NORTH MINNEAPOLIS GREENWAY

Technical Investigation Progress Report
June 30, 2014

SRF Consulting Group, Inc.

Minneapolis
City of Lakes

BlueCross BlueShield Minnesota

ACKNOWLEDGEMENTS

The City of Minneapolis and the Minneapolis Park and Recreation Board would like to thank the Center for Prevention at Blue Cross and Blue Shield of Minnesota for initiating and generously funding the North Minneapolis Greenway feasibility investigation. It is a rare opportunity to receive funding that allows for a thoughtful and thorough investigation of a potential approach to increase physical activity for residents in North Minneapolis.

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PROJECT PURPOSE AND INTENT

In early 2014, the Center for Prevention at Blue Cross and Blue Shield of Minnesota (BCBS MN) initiated a three-year study investigating the feasibility of constructing a greenway in North Minneapolis, as part of Blue Cross' long-term commitment to tackling the leading root causes of preventable disease: tobacco use, lack of physical activity and unhealthy eating. The City of Minneapolis and the Minneapolis Park and Recreation Board are partnering with BCBS MN in this investigation.

For the purposes of this study, a greenway is defined as space for non-motorized transportation, primarily bicyclists and pedestrians. The purpose of a greenway is to provide:

- Safe, accessible, and efficient non-motorized transportation that will encourage active living as a way to improve community residents' health.
- Places for safe, comfortable and convenient recreation.

The BCBS MN investigation is composed of two components:

- Community Outreach to gain an understanding of the community's interest in a greenway and to get feedback on preliminary greenway concepts. A Greenway Outreach Steering Committee was established to guide community engagement.
- Technical Investigation to analyze and evaluate potential greenway routes and features. These investigations were performed to better understand the potential utility, traffic and parking impacts, funding opportunities, and estimated construction costs associated with implementing the greenway to determine whether the potential greenway routes and features merit continued evaluation. The technical investigation was led by a Technical Advisory Committee (TAC) facilitated by the City of Minneapolis Department of Public Works.

This Progress Report documents the findings of technical investigations performed to date. It is intended to function as a resource for BCBS MN, City of Minneapolis, MPRB, and the Greenway Outreach Steering Committee. It documents analysis and evaluations performed to date on potential greenway routes and features and associated findings. It provides technical support and guidance on potential greenway routes and features that currently appear feasible and worthy of continued evaluation. The Outreach Steering Committee continues to perform public engagement as a separate, yet coordinated effort.

The North Minneapolis Greenway is still in a conceptual stage and is not a designated city project. The City has not selected a preferred greenway route or made a determination whether the project will move forward to final design and construction. Input received through the concurrent community outreach process will be reflected in the next phase of the BCBS MN greenway investigation.

PROPOSED GREENWAY ROUTE

The proposed North Minneapolis Greenway is an approximate 3.5-mile route extending from the intersection of Humboldt Avenue N and 47th Avenue N to the intersection of Irving Avenue N and 15th Avenue N as presented Figure i. The route is conceptual and is subject to change based on public engagement results and future technical analysis.

The southern terminus for the North Minneapolis Greenway is yet to be determined. The following related studies are concurrently occurring in North Minneapolis:

- Penn Avenue Corridor Vision and Implementation Framework
- METRO Blue Line LRT Extension Station Area Planning
- Protected Bikeways update to the Minneapolis Bicycle Master Plan

The outcomes of these studies may influence the selection of the greenway terminus and associated route.

GREENWAY TYPES

The proposed greenway is currently comprised of the following four "greenway types":

Full "Linear Park" Greenway (Seven segments totaling 2.1 miles). This greenway type entails the removal of the traditional street vehicular traffic and parking. The traditional street is replaced with a trail and open space. This greenway type allows for the provision of alternative recreation or amenity features in the street right-of-way (see Figure ii).

Half and Half, One-Way (Six segments totaling 1.0 mile). For this greenway type, the existing street would be narrowed to one-way street with parking limited to one side of the street. The off-street trail would be placed at the back of curb to avoid impacts to existing street trees (see Figure iii).

Half and Half, Two-Way (Two segments totaling 0.5 mile). This greenway type would be used only in limited situations where two-way traffic must be maintained. The existing street would be narrowed, eliminating all on-street parking, with an off-street trail replacing a sidewalk along one side of the street (see Figure iv).

