Protected Bikeway Feasibility Analysis

Prepared for the City of Minneapolis by Alliant Engineering, Inc.

Final Report — March 4th, 2015
1. Introduction

The City of Minneapolis is preparing an update to the 2011 Minneapolis Bicycle Master Plan. The current plan addresses a broad range of bikeway facility types, including off-street trails, bike boulevards, bike lanes, and shared lanes, but it does not specifically address on-street protected bikeways. The City of Minneapolis also approved a Climate Action Plan in 2013 recommending the implementation of 30 miles of on-street protected bike facilities by 2020. The Bicycle Master Plan update will identify priority locations, capital costs and maintenance costs for the implementation of protected bikeways in Minneapolis. This document has investigated the feasibility of installing protected bikeways on 19 corridors, shown in Figure 1-1. The evaluation will provide supporting information and preliminary concepts for the Bicycle Master Plan update.

Protected Bikeway

A protected bikeway is a bicycle facility that is physically separated from motor vehicle traffic. Off-street trails are the most common type of protected bikeway; however, protected bikeways may also be located within street corridors and separated from traffic lanes through parked cars, curbs, medians, bollards/flexible traffic posts, planters or other vertical feature.

The bicycle network has been expanded significantly in recent years, and a lot of people are biking. However, not everyone feels comfortable and safe riding on a busy street, even with a bike lane. There are some parts of the city where potential bicycling demand is high, but where low-stress bikeway facilities such as trails, bike boulevards, and lower-traffic streets aren’t an option. Protected bikeways are designed to feel comfortable and accommodate all bicycle rider types.

Feasibility Analysis

This report provides a summary of the development and methodology to arrive at potential concepts for each corridor. The goal of this report is not to identify a final recommended design, or details of the design; rather, to determine feasibility of implementing a protected bikeway, design considerations, impacts and where feasible, determine a preliminary concept for each corridor. Every corridor is located within a constrained environment. Therefore, changes to rebalance the transportation mode or to generate additional bike lane width may require street trade-offs or major reconstruction. As noted, protected bikeways separate the bike lane from the adjacent traffic lane. In general, the feasibility analysis and preliminary concepts identified represent a retrofit of the existing roadway where transportation system trade-offs are required to accommodate an on-street protected bikeway. In a few locations, an off-street facility has been identified. The preliminary concepts for the 19 corridors are illustrated in Figures A-1 through A-19.

Study Process

The feasibility analysis include the following key components:

- **Technical Advisory Committee (TAC):** The TAC consisted of City of Minneapolis, Hennepin County, and Alliant Engineering staff. Weekly meetings were held throughout the alternatives analysis process to discuss each corridor in detail. The purpose of the meetings was to form a consensus on protected bikeway design parameters, to gain background information, review future plans, discuss feasibility, review conceptual cross-sections, and detail potential impacts for protected bikeways on each of the 19 corridors.

- **Documentation of Existing Conditions:** The existing conditions for each corridor was documented by completing a thorough field review and investigating current aerials, planimetric files, and as-built plans that were provided by the City. Criteria that was documented included existing street width, travel lane width, sidewalk width, lane assignments, presence of bike facilities, parking characteristics, transit services, curb and gutter characteristics, and other elements.

- **Develop Conceptual Cross-Sections and Intersection Improvements:** A range of typical cross-section alternatives for protected bikeway implementation for each corridor was developed. The cross-sections evaluated transportation and street use trade-offs needed to accommodate a protected bikeway. These include:
  - Lane widths and/or parking widths
  - Presence of parking
  - Number of vehicle travel lanes
  - Sidewalk, median and/or boulevard widths
  - Curb and gutter characteristics
  - Transit Services

- **High Level Impact Analyses:** For alternatives where eliminating a travel lane was considered, a high level traffic operations analysis was conducted using the existing AM and PM peak hours traffic volumes and signal timing parameters to understand lane removal impacts to traffic operations. The intersection delay was documented, along with an assessment of the impact of removing a travel lane. The analysis was used as a gauge to determine if further analysis was required.

- **Estimate Capital Costs for Each Corridor:** Planning level capital costs for construction were developed for each preliminary concept.

Photo: Two-Way Protected Bikeway on 36th St W, Minneapolis (2014)
Figure 1-1. Study Corridors

Minneapolis Public Works, 7/11/2014
2. Corridor Evaluation

The objective of the analysis is to provide a high-level evaluation of the feasibility of protected bikeways on 19 corridors in the City of Minneapolis. The study process involved breaking down each corridor into similar segments, developing cross-section alternatives for each segment, detailing the transportation system trade-offs for providing a protected bikeway, and performing an operations analysis on segments where the removal a vehicle travel lane was an option. The following text describes more in depth the evaluation process that was used to form the preliminary concepts.

Corridor Breakdown

Each corridor was segmented based on street widths, parking characteristics; and sections with similar features. For each segment, the street width, daily traffic and bicycle volumes, parking, and State Aid route classification were documented, as well as land use context and connections with the surrounding network. Based on each segment’s characteristics, different cross-section options to create dedicated space for a protected bike facility was explored.

Design Parameters

The protected bikeway design guidelines for one-way, two-way and raised facilities are documented in the NACTO (National Association of City Transportation Officials) Urban Bikeway Design Guidelines as illustrated in Figure 2-1. Based on limited experience from Minneapolis and Hennepin County the ideal geometric parameters for the protected bikeway designs include a 3-foot buffer lane and a 7-foot one-way bike lane (or 10-foot two-way bike lane). In some instances these parameters were not feasible for retrofit conditions and are noted on the preliminary concepts.

Where applicable, Minnesota State Aid standards are considered for vehicle, parking and bicycle lane widths. Every effort is made to meet these design standards. Where this is not possible, or parking or vehicle lane trade-offs cannot be made, a protected bikeway may not be feasible. However, in some cases a design exception could be investigated. Segments requiring a design exception are denoted.

Special consideration was given to segments where there was a 2-foot gutter pan/bituminous seam along with narrow bike lanes. This situation can be uncomfortable or hazardous for bicyclists. In some cases integrant concrete curb may be required. Specifically, the need for integrant curb was identified for two cases. First, is the case of a one-way protected bike facility with a 3-foot bike lane width or less, which also includes the two-foot concrete gutter. In this case, a 5-foot integrant curb is needed to provide a seamless facility for bicyclists. Second is the case of a two-way protected bike facility where the combined two-way bike lane width was 8-feet or less. In this case an integrant curb was assumed at the width of the two-way bike lanes plus the buffer width.

Traffic Operations Analysis

For segments with cross-section alternatives where a reduction in the number of vehicle lanes was recommended, a high level traffic operations analysis was performed. Using the industry current SYMCHRO/SIMTRAFFIC software package, approach delays were estimated and evaluated in context of the overall corridor operation and other factors (e.g., bus stop location, bus frequency and pedestrian activity). Based on this analysis, an assessment of the level of congestion was made to determine whether or not the removal of a travel lane is feasible, manageable or if alternative options require further consideration. It is noted that this was a very high level analysis and a more detailed analysis, where applicable, should be completed with preliminary engineering design.
Preliminary Cross-Section Selection

The project team worked closely with City and County staff to develop a selection of potential cross-sections for each segment on each of the 19 corridors. The cross-sections show various strategies to incorporate protected bikeways while detailing the transportation space trade-offs. The cross-section alternatives for each corridor were reviewed and discussed at meetings with the City and County. Ultimately, the cross-sections were narrowed down to one preliminary cross-section for most segments as illustrated in Figure A-1 through Figure A-19. In several cases, there are corridor segments identified as requiring further evaluation or where the implementation of a protected bikeway is not feasible.

Within each segment, there are variations to certain cross-sections that show how they could be modified to accommodate safety and mobility for all transportation modes. These variations include:

- Intersection treatments:
  - Signal improvements, re-alignment, turn lane or travel lane removal
- Travel lane, parking and bicycle-related treatments:
  - Lane width reductions, travel lane reduction, turn lane creation, and/or lane for bicycle travel
  - On-street parking on one side, both sides, and/or removed
  - Designated bike facilities: Bike Boulevards/sharrows/bike lanes (regular, buffered, or protected)

While each cross-section is tailored to a specific segment, it is feasible that certain cross-sections may apply in more than one segment, which should be considered in the forthcoming stages of preliminary design.

3. Intersection Treatments

The feasibility analysis focused largely on the overall corridor bicycle type and typical street cross-sections. However, intersection treatments will need to be considered to make a protected bikeway comfortable and safe for all bicycle rider types. There are a number a strategies that can be employed at intersections to enhance safety and mobility of bicycle travel.

Signal Operation Treatments – The following signal revisions could be considered for protected bike lanes at signalized intersections:

- Leading Bike/Pedestrian Phasing – Providing a leading bicycle or pedestrian phase gives priority and enables the bicyclist/pedestrian to establish a presence at an intersection.
- Dedicated Bike Phase – A dedicated bike phase is indicated by bike signal heads and provides a dedicated signal phase for bikes only, separating them from conflicting motor vehicle, LRT, and/or pedestrian movements.
- Bicycle Detection – Providing bicycle detection at actuated signals to alert the controller of a bike demand. Detection can be provided via a push-button or automated means.

