffic volumes assume a 50% reduction in auto trips due to the availability of other modal options, but auto traffic is expected increase by approximately 10% in the study area.

Evaluation Summary

Staff presented leading one-way and two-way concepts identified by study's Technical Advisory Committee (TAC), composed of City, Hennepin County, Metro Transit, and MnDOT staff. Below are a list of questions, comments, and responses related to the evaluation process.

- Center-running bridge concept may not be supported by DeLaSalle and Park Board due to location of station.
 - Staff will provide an update on streetcar study to DeLaSalle and Park Board staff to better understand their concerns. Center-running streetcar on the bridge allows for (*and does not preclude*) left-side or right-side running streetcar north/east of Main Street.
- Concepts must reflect long-term plan to extend streetcar further to the north along Central Ave.
 - Staff understands these plans, noting that this can be accomplished whether streetcar is left-side or right-side running for either the one-way or two-way concepts.
- Concepts do not yet consider potential State-Aid variance requests (e.g., narrowing travel lanes, reducing curb reaction distance, etc.) that could further expand the pedestrian realm.
- If two-way concept is carried forward for more detailed analysis, the following items must be considered:
 - Restoring two-way operations along Hennepin Ave between 5th Street and 7th Street.
 - No left turns at Hennepin/Central/5th intersection.
 - Closure of vehicle access at 5th Street (maintain bike/ped movements).
 - Discuss opportunities related to redevelopment of Holiday/White Castle site.
 - Closure of 6th Street between Central Ave and Hennepin Ave.

ACTION: Continued coordinate with CPED staff regarding Holiday/White Castle redevelopment.

ACTION: Determine potential closure of 6th Street and need for emergency vehicle access.

ACTION: Identify left-turn volumes occurring at Hennepin/Central/5th intersection.

Concept Layouts

- All concepts must have interim solutions.
 - This was a prerequisite for advancement for more detailed analysis.
- Can lane widths be reduced below 11 feet?
 - This area serves buses and trucks, thus there is a need for lanes wider than 10 feet. There are other measures to reduce visual lane widths, such as wider striping.
- Bicycle facilities similar to First Ave N in downtown are not preferred, but supportive of greening elements and sidewalk-level cycletracks.
- Three-lanes dedicated for vehicular traffic for the one-way concepts are not preferred and not supported, but there is openness to dedicated transit-only lanes. This provides a continuation of the high speed travel from the bridge and induces the continual growth of traffic in the neighborhood.
- Biggest problem with the one-way concepts is the left-side running streetcar. This design is not intuitive and puts transit facilities on both sides of the street.
- Parking will remain a big concern for businesses in the neighborhood relying upon pull-up parking in front of stores. There will need to be trade-offs when allocating space.
- Those in attendance unanimously stated their preference for the two-way configuration over one-way configuration, which has been consistent throughout all phases of the study. There is a desire to see an interim two-way concept implemented with signing, striping, and signal modifications.
- Split preferences between long-term two-way concept, split between 2-1B and 2-1C.
- Staff reiterated that the study would not be providing recommendations and no capital projects have been identified along Hennepin or First Avenues.

- The study will document the results of the analysis along with the pros and cons of each concept.

Next Steps

Documentation is expected to be complete by early June. The results of the study will be presented to management and elected officials during this timeframe. Outreach to the neighborhoods, business association, and the City's Pedestrian and Bicycle Advisory Committees is expected in July.

ACTION: Meeting materials and report will be posted to the study website as soon as possible.