Bike Boulevard (One segment approximately 200 feet in length). A bike boulevard is proposed along one small segment of the greenway where the other greenway types would not work due to parcel access needs. A bike boulevard consists of an on-street, non-exclusive facility, where bikes share the roadway with vehicles.

FIGURE i **PROPOSED GREENWAY ROUTES AND INTERSECTION TREATMENTS**

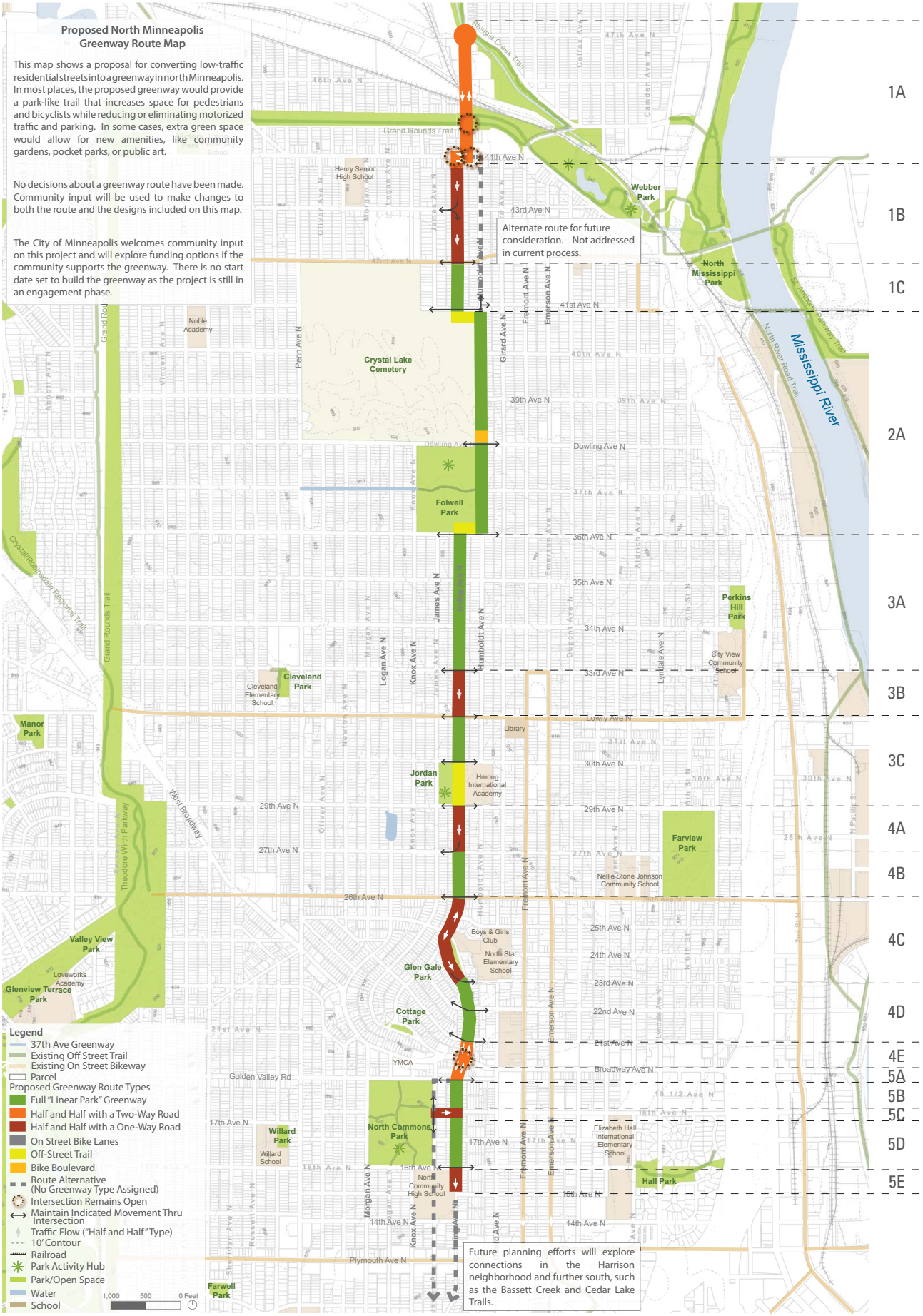

FIGURE ii **FULL LINEAR PARK GREENWAY: ILLUSTRATION**

FIGURE iii **HALF AND HALF, ONE-WAY GREENWAY: ILLUSTRATION**

FIGURE iv **HALF AND HALF, TWO-WAY GREENWAY: ILLUSTRATION**

PROPOSED GREENWAY ANALYSIS

Traffic and Circulation Analysis

North-South Street Closure Evaluation

The majority of the north-south streets that correspond with the proposed greenway route have low traffic volumes that can be diverted to and accommodated by adjacent roadways.