Pavement Marking Treatments – The following pavement marking and signage elements could be considered for protected bike lanes at intersections:

- Bike Boxes – A bike box is a marked area (typically a green painted zone) ahead of vehicle traffic at a signalized intersection. The bike box allows bicycle traffic to get ahead of queued vehicle traffic when the light turns green and increases visibility.
- Two-Stage Turn Queue Boxes – A two-stage turn queue box creates a safe route to get bicyclists from one side of the roadway to the opposite side to make a turn. This application basically creates a two-step safe crossing route to get to the desired side of the roadway through pavement markings and signage.
- Intersection Conflict Zone Markings – Pavement markings that provide a clear path for bicyclists and vehicle drivers through an intersection. The pavement markings raise awareness for both motorists and bicyclists to potential conflict areas.
- Mixing Zones – A mixing zone is an area where vehicle traffic merges into a bike lane by yielding to bike traffic to prepare for a turn. Mixing zones are generally characterized by dashed bike lane lines and/or specialize pavement markings to denote a shared area. For this study, the mixing zones are assumed at all unsignalized and signalized intersections.

Concrete Related Construction Treatments – The following construction elements could be considered for protected bike lanes:

- Integrant Curb – Integrant curb of varying widths has been assumed on many corridors. Integrant curb was assumed to eliminate the standard 2-foot gutter pan and, in turn, provide a seamless travel lane for bicyclists.
- Curb Extensions – A curb extension is constructed by increasing the sidewalk/curb area and narrowing the roadway. Curb extensions increase pedestrian safety by decreasing the crossing distance and making pedestrians more visible.
- Medians/Refuge Islands – A median or refuge island can be installed in the center of an approach leg at intersections to facilitate crossings of higher volume two-way streets. The median or refuge island allows bicycle or pedestrians to cross one direction at a time and provides a safe haven between traffic directions. The median or refuge island also acts a traffic calming measure for approaching vehicles as they slow down to navigate the in street obstacle.
- Dedicated Bike Phase – A dedicated bike phase is indicated by bike signal heads and provides a dedicated signal phase for bikes only, separating them from conflicting motor vehicle, LRT, and/or pedestrian movements.
- Bicycle Detection – Providing bicycle detection at actuated signals to alert the controller of a bike demand. Detection can be provided via a push-button or automated means.

Detailed evaluation and identification of intersection treatments will be necessary during preliminary engineering of the corridors. The feasibility analysis identified key intersections that will require attention and in some cases evaluated possible bicycle treatments. For this study many intersection treatments were assumed and are detailed in the Preliminary Concept Figures and in the Cost Estimates. This section
highlights strategies that were assumed and additional treatments that should be considered during preliminary engineering design.

4. Capital Costs

A planning level capital cost estimate for each corridor was prepared based on the basic cross-section and corridor information detailed on each preliminary concept layout. Corridor specific construction elements such as integrant curb, medians, curb extensions, diverters, etc. were included where noted. Additionally, annual maintenance costs provided by the city, were included for each corridor section. The following details the general cost assumptions for each category:

Pavement Marking & Signage
- Removal of all existing pavement markings.
- 12 inch painted markings (latex paint) were assumed for all buffered lanes or protected bikeway buffer hatching and all stop bar locations. Hatching spacing was assumed to be 25 feet.
- For the buffer zones, 6 inch solid white paint is assumed for the longitudinal striping next to vehicle traffic and 4” solid white paint is assumed for striping next to the bike lane.
- Bike message symbols in the bike lanes are assumed to be thermoplastic and spaced one per direction per block.
- All longitudinal pavement markings are assumed to be paint and all symbols are assumed to be thermoplastic material.
- Conflict zone markings (colored and dashed) are assumed in the intersection crossing of each unsignalized and signalized intersections.
- All crosswalks and stop bars are assumed to be remarked with latex paint.
- For a one-way and two-way protected bike lanes 5 sign assemblies per block, on average, are assumed (includes removal and new panels or panel relocations).
- Mobilization was assumed to be 5% of the total cost. Traffic Control was assumed to be 8% of the total cost.

Delineation
- Flexible delineator posts are assumed at an average 25 foot spacing. The total number of delineators was increased by 10 percent.

Signal Modifications
- Signal modifications are assumed at every signalized intersection to account for signal operation changes (phasing or added signal indications or countdown timers or bike phasing). In general, simple revisions were assumed at two-phased signals and more complex revisions were assumed at signals with left turn phasing.

Construction Elements
- For one-way protected bike lanes where there is a 2-foot gutter seam and the bike lane width is 5-feet or less, the section will be replaced with integrant curb.
- For two-way protected bike lanes where there is a 2-foot gutter seam and the two-way bike lane width is 8-feet or less, the section will be replaced with integrant to the outer edge of the buffer.
- Corridor specific construction elements such as off-street trails, medians and curb extensions were added to some corridors as denoted on the preliminary concept figures.

Other Costs
- Seal coating was assumed on all bituminous roadways where pavement markings are being removed. Concrete roadways would not be seal coated.
- 25% contingency was assumed for all corridors.

The capital construction costs are summarized in Table 1.
Table 1. Capital Cost and Corridor Summary

<table>
<thead>
<tr>
<th>Section</th>
<th>Signs, Pavement Markings &amp; Delineators</th>
<th>Signals</th>
<th>Seal Cost</th>
<th>Construction Elements</th>
<th>Total Cost (Includes 25% Contingency)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - 24th St from Hennepin Ave to Hiawatha Ave</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>B - Franklin Ave from Hennepin Ave to Bloomington Ave S</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>C - Franklin Ave from 20th Ave S to 28th Ave S</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>D - Franklin Ave SE from Thornton St SE to Emeral SE</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>E - Lyndale Ave S from Franklin Ave to Lowry Greenway Bridge</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>F - Hennepin Ave from Oak Grove St to Dunscombe Blvd</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>G - Hennepin Ave from Maple St to 12th St N</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>H - Park/Portland Ave from 60th St to Franklin Ave S</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>I - Park/Portland Ave from 15th Ave SE to Madison Ave</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>J - 1st Ave S from Hennepin Ave to 3rd Ave N</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>K - Grant St W from Willow St to Marquette Ave</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>L - Marquette Ave/2nd Ave S from 1st Ave S to Washington Ave</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>M - Portland Ave from 1st Ave NE to West River Pkwy</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>N - Portland Ave from Minnehaha Pkwy to 46th St E</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>O - 1st Ave S/Blaisdell Ave from 40th St E to Grant St W</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>P - 6th St S from Hennepin Ave to Park Ave &amp; Trail from Park to Chicago</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Q - 60th St S from Hennepin Ave to Park Ave &amp; Trail from Park to Chicago</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>R - 15th Ave SE from University Ave to Marquette Ave</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>S - 15th Ave SE from University Ave to Marquette Ave</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>T - 15th Ave SE from University Ave to Marquette Ave</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>U - 15th Ave SE from University Ave to Marquette Ave</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>V - 15th Ave SE from University Ave to Marquette Ave</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>W - 15th Ave SE from University Ave to Marquette Ave</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>X - 15th Ave SE from University Ave to Marquette Ave</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Y - 15th Ave SE from University Ave to Marquette Ave</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Z - 15th Ave SE from University Ave to Marquette Ave</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

- Costs were not calculated for these segments as no construction work is proposed. If the segment is an existing facility, it will remain as such or a future bike facility type is not yet determined.

- Pavement Marking Unit Costs Assume: Removal at $5.00 per SF and $0.55 per LF. Thermoplastic Symbols (New Bike Message a $350.00 each, Bike Boulevard Symbol at $900.00 each), 12” Stop Bar/Buffer Paint Lines at $1.50 per LF, 4” Longitudinal Paint Lines at $0.25 per LF, 6” Longitudinal Paint Lines at $0.50 per LF, Unsignalized Mixing Zone at $400.00 Each Approach, Signalized Mixing Zone at $1,000.00 Each Approach.

- Signal Revisions: Assume a Revision at All Signals (Simple Signals Without Left Turn Phasing $5,000 Each, Complex Signals With Left Turn Phasing $10,000 Each).

- Seal Cost Assume: $4.00 per SQ YD.

- Delineators Assume: $100.00 Each. A decrease in number of Delineators Was Increased by 10%.

- Off-Street Trail: $65 per LF (Does not assume ROW Cost or Acquisition)
Appendix A:
Preliminary Corridor Concepts
1. **NOTE:** CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.

   - PROTECTED BIKE LANE'S ARE NOT FEASIBLE ON FRANKLIN AVE. OTHER ALTERNATIVE BIKE FACILITY TREATMENTS SHOULD BE EXPLORED.
   - PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE.

2. **LONGER-TERM OPTIONS REQUIRED**
   - FURTHER EVALUATION OF BIKEWAY TYPE OPTIONS
   - REVIEW ALTERNATIVE ROUTE OR BIKEWAY TYPE OPTIONS
   - FURTHER EVALUATION OF LONGER-TERM OPTIONS REQUIRED

3. **TRAFFIC SIGNAL IMPROVEMENTS ARE NOT EXPECTED NECESSARY. (PRETIMED OPERATION)**

4. **BIKE LANE IN BOTH DIRECTIONS ON BLOCKS WHERE THERE CURRENTLY IS NO PARKING.**

5. **SHARED LANE FACILITY IN BOTH DIRECTIONS; OR**

6. **EXCLUSIVE BIKE LANE IN ONE DIRECTION WITH A SHARED LANE IN THE OTHER DIRECTION; OR**

7. **MAINTAIN EXISTING PARKING.**

8. **LANE FACILITIES. FURTHER EVALUATION MAY BE NEEDED:**

   - **FRANKLIN OR 24TH STREET (HENNEPIN TO HIAWATHA) - CONCEPT DESIGN 1**

---

**NOTE:**

1. **PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY**

   - OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
FRANKLIN AVE (HIAWATHA TO RIVER) - CONCEPT DESIGN 2

- 20TH AVE TO 28TH AVE S - MAINTAIN EXISTING BIKE LANES.
- HIGH WESTBOUND RIGHT TURN CONFLICT
  1. PROVIDE RIGHT TURN MIXING ZONE
  2. PROVIDE CONFLICT MARKINGS
- 28TH AVE S TO SEABURY AVE - ONE-WAY PROTECTED BIKE LANE
- MAY NEED TO ADJUST LEFT TURN LANE ALIGNMENT
- CONNECT TO EXISTING PROTECTED BIKE LANE

NOTE:
1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
NOTE:

1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
FRANKLIN AVE SE - CONCEPT DESIGN 3

CONSIDER INTERSECTION TREATMENTS SUCH AS COLORED CONFLICT MARKINGS AND BIKE LANE TRACKING

COORDINATE BICYCLE CONNECTION WITH CITY OF ST. PAUL

NOTE:
1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.

LEGEND

- STANDARD BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- BIKE BOULEVARD
- SHARED BIKE LANE
- REVIEW ALTERNATIVE ROUTE OR BIKEWAY TYPE OPTIONS
- FURTHER EVALUATION OF LONGER-TERM OPTIONS REQUIRED
- SPECIAL INTERSECTION TREATMENT MAY BE NEEDED
- DELINEATOR
- OFF-STREET TRAIL
- FUTURE OFF-STREET TRAIL
- EXISTING BIKE LANE
- PARKING REMOVAL
- TRAVEL LANE REMOVAL
- ADD PARKING

FIGURE A-3

FRANKLIN AVE SE - CONCEPT DESIGN 3

PROTECTED BIKEWAYS FEASIBILITY ANALYSIS
FRANKLIN AVE SE
PRELIMINARY CONCEPT
CORRIDOR 3
NOTE:

1. **PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.**

**LYNDALE AVE FROM FRANKLIN AVE TO I-94 - CONSIDER THE RECONSTRUCTION OF THE WEST CURB LINE TO CREATE A RAISED OFF-STREET TWO-WAY BIKE FACILITY. A 30% PRELIMINARY ENGINEERING IS NEEDED TO DETERMINE:**

1. DRAINAGE ISSUES
2. UTILITY IMPACTS
3. PEDESTRIAN & PARKING IMPACTS AND FEASIBILITY
4. RIGHT TURN LANE SIGNALIZATION FEASIBILITY
5. CONDUCT FEASIBILITY STUDY TO EXTEND OFF-STREET TRAIL SOUTH TO 22ND OR 24TH STREET.

**LYNDALE AVE FROM DUNWOODY BLVD TO 15TH ST - CONSIDER AN OFF- STREET TRAIL ON THE WEST SIDE OF LYNDALE AVE FROM DUNWOODY BLVD TO THE LORING PARK BRIDGE RAMP Entrance. Coordination will be needed with the park board, sculpture garden and LYNDALE/HENNEPIN DESIGN TEAM.**

**CONNECTION TO FUTURE DUNWOODY BLVD TRAIL COULD BE VIA A TWO-WAY OFF-STREET TRAIL ON THE SOUTH SIDE OF DUNWOODY BETWEEN LYNDALE AND HENNEPIN.**

**LYNDALE AVE FROM HENNEPIN TO 15TH ST - CONSIDER A TWO-WAY BIKE FACILITY ON THE EAST SIDE.**

1. INCORPORATE THE DESIGN INTO THE HENNEPIN/LYNDALE RECONSTRUCTION PLANS
2. COULD CONSIDER PROVIDING AN OFF-STREET TRAIL FOR A FURTHER DISTANCE NORTH ON HENNEPIN AVE BEFORE TRANSITIONING TO AN ON-STREET FACILITY.

**BUS STOP**

1. REMOVE OR RELOCATE
2. PROVIDE TWO STAGE LEFT TURN.

**LEGEND**

- **STANDARD BIKE LANE**
- **BUFFERED BIKE LANE**
- **PROTECTED BIKE LANE**
- **BIKE BOULEVARD**
- **SHARED BIKE LANE**
- **REVIEW ALTERNATIVE ROUTE OR BIKEWAY TYPE OPTIONS**
- **FURTHER EVALUATION OF LONGER-TERM OPTIONS REQUIRED**

- **OFF STREET TRAIL**
- **FUTURE OFF STREET TRAIL**
- **EXISTING BIKE LANE**
- **SPECIAL INTERSECTION TREATMENT MAY BE NEEDED**
- **DELINEATOR**
- **PARKING REMOVAL**
- **TRAVEL LANE REMOVAL**
- **ADD PARKING**

**NOTE:**

1. **PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.**
HENNEPIN OR 1ST & DUNWOODY-CONCEPT DESIGN 5

DUNWOODY BLVD FROM CEDAR LAKE TRAIL TO DUNWOODY INSTITUTE - OFF-STREET TRAIL IS RECOMMENDED.

THE OFF-STREET TRAIL WILL CROSS FROM THE NORTH SIDE OF DUNWOODY BLVD TO THE SOUTH SIDE AT THE SIGNAL. CONSIDER INTERSECTION MODIFICATIONS.

ON-STREET PROTECTED BIKE FACILITY IS NOT FEASIBLE. CONSIDERATIONS:
1. PROVIDE OFF STREET TRAIL ON SOUTH SIDE OF DUNWOODY
2. MAKE CONNECTIONS TO LORING PARK AND DOWNTOWN AT LYNDALE AVE INTERSECTION (SEE ALSO CORRIDOR 4)

DUNWOODY BLVD - A TWO WAY PROTECTED BIKEWAY IS FEASIBLE ON SOUTH SIDE. CONSIDERATIONS:
1. PROVIDE CONNECTIONS TO HENNEPIN AVE INTO DOWNTOWN AND LORING PARK (SEE CORRIDOR 4)
2. PROVIDE CONNECTION TO FUTURE DUNWOODY BLVD OFF STREET TRAIL

RELOCATE OR REMOVE EB BUS STOP

1ST AVE FROM 12TH ST TO 1ST ST - ONE-WAY PROTECTED BIKE LANES THROUGH ADDING DELINEATORS TO EXISTING BUFFERS
1. ADD BUFFER/DELINEATORS TO ALL BLOCKS
2. CONSIDER PURSUING A DESIGN EXCEPTION BETWEEN 7TH ST AND 12TH ST TO PROVIDE PROTECTED BIKE LANES WITH A BUFFER
3. FURTHER EVALUATION OF LONG TERM FACILITY IN CONJUNCTION WITH HENNEPIN AVE IS NEEDED.

RECONSTRUCT PORK CHOP ISLANDS TO FACILITATE SAFE BIKE MOVEMENTS

1ST AVE FROM 12TH ST TO 1ST ST - ONE-WAY PROTECTED BIKE LANES THROUGH ADDING DELINEATORS TO EXISTING BUFFERS

ERGONOMIC車 NEW AVE IS NEEDED.

2. CONSIDER PURSUING A DESIGN EXCEPTION BETWEEN 7TH ST AND 12TH ST TO PROVIDE PROTECTED BIKE LANES WITH A BUFFER
3. FURTHER EVALUATION OF LONG TERM FACILITY IN CONJUNCTION WITH HENNEPIN AVE IS NEEDED.

FYIR

HENNEPIN AVE FROM LYNDALE AVE TO 12TH ST - MAINTAIN EXISTING BUFFERED BIKE LANES
1. ADD DELINEATORS TO THE EXISTING BUFFER
2. MAINTAIN BUFFER ONLY IN AREAS ADJACENT TO PARKING

HENNEPIN AVE FROM 12TH ST S TO 1ST ST N - PROTECTED BIKE LINES ARE NOT FEASIBLE WITH IN EXISTING CURBS. MAINTAIN EXISTING SHARED LANE BIKE FACILITY. FURTHER EVALUATION OF LONG TERM BICYCLE FACILITY IS NECESSARY. MAINTAIN PROTECTED BIKE LANES ON 1ST AVE N PENDING FUTURE CHANGES ON HENNEPIN AVE.

NOTE:
1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.

LEGEND

- STANDARD BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- BIKE BOULEVARD
- SHARED BIKE LANE
- REVIEW ALTERNATIVE ROUTE OR BIKEWAY TYPE OPTIONS
- FURTHER EVALUATION OF LONGER-TERM OPTIONS REQUIRED
- SPECIAL INTERSECTION TREATMENT MAY BE NEEDED
- DELINEATOR
- PARKING REMOVAL
- TRAVEL LANE REMOVAL
- ADD PARKING

PROTECTED BIKEWAYS FEASIBILITY ANALYSIS HENNEPIN OR 1ST & DUNWOODY PRELIMINARY CONCEPT CORRIDOR 5

FIGURE A-5 1 OF 2
HENNEPIN OR 1ST & DUNWOODY-CONCEPT DESIGN 5

1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.