Intersection Closure Evaluation

In order to facilitate vehicular mobility through the community, four intersections should remain open and east-west movement through another eleven intersections should remain open. Approximately 13 intersections could be closed as they are not critical to cross-city movement and the diversion of traffic from these closed intersections could be adequately handled by adjacent intersections, provided there are no planning or operational issues and there is community support for closure.

Parking

The proposed greenway would result in approximately 310 parcels facing onto a full linear park greenway type resulting in the loss of on-street parking directly in front of their house. For the Half and Half, One-Way greenway type, approximately 70 parcels will only have access to on-street parking across the street from their house. Finally, approximately 10 parcels face onto a Half and Half, Two-Way greenway type resulting in the loss of on-street parking directly in front of their house.

All of the blocks along the proposed greenway route have alleys that can provide vehicular access to individual parcels if north-south roadways are removed. If on-street parking were removed from the greenway, the displaced parking could be accommodated on adjacent streets. Providing parking on one-side of the roadway would also provide an adequate supply.

Potential Utility Impacts

While some utility impacts are expected, the proposed greenway is not anticipated to create any significant utility impacts.

Lighting

Representative lighting layouts (using a city standard luminaire on a standard 15-foot pole) designed to achieve a desired minimum illumination level of 0.8 foot candles on greenway sidewalks and trails resulted in an inefficient lighting layout and areas of bright light levels. Additional investigation is needed to develop an appropriate greenway illumination approach.

Stormwater Management Opportunities

There are several locations along, or adjacent to, the proposed greenway route where there are known flooding problems. New open space associated with the greenway could not only provide a community amenity, but also help manage known flooding problems in the community.

Preliminary Estimated Cost

A preliminary estimated cost of $15.7 million was developed for the proposed route that reflects the greenway types depicted in Figure i.

Additional Greenway Analyses

Work tasks performed as part of this effort helped the TAC to identify additional analysis that could be performed as the project moves into the next phase of conceptual design.

PROJECT INTRODUCTION

PROJECT PURPOSE AND INTENT

In early 2014, the Center for Prevention at Blue Cross and Blue Shield of Minnesota (BCBS MN) initiated a three-year study investigating the feasibility of constructing a greenway in North Minneapolis, as part of Blue Cross' long-term commitment to tackling the leading root causes of preventable disease: tobacco use, lack of physical activity and unhealthy eating. The City of Minneapolis and the Minneapolis Park and Recreation Board are partnering with BCBS MN in this investigation.

For the purposes of this study, a greenway is defined as space for non-motorized transportation, primarily bicyclists and pedestrians. The purpose of a greenway is to provide:

- Safe, accessible, and efficient non-motorized transportation that will encourage active living as a way to improve community residents' health.
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The BCBS MN investigation is composed of two components:

- Community Outreach to gain an understanding of the community's interest in a greenway and to get feedback on preliminary greenway concepts. A Greenway Outreach Steering Committee was established to guide community engagement.
- Technical Investigation to analyze and evaluate potential greenway routes and features. These investigations were performed to better understand the potential utility, traffic and parking impacts, funding opportunities, and estimated construction costs associated with implementing the greenway to determine whether the potential greenway routes and features merit continued evaluation.

This Progress Report documents the findings of technical investigations performed to date. It is intended to function as a resource for BCBS MN, City of Minneapolis, MPRB, and the Greenway Outreach Steering Committee. It documents analysis and evaluations performed to date on potential greenway routes and features and associated findings. It provides technical support and guidance on potential greenway routes and features that currently appear feasible and worthy of continued evaluation. The Outreach Steering Committee continues to perform public engagement as a separate, yet coordinated effort.

The North Minneapolis Greenway is still in a conceptual stage and is not a designated city project. The City has not selected a preferred greenway route or made a determination whether the project will move forward to final design and construction. Input received through the concurrent community outreach process will be reflected in the next phase of the BCBS MN greenway investigation.