HENNEPIN AV/DUNWOODY BLVD - LYNDALE AVE TO HENNEPIN AVE

HENNEPIN AVE/SPRUCE PL TO 12TH ST
BIKE BUFFER WIDTH LESS THAN 10'

HENNEPIN AVE - WASHINGTON AVE TO 1ST ST S

HENNEPIN AVE - MAPLE ST TO SPRUCE PL

1ST AVE - 7TH ST N TO WASHINGTON AVE
BIKE BUFFER WIDTH LESS THAN 10'

2ND ST - HENNEPIN AVE TO 1ST AVE

1ST AVE - 12TH ST N TO 7TH ST N
DESIGN EXCEPTION REQUIRED
BIKE BUFFER WIDTH LESS THAN 10'

NOTE: SEE CORRIDOR 4 FOR HENNEPIN AVE TO MAPLE ST BLOCK

MINNEAPOLIS DEPARTMENT OF PUBLIC WORKS

PROTECTED BIKEWAYS FEASIBILITY ANALYSIS
HENNEPIN OR 1ST & DUNWOODY
PRELIMINARY CONCEPT
CORRIDOR 5

FIGURE A-5
HENNEPIN/1ST NE & 5TH ST NE - CONCEPT DESIGN 6

NOTE:
1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.

1ST S. TO BRIDGE - A ONE-WAY PROTECTED/BUFFERED FACILITY IS FEASIBLE.
1. MAINTAIN EXISTING SB BIKE LANES
2. BUFFER THE LEFT TURN BIKE LANE AND REMOVE A NORTHBOUND TRAVEL LANE.

HENNEPIN AVE BRIDGE - CONSIDER A ONE-WAY PROTECTED BIKE FACILITY. CONSIDERATIONS:
1. THE USE OF JERSEY BARRIER COULD BE A LANE SEPARATION OPTION.
2. FURTHER EVALUATION REGARDING THE NEED FOR 2 OR 3 TRAVEL LANES SHOULD BE COMPLETED IN CONSIDERATION OF STREET CAR OPERATIONS AND STATION STOPS.
3. MAINTAIN LANE CONTINUITY WITH SEGMENTS NORTH AND SOUTH OF THE BRIDGE.

1ST AVE FROM THE BRIDGE TO 5TH ST - A ONE WAY PROTECTED FACILITY WITH THE REMOVAL OF A TRAVEL LANE OR ON STREET PARKING.
1. FURTHER EVALUATION OF STREET CAR OPERATIONS AND DETAILED TRAFFIC OPERATION ANALYSIS IS NEEDED BEFORE DETERMINING FEASIBILITY OF REMOVING A TRAVEL LANE.
2. THERE MAY BE OPPORTUNITY TO PROVIDE CURB EXTENSIONS OR PEDESTRIAN/BICYCLE ENHANCEMENTS. FURTHER EVALUATION IS NEEDED.

AT UNIVERSITY CONSIDER REMOVING THE INSIDE SHARED THR/RIGHT TURN LANE.
(SEE TYPICAL J)

5TH ST NE - MAINTAIN EXISTING BIKE LANES/SHARED LANES. THE CITY SHOULD INVESTIGATE PARKING REMOVAL ON ONE SIDE (1ST AVE TO 3RD AVE) TO ACCOMMODATE BIKE LANES IN BOTH DIRECTIONS.

HENNEPIN AVE FROM UNIVERSITY AVE TO 5TH ST - ONE WAY PROTECTED FACILITY IS NOT LIKELY FEASIBLE. CONSIDERATIONS:
1. THE USE OF JERSEY BARRIER COULD BE A LANE SEPARATION OPTION.
2. ALL ON STREET PARKING IS WITHIN CURB CUT BAYS AND CANNOT EASILY BE SWITCHED WITH THE BIKE LANE TO CREATE A PROTECTED LANE.
3. BUFFERED BIKE LANES ARE PREFERRED NEXT TO OUTSIDE LANE TO CREATE A PROTECTED LANE.
4. FURTHER EVALUATION AT CONCRETE PANEL JOINTS AND PROPOSED LANE LINES LOCATIONS IS NEEDED TO DETERMINE FEASIBILITY OF CHANGING LANE WIDTHS.

1. ONLY PM PEAK HOUR PARKING RESTRICTION.
2. FURTHER EVALUATION OF CONCRETE PANEL JOINTS AND PROPOSED LANE LINES LOCATIONS IS NEEDED TO DETERMINE FEASIBILITY OF CHANGING LANE WIDTHS.

HENNEPIN AVE FROM 5TH ST TO MAIN ST IF 3 LANES ARE REQUIRED BETWEEN ISLAND AVE AND MAIN ST IF 3 LANES ARE MAINTAINED.

LEGEND

- STANDARD BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- BIKE BOULEVARD
- SHARED BIKE LANE
- REVIEW ALTERNATIVE ROUTE OR BIKEWAY TYPE OPTIONS
- FURTHER EVALUATION OF LONGER-TERM OPTIONS REQUIRED
- OFF-STREET TRAIL
- FUTURE OFF-STREET TRAIL
- SPECIAL INTERSECTION TREATMENT MAY BE NEEDED
- DELINEATOR
- PARKING REMOVAL
- TRAVEL LANE REMOVAL
- ADD PARKING

MINNEAPOLIS DEPARTMENT OF PUBLIC WORKS
223 Park Ave S, Ste 400 Minneapolis, MN 55401
612.758.3099 Fax www.alliant-inc.com

PROTECTED BIKEWAYS FEASIBILITY ANALYSIS
HENNEPIN/1ST NE & 5TH ST NE
PRELIMINARY CONCEPT CORRIDOR 6

FIGURE A-6
1 OF 2
HENNEPIN/1ST NE & 5TH ST NE - CONCEPT DESIGN 6

NOTE:
1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
MARQUETTE &/OR 2ND AVE S AND GRANT - CONCEPT DESIGN 7

1. SOUTHBOUND BIKES ARE PERMITTED IN BUS LANE AND WILL SERVE AS A CONNECTION DURING OFF PEAK PERIODS.
2. A STANDARD BIKE LANE COULD BE USED IN THE NORTHBOUND DIRECTION WITHOUT REQUIRING A DESIGN EXCEPTION.

FURTHER EVALUATION OR CONSIDERATIONS INCLUDE:
1. TRANSIT IMPACTS (11' LANE OPERATION)
2. FOOD TRUCK VENDOR OPERATIONS AND CONFLICT WITH BIKE LANE.
3. DESIGN EXCEPTION REQUIRED ON MARQUETTE (GRANT TO WASHINGTON) AND 2ND AVE (12TH TO WASHINGTON)
4. PROVIDE BIKE TURN BOXES AT E/W BIKE LANE STREETS

FURTHER INVESTIGATION INTO PARKING REMOVAL MAY BE NEEDED IF NARROW TRAVEL WAY BECOMES PROBLEMATIC.

1. SOUTHBOUND BIKES ARE PERMITTED IN BUS LANE AND WILL SERVE AS A CONNECTION DURING OFF PEAK PERIODS.
2. A STANDARD BIKE LANE COULD BE USED IN THE NORTHBOUND DIRECTION WITHOUT REQUIRING A DESIGN EXCEPTION.

FURTHER EVALUATION OR CONSIDERATIONS INCLUDE:
1. TRANSIT IMPACTS (11' LANE OPERATION)
2. FOOD TRUCK VENDOR OPERATIONS AND CONFLICT WITH BIKE LANE.
3. DESIGN EXCEPTION REQUIRED ON MARQUETTE (GRANT TO WASHINGTON) AND 2ND AVE (12TH TO WASHINGTON)
4. PROVIDE BIKE TURN BOXES AT E/W BIKE LANE STREETS

FURTHER INVESTIGATION INTO PARKING REMOVAL MAY BE NEEDED IF NARROW TRAVEL WAY BECOMES PROBLEMATIC.

1. SOUTHBOUND BIKES ARE PERMITTED IN BUS LANE AND WILL SERVE AS A CONNECTION DURING OFF PEAK PERIODS.
2. A STANDARD BIKE LANE COULD BE USED IN THE NORTHBOUND DIRECTION WITHOUT REQUIRING A DESIGN EXCEPTION.

FURTHER EVALUATION OR CONSIDERATIONS INCLUDE:
1. TRANSIT IMPACTS (11' LANE OPERATION)
2. FOOD TRUCK VENDOR OPERATIONS AND CONFLICT WITH BIKE LANE.
3. DESIGN EXCEPTION REQUIRED ON MARQUETTE (GRANT TO WASHINGTON) AND 2ND AVE (12TH TO WASHINGTON)
4. PROVIDE BIKE TURN BOXES AT E/W BIKE LANE STREETS

FURTHER INVESTIGATION INTO PARKING REMOVAL MAY BE NEEDED IF NARROW TRAVEL WAY BECOMES PROBLEMATIC.

1. SOUTHBOUND BIKES ARE PERMITTED IN BUS LANE AND WILL SERVE AS A CONNECTION DURING OFF PEAK PERIODS.
2. A STANDARD BIKE LANE COULD BE USED IN THE NORTHBOUND DIRECTION WITHOUT REQUIRING A DESIGN EXCEPTION.

FURTHER EVALUATION OR CONSIDERATIONS INCLUDE:
1. TRANSIT IMPACTS (11' LANE OPERATION)
2. FOOD TRUCK VENDOR OPERATIONS AND CONFLICT WITH BIKE LANE.
3. DESIGN EXCEPTION REQUIRED ON MARQUETTE (GRANT TO WASHINGTON) AND 2ND AVE (12TH TO WASHINGTON)
4. PROVIDE BIKE TURN BOXES AT E/W BIKE LANE STREETS

FURTHER INVESTIGATION INTO PARKING REMOVAL MAY BE NEEDED IF NARROW TRAVEL WAY BECOMES PROBLEMATIC.

1. SOUTHBOUND BIKES ARE PERMITTED IN BUS LANE AND WILL SERVE AS A CONNECTION DURING OFF PEAK PERIODS.
2. A STANDARD BIKE LANE COULD BE USED IN THE NORTHBOUND DIRECTION WITHOUT REQUIRING A DESIGN EXCEPTION.

FURTHER EVALUATION OR CONSIDERATIONS INCLUDE:
1. TRANSIT IMPACTS (11' LANE OPERATION)
2. FOOD TRUCK VENDOR OPERATIONS AND CONFLICT WITH BIKE LANE.
3. DESIGN EXCEPTION REQUIRED ON MARQUETTE (GRANT TO WASHINGTON) AND 2ND AVE (12TH TO WASHINGTON)
4. PROVIDE BIKE TURN BOXES AT E/W BIKE LANE STREETS

FURTHER INVESTIGATION INTO PARKING REMOVAL MAY BE NEEDED IF NARROW TRAVEL WAY BECOMES PROBLEMATIC.

1. SOUTHBOUND BIKES ARE PERMITTED IN BUS LANE AND WILL SERVE AS A CONNECTION DURING OFF PEAK PERIODS.
2. A STANDARD BIKE LANE COULD BE USED IN THE NORTHBOUND DIRECTION WITHOUT REQUIRING A DESIGN EXCEPTION.

FURTHER EVALUATION OR CONSIDERATIONS INCLUDE:
1. TRANSIT IMPACTS (11' LANE OPERATION)
2. FOOD TRUCK VENDOR OPERATIONS AND CONFLICT WITH BIKE LANE.
3. DESIGN EXCEPTION REQUIRED ON MARQUETTE (GRANT TO WASHINGTON) AND 2ND AVE (12TH TO WASHINGTON)
4. PROVIDE BIKE TURN BOXES AT E/W BIKE LANE STREETS

FURTHER INVESTIGATION INTO PARKING REMOVAL MAY BE NEEDED IF NARROW TRAVEL WAY BECOMES PROBLEMATIC.

1. SOUTHBOUND BIKES ARE PERMITTED IN BUS LANE AND WILL SERVE AS A CONNECTION DURING OFF PEAK PERIODS.
2. A STANDARD BIKE LANE COULD BE USED IN THE NORTHBOUND DIRECTION WITHOUT REQUIRING A DESIGN EXCEPTION.

FURTHER EVALUATION OR CONSIDERATIONS INCLUDE:
1. TRANSIT IMPACTS (11' LANE OPERATION)
2. FOOD TRUCK VENDOR OPERATIONS AND CONFLICT WITH BIKE LANE.
3. DESIGN EXCEPTION REQUIRED ON MARQUETTE (GRANT TO WASHINGTON) AND 2ND AVE (12TH TO WASHINGTON)
4. PROVIDE BIKE TURN BOXES AT E/W BIKE LANE STREETS

FURTHER INVESTIGATION INTO PARKING REMOVAL MAY BE NEEDED IF NARROW TRAVEL WAY BECOMES PROBLEMATIC.
MARQUETTE &/OR 2ND AVE S AND GRANT - CONCEPT DESIGN 7

NOTE:

1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
NOTE:

1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
NOTE:

1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
1ST/BLAISDELL - CONCEPT DESIGN 9

NOTE:

1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY
   OF PROTECTED BIKEWAY IMPLEMENTATION WIDTHS ARE APPROXIMATE.
   CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
5TH &/OR 6TH ST S & 11TH AVE - CONCEPT DESIGN 10

LEGEND

- STANDARD BIKE LANE
- OFF-STREET TRAIL
- BUFFERED BIKE LANE
- FUTURE OFF-STREET TRAIL
- PROTECTED BIKE LANE
- EXISTING BIKE LANE
- BIKE BOULEVARD
- SPECIAL INTERSECTION TREATMENT MAY BE NEEDED
- DELINEATOR
- PARKING REMOVAL
- TRAVEL LANE REMOVAL
- ADD PARKING
- SHARED BIKE LANE
- REVIEW ALTERNATIVE ROUTE OR BIKEWAY TYPE OPTIONS
- FURTHER EVALUATION OF LONGER-TERM OPTIONS REQUIRED

NOTE:
1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.

NOTE:
1. PEAK PERIOD PARKING RESTRICTIONS ON ONE SIDE STREET WILL BE NECESSARY EXCEPT FULL TIME REMOVAL ON NORTH SIDE BETWEEN HENNEPIN AVE AND NICOLLET AVE IS NEEDED.

OPTION A1 IS A ONE-WAY PROTECTED FACILITY ON THE LEFT SIDE OF THE ROAD. CONSIDERATIONS:
1. ON-STREET PARKING AND LOADING WILL BE MAINTAINED
2. PARKING RAMP ACCESSSES
3. 2 GUTTER PAN WITH BIT SEAM

OPTION A2 IS A TWO-WAY BIKE FACILITY ON THE LEFT SIDE OF THE ROAD. CONSIDERATIONS:

HENNEPIN AVE TO PARK AVE - TWO OPTIONS ARE FEASIBLE AND REQUIRE FURTHER DISCUSSION WITH STAKEHOLDERS.

PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.

1. PROVIDE A SHARED BIKE LANE.
2. CREATE BIKEWAY WITH FUTURE CONSTRUCTION OF THESE SEGMENTS.

HIGH PARKING RAMP ACCESS DEMAND. FUTURE EVALUATION OF THE BIKE AND TRAVEL LANES IS REQUIRED.

FUTURE EVALUATION IS NEEDED.
1. PEDESTRIAN PLAZA AREA BETWEEN 3RD AVE AND 4TH AVE.
2. 4TH AVE TO 5TH AVE - WIDE SIDEWALK ON NORTH SIDE OF STREET
3. EVALUATE POTENTIAL TRAIL CONNECTION AND LRT CROSSING FROM NORTH SIDE TO SOUTH SIDE OF TRACKS

PARK AVE TO 4TH AVE AVE. PROVIDE A SHARED BIKE LANE FACILITY. CONSIDERATIONS.
1. CITY IS CURRENTLY EXPLORING AN OFF-STEP TRAIL ON NORTH SIDE OF 5TH ST.
2. COORDINATE WITH STAR TRIBUNE PROPERTY PROPOSED REDEVELOPMENT PLANS
3. 2' GUTTER PAN WITH BIT SEAM AND TOO NARROW OF TRAVEL LANE TO A FIT BIKE LANE

ONE-WAY EASTBOUND OFF-STEP TRAIL IS BEING CONSTRUCTED WITH THE STADIUM ON 5TH ST.

TWO-WAY TRAIL IS BEING CONSTRUCTED WITH THE STADIUM ON 5TH ST.

EVALUATE POTENTIAL TO CLOSE TRAVEL LANE AND PROVIDE A BIKE/PEDESTRIAN ONLY CONNECTION.

NOTE:
1. PROVIDE A SHARED BIKE LANE.
2. COORDINATE WITH STAR TRIBUNE PROPERTY PROPOSED REDEVELOPMENT PLANS
3. 2' GUTTER PAN WITH BIT SEAM.

1. PEAK PERIOD PARKING RESTRICTIONS ON ONE SIDE STREET WILL BE NECESSARY EXCEPT FULL TIME REMOVAL ON NORTH SIDE BETWEEN HENNEPIN AVE AND NICOLLET AVE IS NEEDED.

OPTION A1 IS A ONE-WAY PROTECTED FACILITY ON THE LEFT SIDE OF THE ROAD. CONSIDERATIONS:
1. ON-STREET PARKING AND LOADING WILL BE MAINTAINED
2. PARKING RAMP ACCESSSES
3. 2 GUTTER PAN WITH BIT SEAM

OPTION A2 IS A TWO-WAY BIKE FACILITY ON THE LEFT SIDE OF THE ROAD. CONSIDERATIONS:

HENNEPIN AVE TO PARK AVE - TWO OPTIONS ARE FEASIBLE AND REQUIRE FURTHER DISCUSSION WITH STAKEHOLDERS.

PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
**NOTE:**

1. **PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.**
7TH ST N & 9TH/10TH ST S - CONCEPT DESIGN 11

NOTE:
1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.