PROJECT BACKGROUND

In 2011, Bike Walk Twin Cities (a program of Transit for Livable Communities) in partnership with Twin Cities Greenways and the City of Minneapolis, introduced the North Minneapolis Greenway concept and developed initial approaches for how the greenway could take form (now referred to as greenway types).

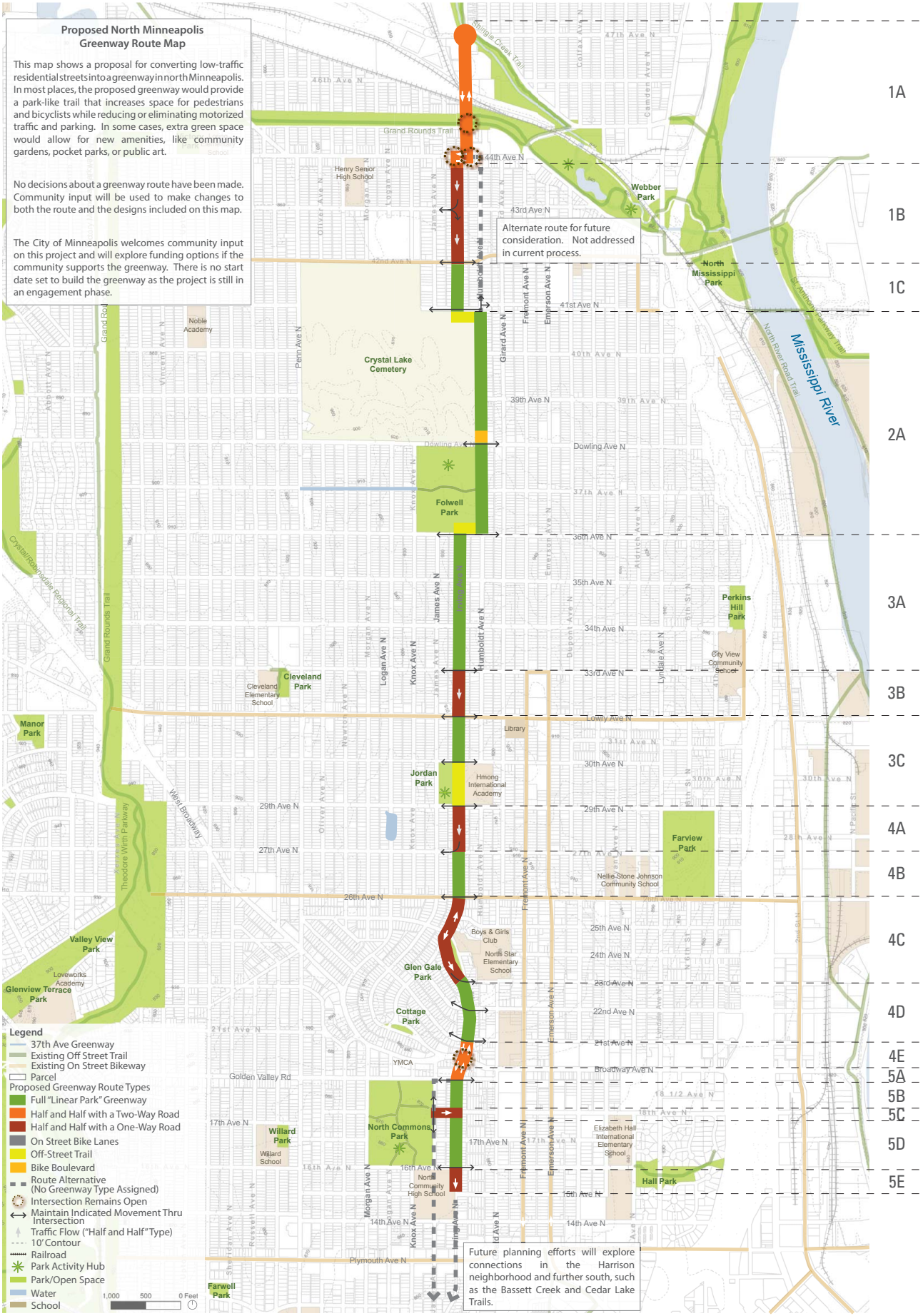
In 2012, the Minnesota Department of Health, through the Statewide Health Improvement Program (SHIP), partnered with the City to evaluate potential greenway route alternatives, select a proposed greenway route, and assign greenway types to segments of the proposed route. Other SHIP work tasks included:

- Community engagement activities
- Refinement of right-of-way space allocation between pedestrians, bicyclists, vehicles, and open space for the various greenway types
- An overnight, on-street, parked vehicle count
- An initial traffic analysis
- Development of intersection treatment concepts for five intersections along the proposed route

PROJECT PROCESS

The technical investigation was led by a Technical Advisory Committee (TAC) facilitated by the City of Minneapolis Department of Public Works. Members of the TAC represented the City of Minneapolis Departments of Public Works, Health, and Community Planning and Economic Development; the Minneapolis Park and Recreation Board; and the Greenway Outreach Steering Committee. The TAC met five times over the course of the project to review draft investigation findings and to provide guidance. The TAC brought preliminary technical investigation findings to the Greenway Outreach Steering Committee over the course of the current investigation.

FIGURE 1 **PROPOSED GREENWAY ROUTES AND INTERSECTION TREATMENTS**



PROJECT DESCRIPTION

PROPOSED GREENWAY ROUTE

After an evaluation of three route alternatives, the TAC selected a proposed North Minneapolis Greenway route for further detailed evaluation, which is shown in Figure 1. The route primarily follows portions of Humboldt and Irving Avenues and is subject to change based on public engagement results and future technical analysis. The proposed route was selected based on the following considerations:

Minimize Impacts to:

- Property access (driveways, alleys)
- Emergency access (fire, police, ambulance)
- Resident and visitor parking
- Traffic diversion
- Intersection crossings
- Parks (do not place trail through center of park)
- Businesses
- Existing utilities (above and below ground)

Maximize:

- Local resident support
- Connectivity to
  - The existing and planned trail network
  - Destinations for children (parks, schools, and recreation centers)
  - Neighborhood destinations (retail, churches)
  - Transit
- Directness of route
- Use of low volume streets
- Routes with few hills
- User safety
- Opportunities to partner with other neighborhood amenities or infrastructure elements, similar to the 37th Avenue North greenway that also performs stormwater management functions

The southern terminus and route for the North Minneapolis Greenway is yet to be determined. The following related studies are concurrently occurring in North Minneapolis:

- Penn Avenue Corridor Vision and Implementation Framework
- METRO Blue Line LRT Extension Station Area Planning
- Protected Bikeways update to the Minneapolis Bicycle Master Plan

The outcomes of these studies may influence the selection of the greenway terminus and associated route. In the meantime, this study identified several potential route alternatives between the Irving Avenue/Golden Valley Road intersection on the north and Glenwood Avenue on the south (see Figure 2). The route alternatives are composed of two options (A and B) between Golden Valley Road and 16th Avenue and six different route options between 15th Avenue N and Glenwood Avenue. Each of the route options was evaluated against the same criteria used to select the northern portion of the greenway route.