- PROVIDE LEFT TURN BOX
- 7TH ST N & 9TH/10TH ST S - CONCEPT DESIGN 11
- 8TH ST (HAWTHORNE AVE TO 7TH STREET) - A ONE-WAY OR TWO-WAY PROTECTED BIKE LANE IS FEASIBLE. CONSIDERATIONS:
  1. THIS SEGMENT IS BEING RECONSTRUCTED WITH TARGET CENTER RENOVATION. THE CITY SHOULD DETERMINE THE APPROPRIATE CONFIGURATION AT THAT TIME.
  2. A TWO-WAY BIKE FACILITY ON THIS SEGMENT MAY GIVE A MORE DIRECT CONNECTION INTO DOWNTOWN FOR BICYCLIST ON 2ND AVE OR COMING FROM TARGET FIELD.
  3. 7TH ST N/2ND AVE N TWO-WAY SIGNAL AT INTERSECTION IS COMPLEX

- HIGH VOLUME PARKING RAMP ACCESS AND LEFT TURN CONFLICT AT LASALLE AVE
- CHARTER BUS & TAXI PARKING DURING EVENTS - CONSIDER BUFFER LANE ONLY (WB)
- 9TH ST - A ONE-WAY PROTECTED BIKE LANE IS FEASIBLE. FURTHER EVALUATION MAY BE NECESSARY TO DETERMINE PREFERRED CONCEPT. CONSIDERATIONS INCLUDE:
  1. PROVIDE PROTECTED BIKE LANE WITH NARROW LANES TO MAINTAIN FULL TRAVEL LANES
  2. RESTRICT PARKING ON THE SOUTH SIDE DURING PEAK PERIODS (OFF PEAK PERIODS WOULD BE ALLOWED) TO PROVIDE MORE COMFORTABLE LANE WIDTHS. (CONCEPT 9)

- 7TH ST/10TH ST SPLIT TO GLENWOOD - ONE-WAY PROTECTED BIKEWAY IS FEASIBLE THROUGH LANE NARROWING
- CONSIDER PROVIDING A BIKE LANE CONNECTION ON GLENWOOD AVE. BETWEEN 10TH ST AND 9TH ST
- 7TH/10TH ST SPLIT TO GLENWOOD - ONE-WAY PROTECTED BIKE LANE IS FEASIBLE. CONSIDERATIONS:
  1. FURTHER INVESTIGATION IS NEEDED TO DETERMINE WHICH SIDE THE BIKE LANE SHOULD BE ON DUE TO BUS STOPS AND TAXI AREAS
  2. DETERMINE BEST OPTION AND LOCATION TO SHIFT BIKES FROM RIGHT SIDE OF 10TH ST TO THE LEFT SIDE
  3. A DESIGN EXCEPTION MAY BE NEEDED FOR SEGMENT C BETWEEN GLENWOOD AND HAWTHORNE; OR PROVIDE A STANDARD BIKE LANE ON THIS SEGMENT.

- 9TH ST- A ONE-WAY PROTECTED BIKE LANE IS FEASIBLE. FURTHER EVALUATION MAY BE NEEDED TO DETERMINE THE FEASIBILITY OF ADDITIONAL BIKE LANE/BUFFER WIDTH FOR ONE-WAY PROTECTED BIKE LANE. SWLRT FUNDING COULD BE AVAILABLE.
  - ADDITIONAL BIKE LANE/BUFFER WIDTH FOR ONE-WAY PROTECTED BIKE LANE TO PROVIDE OUTSIDE OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE.
  - PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.

- 7TH ST N & 9TH/10TH ST S - CONCEPT DESIGN 11
- 8TH ST (HAWTHORNE AVE TO 7TH STREET) - A ONE-WAY OR TWO-WAY PROTECTED BIKE LANE IS FEASIBLE. CONSIDERATIONS:
  1. THIS SEGMENT IS BEING RECONSTRUCTED WITH TARGET CENTER RENOVATION. THE CITY SHOULD DETERMINE THE APPROPRIATE CONFIGURATION AT THAT TIME.
  2. A TWO-WAY BIKE FACILITY ON THIS SEGMENT MAY GIVE A MORE DIRECT CONNECTION INTO DOWNTOWN FOR BICYCLIST ON 2ND AVE OR COMING FROM TARGET FIELD.
  3. 7TH ST N/2ND AVE N TWO-WAY SIGNAL AT INTERSECTION IS COMPLEX

- HIGH VOLUME PARKING RAMP ACCESS AND LEFT TURN CONFLICT AT LASALLE AVE
- CHARTER BUS & TAXI PARKING DURING EVENTS - CONSIDER BUFFER LANE ONLY (WB)
- 9TH ST - A ONE-WAY PROTECTED BIKE LANE IS FEASIBLE. FURTHER EVALUATION MAY BE NECESSARY TO DETERMINE PREFERRED CONCEPT. CONSIDERATIONS INCLUDE:
  1. PROVIDE PROTECTED BIKE LANE WITH NARROW LANES TO MAINTAIN FULL TRAVEL LANES
  2. RESTRICT PARKING ON THE SOUTH SIDE DURING PEAK PERIODS (OFF PEAK PERIODS WOULD BE ALLOWED) TO PROVIDE MORE COMFORTABLE LANE WIDTHS. (CONCEPT 9)

- 7TH ST/10TH ST SPLIT TO GLENWOOD - ONE-WAY PROTECTED BIKEWAY IS FEASIBLE THROUGH LANE NARROWING
- CONSIDER PROVIDING A BIKE LANE CONNECTION ON GLENWOOD AVE. BETWEEN 10TH ST AND 9TH ST
- 7TH/10TH ST SPLIT TO GLENWOOD - ONE-WAY PROTECTED BIKE LANE IS FEASIBLE. CONSIDERATIONS:
  1. FURTHER INVESTIGATION IS NEEDED TO DETERMINE WHICH SIDE THE BIKE LANE SHOULD BE ON DUE TO BUS STOPS AND TAXI AREAS
  2. DETERMINE BEST OPTION AND LOCATION TO SHIFT BIKES FROM RIGHT SIDE OF 10TH ST TO THE LEFT SIDE
  3. A DESIGN EXCEPTION MAY BE NEEDED FOR SEGMENT C BETWEEN GLENWOOD AND HAWTHORNE; OR PROVIDE A STANDARD BIKE LANE ON THIS SEGMENT.

- 9TH ST- A ONE-WAY PROTECTED BIKE LANE IS FEASIBLE. FURTHER EVALUATION MAY BE NEEDED TO DETERMINE THE FEASIBILITY OF ADDITIONAL BIKE LANE/BUFFER WIDTH FOR ONE-WAY PROTECTED BIKE LANE. SWLRT FUNDING COULD BE AVAILABLE.
  - ADDITIONAL BIKE LANE/BUFFER WIDTH FOR ONE-WAY PROTECTED BIKE LANE TO PROVIDE OUTSIDE OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE.
  - PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.

- 7TH ST N & 9TH/10TH ST S - CONCEPT DESIGN 11
- 8TH ST (HAWTHORNE AVE TO 7TH STREET) - A ONE-WAY OR TWO-WAY PROTECTED BIKE LANE IS FEASIBLE. CONSIDERATIONS:
  1. THIS SEGMENT IS BEING RECONSTRUCTED WITH TARGET CENTER RENOVATION. THE CITY SHOULD DETERMINE THE APPROPRIATE CONFIGURATION AT THAT TIME.
  2. A TWO-WAY BIKE FACILITY ON THIS SEGMENT MAY GIVE A MORE DIRECT CONNECTION INTO DOWNTOWN FOR BICYCLIST ON 2ND AVE OR COMING FROM TARGET FIELD.
  3. 7TH ST N/2ND AVE N TWO-WAY SIGNAL AT INTERSECTION IS COMPLEX

- HIGH VOLUME PARKING RAMP ACCESS AND LEFT TURN CONFLICT AT LASALLE AVE
- CHARTER BUS & TAXI PARKING DURING EVENTS - CONSIDER BUFFER LANE ONLY (WB)
- 9TH ST - A ONE-WAY PROTECTED BIKE LANE IS FEASIBLE. FURTHER EVALUATION MAY BE NECESSARY TO DETERMINE PREFERRED CONCEPT. CONSIDERATIONS INCLUDE:
  1. PROVIDE PROTECTED BIKE LANE WITH NARROW LANES TO MAINTAIN FULL TRAVEL LANES
  2. RESTRICT PARKING ON THE SOUTH SIDE DURING PEAK PERIODS (OFF PEAK PERIODS WOULD BE ALLOWED) TO PROVIDE MORE COMFORTABLE LANE WIDTHS. (CONCEPT 9)

- 7TH ST/10TH ST SPLIT TO GLENWOOD - ONE-WAY PROTECTED BIKEWAY IS FEASIBLE THROUGH LANE NARROWING
- CONSIDER PROVIDING A BIKE LANE CONNECTION ON GLENWOOD AVE. BETWEEN 10TH ST AND 9TH ST
- 7TH/10TH ST SPLIT TO GLENWOOD - ONE-WAY PROTECTED BIKE LANE IS FEASIBLE. CONSIDERATIONS:
  1. FURTHER INVESTIGATION IS NEEDED TO DETERMINE WHICH SIDE THE BIKE LANE SHOULD BE ON DUE TO BUS STOPS AND TAXI AREAS
  2. DETERMINE BEST OPTION AND LOCATION TO SHIFT BIKES FROM RIGHT SIDE OF 10TH ST TO THE LEFT SIDE
  3. A DESIGN EXCEPTION MAY BE NEEDED FOR SEGMENT C BETWEEN GLENWOOD AND HAWTHORNE; OR PROVIDE A STANDARD BIKE LANE ON THIS SEGMENT.