FIGURE 2 **POTENTIAL ROUTE ALTERNATIVES**

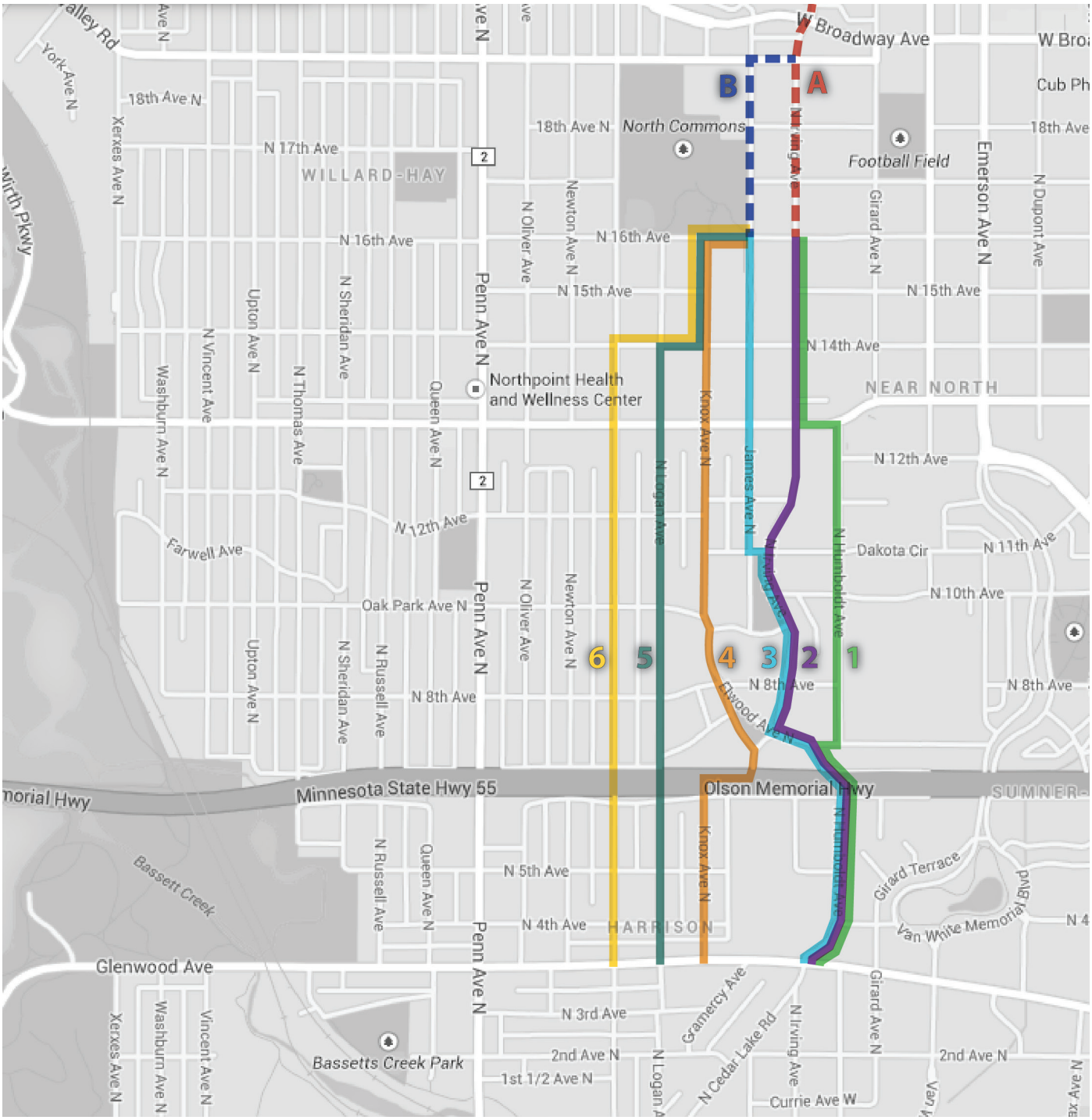


Table 1 lists the evaluation of each route option. This information, along with the outcomes of the studies listed above, and community input will inform the selection of a final greenway route, should the project move forward to final design and construction.

TABLE 1 **SOUTHERN GREENWAY ROUTE ALTERNATIVES**

Alignment Option	Alley Access Available	Driveways (As detected on aerial photography)	High Traffic Road Crossings	Adjacencies to Activity Areas (Parks/Schools)	Bikeway Connections	Transit Connections	Directness of Route*	Street Traffic Volume	Topography
A	Yes	None	Crosses Golden Valley Road at unsignalized intersection	Adjacent North Commons Park	One block redundant with planned bike lanes on Golden Valley Road	n/a	More Direct	Adjacent a park	No hills
B	Yes	None	Crosses Golden Valley Road at unsignalized intersection		Follows planned Irving Ave Bike Blvd (Future Greenway)	n/a	Less Direct	Low	No hills
1	Yes	Several alley/parking lot driveways onto Irving Ave north of Plymouth Ave Several parking lot driveways along Humboldt north of TH 55 Several parking lot driveways on Humboldt south of TH 55	Crosses Plymouth Ave at unsignalized intersection (curve in road may limit sightlines) Crosses TH 55 at signalized intersection Crosses Glenwood at a signalized intersection	Adjacent North Commons High School Adjacent Bethune School Adjacent Harvest Prep/Seed Academy Adjacent River Bend Education Center One block from Lao Assistance Center/Harrison Education Center	Connects to 8th Ave trail Short distance to Van White trail Connects to Glenwood Ave and Cedar Lake Road Bikeways	Approx. 800 feet to proposed Blue Line LRT (Van White Station)	More Direct	Generally low May have higher traffic volumes near schools	Slight hill along Humboldt
2	Yes	Several alley/parking lot driveways onto Irving Ave north of Plymouth Ave Several alley driveways onto Irving/Humboldt north of TH 55 Several parking lot driveways on Humboldt south of TH 55	Crosses Plymouth Ave at unsignalized intersection Crosses TH 55 at signalized intersection Crosses Glenwood at a signalized intersection	Adjacent North Commons High School Adjacent to Lovell Square Park Adjacent Harvest Prep/Seed Academy Adjacent River Bend Education Center One block from Lao Assistance Center/Harrison Education Center	Substantially follows planned Irving Ave Bike Blvd (Future Greenway) down to TH 55 Short distance to Van White trail Connects to Glenwood Ave Bikeway	Approx. 800 feet to proposed Blue Line LRT (Van White Station)	More Direct	Generally low May have higher traffic volumes near schools	No hills

Alignment Option	Alley Access Available	Driveways (As detected on aerial photography)	High Traffic Road Crossings	Adjacencies to Activity Areas (Parks/Schools)	Bikeway Connections	Transit Connections	Directness of Route*	Street Traffic Volume	Topography
3	Yes	Several alley driveways onto James north of 11th Ave Several alley driveways onto Irving/Humboldt north of TH 55 Several parking lot driveways on Humboldt south of TH 55	Crosses Plymouth Ave at unsignalized intersection Crosses TH 55 at signalized intersection Crosses Glenwood at a signalized intersection	Passes through North Commons High School Site. May pose personal safety, pedestrian safety, and school security challenges Adjacent to Lovell Square Park Adjacent Harvest Prep/Seed Academy Adjacent River Bend Education Center One block from Lao Assistance Center/Harrison Education Center	Short distance to Van White trail Connects to Glenwood Ave Bikeway	Approx. 800 feet to proposed Blue Line LRT (Van White Station)	More Direct	Generally low May have higher traffic volumes near schools	No hills
4	Yes	Several alley/parking lot driveways and one residential driveway onto Knox Ave north of TH 55 Several alley driveways onto Knox Ave south of TH 55	Crosses Plymouth Ave at unsignalized intersection Crosses TH 55 at a mid-block location Crosses Glenwood at an unsignalized intersection	Adjacent North Commons High School Adjacent Barnes Park One block from Harrison Park	One block redundant with planned bike route Connects to Glenwood Ave Bikeway	n/a	Less Direct	Generally low May have higher traffic volumes near school	No hills
5	Yes	School parking driveways between16th and 14th One alley driveway on 14th Several alley driveways onto Logan north of TH 55 Several alley driveways onto Logan south of TH 55	Crosses Plymouth Ave at signalized intersection Crosses TH 55 at a mid-block location Crosses Glenwood at an unsignalized intersection	Adjacent North Commons High School	Connects to Glenwood Ave Bikeway	n/a	Less Direct	Low	No hills
6	Yes	School parking driveways between16th and 14th Two alley driveways on 14th Several alley driveways onto Morgan north of TH 55 Several alley driveways and one residential driveway onto Morgan south of TH 55	Pedestrian flasher at Plymouth Ave Crosses TH 55 at signalized intersection Crosses Glenwood at a signalized intersection	Adjacent North Commons High School	Connects to Glenwood Ave Bikeway	Approx. 700 feet to proposed Blue Line (Penn Station)	Less Direct	Low, but may have slightly more traffic due to traffic signals at TH 55 and Glenwood	No hills

** Glenwood Avenue used as terminus.*

GREENWAY TYPES

The proposed greenway is currently comprised of the following four greenway types:

Full Linear Park Greenway (Seven segments totaling 2.1 miles). This greenway type entails the removal of the traditional street vehicular traffic and parking. Figure 3 illustrates a traditional Minneapolis street. The traditional street is replaced with a trail and open space (see Figures 4 – 6). The trail would meander within the previous street area to avoid impacts to existing utilities. This greenway type allows for the provision of alternative recreation or amenity features in the street right-of-way. A representative list of potential greenway amenities can be found on Figure 4. The Full Linear Park greenway type would be designed to provide emergency vehicle access along the trail. Vehicular access to parcels located along the Full Linear Park greenway would be through existing alleys. Vehicle parking would need to occur either in garages or stalls located off of the alley or on adjacent streets. For the purpose of this study, if there was not a physical reason that prohibited a street from being shown as a Full Linear Park greenway, such as existing driveways leading to the street, it was predominantly designated as such.