- 9TH ST- A ONE-WAY PROTECTED BIKE LANE IS FEASIBLE. FURTHER EVALUATION MAY BE NEEDED TO DETERMINE THE FEASIBILITY OF ADDITIONAL BIKE LANE/BUFFER WIDTH FOR ONE-WAY PROTECTED BIKE LANE. SWLRT FUNDING COULD BE AVAILABLE.
  - ADDITIONAL BIKE LANE/BUFFER WIDTH FOR ONE-WAY PROTECTED BIKE LANE TO PROVIDE OUTSIDE OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE.
  - PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
NOTE:

1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
1. NOTE: A ONE-WAY PROTECTED BIKE LANE IS FEASIBLE.

2. UNIVERSITY AVE - 1ST AVE NE TO CENTRAL AVE
   LANE REMOVAL IS STILL NECESSARY
   NOTE: A ONE-WAY PROTECTED BIKE LANE IS FEASIBLE.

3. UNIVERSITY AVE - 10TH AVE TO OAK ST
   ALTERNATE CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.

4. 4TH STREET - CENTRAL AVE TO HENNEPIN AVE
   52' SECTION IS LOCATED BETWEEN 15TH AVE TO 16TH AVE
   DESIGN EXCEPTION REQUIRED ON 42 FOOT WIDE BLOCKS

5. UNIVERSITY AVE - 8TH AVE TO 10TH AVE
   DESIGN EXCEPTION REQUIRED ON 42 FOOT WIDE BLOCKS

6. UNIVERSITY AVE - 10TH AVE TO OAK ST
   42' SECTION IS LOCATED BETWEEN 15TH AVE TO 16TH AVE
   DESIGN EXCEPTION REQUIRED ON 42 FOOT WIDE BLOCKS

7. UNIVERSITY AVE - 1ST AVE NE TO CENTRAL AVE
   LANE REMOVAL IS STILL NECESSARY
   NOTE: A ONE-WAY PROTECTED BIKE LANE IS FEASIBLE.

8. UNIVERSITY AVE - 10TH AVE TO OAK ST
   ALTERNATE CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
15TH ST SE TO NE DIAGONAL - CONCEPT DESIGN 13

17TH AVE SE - ONE-WAY PROTECTED BIKE LANES ARE FEASIBLE.

CONSIDERATIONS:
1. REMOVE CENTER TURN LANE BETWEEN 5TH ST AND 4TH ST.
2. MAINTAIN SB LEFT TURN LANE AT 5TH ST.

TWO-WAY PROTECTED BIKE LANE ON THE NORTH SIDE:
1. RELOCATE ON STREET PARKING TO THE SOUTH SIDE.

FURTHER EVALUATION OF BIKE LANE CONNECTION REQUIRED BY PRELIMINARY ENGINEERING.

1. TURN BOXES
2. PROVIDE BIKE SIGNAL

RECONSTRUCT DIVERTER.
CONSIDERATIONS:
1. MAY REQUIRE RAISED BARRIER ALONG LANE TO PROVIDE ADDED PROTECTION
2. PROVIDE STRAIGHT ALIGNMENT FOR BIKE FACILITY
3. ACCOMMODATE PEDESTRIAN CONNECTIONS

Bike BoulevarD LOW VOLUME AND HIGH RESIDENTIAL PARKING DEMAND

TWO-WAY PROTECTED BIKE LANE ON THE EAST SIDE TO CONNECT TO THE DIAGONAL TRAIL.
A PROTECTED FACILITY MAY NOT BE FEASIBLE. TWO OPTIONS FOR CONSIDERATION INCLUDE:

OPTION D1: PROVIDE TWO-WAY PROTECTED BIKE LANES
1. REMOVE PARKING. THE CITY WILL NEED TO FURTHER INVESTIGATE FEASIBILITY OF PARKING REMOVAL. THIS MAY LIKELY NOT BE SUPPORTED.
2. FURTHER EVALUATION OF BIKE LANE TREATMENT MAY BE REQUIRED.

OPTION D2: PROVIDE SHARED LANE FACILITY
1. MAINTAIN PARKING.
2. STANDARD BIKE LANES DO NOT FIT WITHOUT PARKING REMOVAL.

NOTE:
1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
NOTE:

1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
NOTE:
1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAYS IMPLEMENTATION, WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.

2. REMOVE THE NB RIGHT TURN LANE.
3. TRANSIT STOP.
4. TRANSITION BETWEEN TWO-WAY PROTECTED BIKE WAY MAY BE FEASIBLE.
1. THE CITY MAY CONSIDER STOPPING THE PROTECTED FACILITY AT UNIVERSITY AVE.

DESIGN CONSIDERATIONS:
1. PROVIDE PEDESTRIAN ACCOMMODATIONS ON THE EAST SIDE TO REDUCE MAINTENANCE AND DRAINAGE CONCERNS WITH PROVIDING WALKWAY ON EAST SIDE OF BRIDGE.
2. COULD PROVIDE (2) NB TRAVEL LANES IF NEEDED BY NOT PROVIDING WALKWAY ON WESTSIDE.
3. DRAINAGE CONSIDERATIONS WITH PROVIDING CONTINUOUS BARRIER AND THE RECESSED INLETS BEING LOCATED IN THE BIKE LANE LIKELY CANNOT PROVIDE BARRIER ON BOTH THE WEST SIDE AND EAST DUE TO LOCATION OF INLETS.

LEGEND
- STANDARD BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- BIKE BOULEVARD
- SHARED BIKE LANE
- BIKE SHARED LANE
- SPECIAL INTERSECTION TREATMENT
- FUTURE OFF STREET TRAIL
- OFF STREET TRAIL
- ADD PARKING
- TRAVEL LANE REMOVAL
- PARKING REMOVAL
- DELINERATOR
- REM = 48 SQ' PERIMETER = 30' AREA = 15 SQ'
- 2' GUTTER / BITUMINOUS SEAMS AND BRIDGE DECK
- 2' GUTTER / BITUMINOUS SEAMS

19TH AVE - RIVERSIDE AVE TO WASHINGTON AVE TOWAY PROTECTED BIKE LANE ON THE EAST SIDE IS FEASIBLE THROUGH LANE NARROWING.
1. MAINTAIN NS LEFT TURN LANE AT WASHINGTON AVE.
2. REMOVE THE NB RIGHT TURN LANE

DESIGN CONSIDERATIONS:
1. MAINTAIN EXISTING MEDIAN LOCATION.
2. REMOVE NORTHBOUND RIGHT TURN LANE.
3. TRANSIT STOP.

NOTE:
*2' GUTTER / BITUMINOUS SEAMS

10TH/19TH/20TH AVE S - CONCEPT DESIGN 14
EMERSON/FREMONT AVE N - CONCEPT DESIGN 15

1. A DESIGN EXCEPTION IS REQUIRED FOR 1-TRAVEL LANE ON A ONE-WAY STREET.
2. LONG TERM CONSIDERATION MAY INCLUDE PROVIDING A TWO-WAY BIKE FACILITY WITH BRT CORRIDOR. (CONCEPT A3)
3. PROVIDING A PROTECTED BIKE LANE ON THE LEFT SIDE MAY PROVIDE BETTER COMPATIBILITY WITH FUTURE BRT BUS OPERATION. (CONCEPT A3)
4. PROVIDE A SHORTEST DISTANCE OF PARKING REMOVAL IN APPROACH TO SIGNALIZED INTERSECTIONS TO ALL A DE FACTO TURN LANE OPERATION.

NOTE:
1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
2. PROVIDING A PROTECTED BIKE LANE ON THE LEFT SIDE MAY PROVIDE BETTER COMPATIBILITY WITH FUTURE BRT BUS OPERATIONS. (CONCEPT A2)
3. PROVIDING A PROTECTED BIKE LANE ON THE LEFT SIDE MAY PROVIDE BETTER COMPATIBILITY WITH FUTURE BRT BUS OPERATIONS. (CONCEPT A2)
4. PROVIDE A SHORTEST DISTANCE OF PARKING REMOVAL IN APPROACH TO SIGNALIZED INTERSECTIONS TO ALL A DE FACTO TURN LANE OPERATION.

CONNECTION TO EMERSON AVE BIKE BLVD AT 33RD AVE REQUIRES BICYCLIST TO BE ON THE RIGHT SIDE OF STREET TO ACCESS THE HALF CLOSER TO THE NORTH SIDE OF INTERSECTION.
1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.

SIBLEY ST NE TO UNIVERSITY AVE NE - ONE-WAY PROTECTED BIKE FACILITY IS FEASIBLE.
1. PARKING REMOVAL IS REQUIRED. CITY WILL INVESTIGATE FEASIBILITY.
2. PROVIDE A 6' INTERGRANT CURB BETWEEN 2ND ST AND UNIVERSITY AVE (36' WIDE BLOCK).

PLYMOUTH AVE N BRIDGE TO SIBLEY ST NE - EXISTING PROTECTED BIKE LANCES

CONSIDER NORTHBOUND PROTECTED/PERMITTED LEFT TURN ARROW TO IMPROVE PM PEAK HOUR OPERATIONS IN SINGLE LANE APPROACH

RIGHT TURN CONFLICTS - FURTHER EVALUATION REQUIRED.
1. MAINTAIN RIGHT TURN LANES AND ADD BUFFER TO BIKE LANE.
2. REMOVE RIGHT TURN LANES TO WIDEN BIKE LANE ALONG CURB.

LEGEND
- STANDARD BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- BIKE BOULEVARD
- SHARED BIKE LANE
- REVIEW ALTERNATIVE ROUTE OR BIKEWAY TYPE OPTIONS
- FURTHER EVALUATION OF LONGER-TERM OPTIONS REQUIRED
- OFF-STREET TRAIL
- FUTURE OFF-STREET TRAIL
- EXISTING BIKE LANE
- SPECIAL INTERSECTION TREATMENT MAY BE NEEDED
- DELINEATOR
- PARKING REMOVAL
- TRAVEL LANE REMOVAL
- ADD PARKING

NOTE:
1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
1. Consider widening intersection (NW & SE corners) to provide right turn lane space
2. Right turn mixing zone area
3. Conflict zone pavement markings

14th Ave NE to Lowry Ave NE - Maintain existing conditions. Two options require further consideration

Option E1: Two-way protected bike lane on west side:
1. Remove parking on west side of the street
2. Parking removal feasibility will have to be further investigated with city officials and stakeholder.

Option E2: Multiuse trail:
1. Reconstruct Marshall St NE and narrow roadway.
2. Provide multiuse trail on west side of the street.

Legend

- Standard bike lane
- Buffered bike lane
- Protected bike lane
- Bike boulevard
- Shared bike lane
- Review alternative route or bikeway type options
- Further evaluation of longer-term options required
- Off-street trail
- Future off-street trail
- Existing bike lane
- Special intersection treatment may be needed
- Delineator
- Parking removal
- Add parking
- Buffer

Note:
1. Preliminary concept for purposes of determining the feasibility of protected bikeway implementation. Widths are approximate. Concepts will be further developed during preliminary engineering.

Main St & Marshall Ave NE - Concept Design 17

MINNEAPOLIS
DEPARTMENT OF PUBLIC WORKS

www.alliant-inc.com
612.758.3099
612.758.3080
Minneapolis, MN 55415
233 Park Ave S, Ste 300
www.alliant-inc.com

PROTECTED BIKEWAYS FEASIBILITY ANALYSIS
MAIN ST & MARSHALL AVE NE
PRELIMINARY CONCEPT
CORRIDOR 17

FIGURE A-17
1 OF 2
NOTE:

1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
NOTE:
3RD AVE/CENTRAL AVE - CONCEPT DESIGN 18

A TWO-WAY PROTECTED BIKE LANE MAY BE FEASIBLE BETWEEN 18TH ST AND 11 ST THOUGH THE REMOVAL OF A NORTHBOUND TRAVEL LANE NORTH OF I-94 AND REMOVAL OF A SECTION OF PARKING SOUTH OF I-94. HOWEVER FURTHER EVALUATION IS NECESSARY TO DETERMINE BIKE LANE FEASIBILITY TO THE NORTH AND SOUTH.

CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.

PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE.

NOTE:

PROTECTED BIKE FACILITIES ARE NOT FEASIBLE BETWEEN 11TH ST S AND WASHINGTON AVE WITHIN EXISTING CURBS.

FURTHER EVALUATION OF THE FEASIBILITY OF PARKING REMOVAL IS NEEDED.

SEE CONCEPT 1C

ONE-WAY PROTECTED BIKE LANES BETWEEN WASHINGTON AVE AND 5TH ST NE THROUGH THE REMOVAL OF PARKING. FURTHER INVESTIGATION IN FEASIBILITY OF PARKING REMOVAL IS NEEDED.

SEE CONCEPT 1C

PROTECTED BIKE LANES COULD END AT UNIVERSITY AVE AND TRANSITION TO EXISTING SHARED LANE FACILITY NORTH OF UNIVERSITY AVE.

3RD AVE/CENTRAL AVE CORRIDOR 18

PRELIMINARY CONCEPT

PROTECTED BIKEWAYS FEASIBILITY ANALYSIS

FIGURE A-18
1 OF 2

LEGEND

STANDARD BIKE LANE
BUFFERED BIKE LANE
PROTECTED BIKE LANE
BIKE BOULEVARD
SHARED BIKE LANE
REVIEW ALTERNATIVE ROUTE OR BIKEWAY TYPE OPTIONS
FURTHER EVALUATION OF LONGER TERM OPTIONS REQUIRED
OFF-STREET TRAIL
FUTURE OFF-STREET TRAIL
EXISTING BIKE LANE
SPECIAL INTERSECTION TREATMENT MAY BE NEEDED
DELINEATOR
PARKING REMOVAL
ADD PARKING
1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.
PROTECTED BIKEWAYS FEASIBILITY ANALYSIS
WASHINGTON AVE S
PRELIMINARY CONCEPT
CORRIDOR 19

NOTE:
1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE. CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.

**LEGEND**
- STANDARD BIKE LANE
- BUFFERED BIKE LANE
- PROTECTED BIKE LANE
- BIKE BOULEVARD
- SHARED BIKE LANE
- REVIEW ALTERNATIVE ROUTE OR BIKEWAY TYPE OPTIONS
- FURTHER EVALUATION OF LONGER-TERM OPTIONS REQUIRED
- OFF-STREET TRAIL
- FUTURE OFF-STREET TRAIL
- EXISTING BIKE LANE
- SPECIAL INTERSECTION TREATMENT MAY BE NEEDED
- DELINEATOR
- PARKING REMOVAL
- TRAVEL LANE REMOVAL
- ADD PARKING

**FIGURE A-19**

**WASHINGTON AVE S - CONCEPT DESIGN 19**

- PROVIDE RIGHT TURN LANE MIXING ZONES IN ADVANCE OF PORTLAND AVE, CHICAGO AVE, 11TH AVE AND I-35W TO ACCOMODATE RIGHT TURN VEHICLE MOVEMENTS.
- 5TH AVE TO I-35W - FOR INTERIM CONDITIONS (UNTIL THE WASHINGTON AVE VISION CAN BE CONSTRUCTED) - ONE-WAY PROTECTED BIKE LANCES IS FEASIBLE THROUGH NARROWING OF LANES AND THE REMOVAL OF THE PEAK PERIOD RIGHT TRAVEL LANE IN EACH DIRECTION.
- CONSIDERATION:
  1. THE PEAK PERIOD LANE REMOVAL IS NOT FEASIBLE UNTIL THE 4TH ST ON RAMP PROJECT IS COMPLETED.
  2. RIGHT TURN MIXING ZONES ARE REQUIRED AT PORTLAND AVE, CHICAGO AVE, 11TH AVE, AND BOTH 35W RAMPS.
  3. THE LONG TERM VISION FOR WASHINGTON AVE IS AN OFF-STREET CYCLE TRACK. CONCEPTS ARE NOT SHOWN IN THIS DOCUMENT.
  4. BIKES WILL OPERATE WITH CONCURRENT VEHICLE PHASE. BIKE SIGNALS ARE NOT PROVIDED.
- 1-35W TO 15TH AVE - ONE-WAY PROTECTED BIKE FACILITY WITH REMOVAL OF PARKING ON THE NORTH SIDE IS FEASIBLE IF PARKING REMOVAL IS NOT FEASIBLE THEN PROVIDE A BUFFERED BIKE LANE ON THE NORTH SIDE.
- MAINTAIN STANDARD BIKE LANES ON I-35W BRIDGE. PROVIDE PROTECTED BIKE LANES WHEN THE BRIDGE DECK IS REPLACED.
- PEAK PERIOD TRAVEL LANE REMOVAL (CURRENTLY OPERATES AS TWO LANE DURING AM AND PEAK PERIODS)
- HEAVY RIGHT TURN VOLUMES ONTO I-35W
- NEW 4TH STREET RAMP TO NB I-35W CONSTRUCTION WILL BE COMPLETE IN 2015
- PROVIDE TWO STAGE TURN BOX AND CONFLICT ZONE MARKINGS
- PROTECTED BIKE LANE CONNECTION TO 19TH AVE REQUIRES FURTHER EVALUATION DURING PRELIMINARY ENGINEERING.
- 15TH AVE TO 19 AVE - ONE-WAY PROTECTED BIKE FACILITY IS FEASIBLE WITH REMOVAL OF PARKING ON ONE SIDE.
WASHINGTON AVE S - CONCEPT DESIGN 19

A) 5TH AVE S TO I-35W BRIDGE
   BIKE BUFFER WIDTH LESS THAN 10'

B) I-35W BRIDGE

C) I-35W BRIDGE TO 15TH AVE (PARKING REMOVAL SHOWN)

D) 15TH AVE TO 19TH AVE

NOTE:
1. PRELIMINARY CONCEPT FOR PURPOSES OF DETERMINING THE FEASIBILITY
   OF PROTECTED BIKEWAY IMPLEMENTATION. WIDTHS ARE APPROXIMATE.
   CONCEPTS WILL BE FURTHER DEVELOPED DURING PRELIMINARY ENGINEERING.

MINNEAPOLIS
DEPARTMENT OF
PUBLIC WORKS

PROTECTED BIKEWAYS FEASIBILITY ANALYSIS
WASHINGTON AVE S
PRELIMINARY CONCEPT
CORRIDOR 19

FIGURE A-19
2 OF 2