Half and Half, One-Way (Six segments totaling 1.0 mile). For this greenway type, the existing street would be narrowed to a one-way street with parking limited to one side of the street (see Figures 7 – 9). The off-street trail would be placed at the back of curb to avoid impacts to existing street trees. Both existing sidewalks would remain. This greenway type would be used when vehicular access must be provided to parcels located along a block.

Half and Half, Two-Way (Two segments totaling 0.5 mile). This greenway type would be used only in limited situations where two-way traffic must be maintained. The existing street would be narrowed, eliminating all on-street parking, with an off-street trail replacing a sidewalk along one side of the street (see Figures 10 – 12).

Bike Boulevard (One segment approximately 200 feet in length). A bike boulevard is proposed along one small segment of the greenway where the other greenway types would not work due to parcel access needs. A bike boulevard consists of an on-street, non-exclusive facility, where bikes share the roadway with vehicles. Bike boulevards are low volume streets that typically incorporate traffic calming measures to encourage lower vehicle speeds. The street pavement is also painted with a bike boulevard symbol to inform users of its designation, thus encouraging appropriate travel behavior by all street users (see Figures 13 and 14).

FIGURE 3 **TYPICAL EXISTING RESIDENTIAL STREET: SECTION**

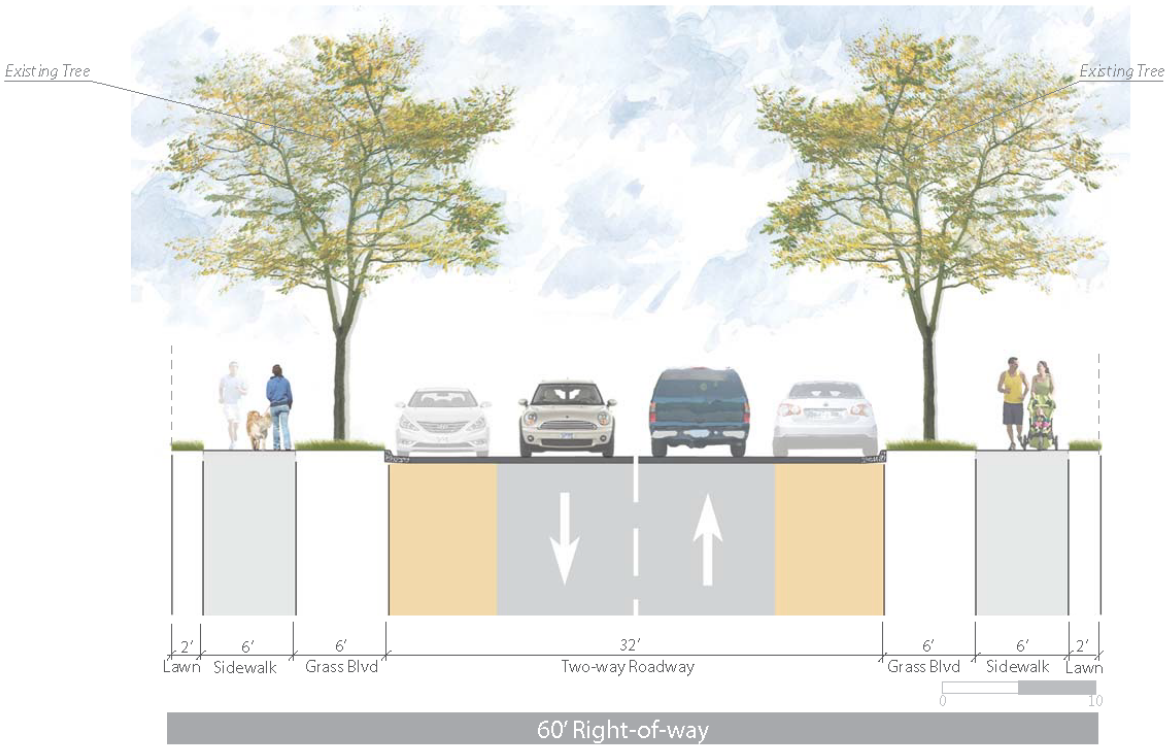


FIGURE 4 **FULL LINEAR PARK GREENWAY: PLAN VIEW**

FIGURE 5 **FULL LINEAR PARK GREENWAY: ILLUSTRATION**

FIGURE 6 **FULL LINEAR PARK GREENWAY: SECTION**

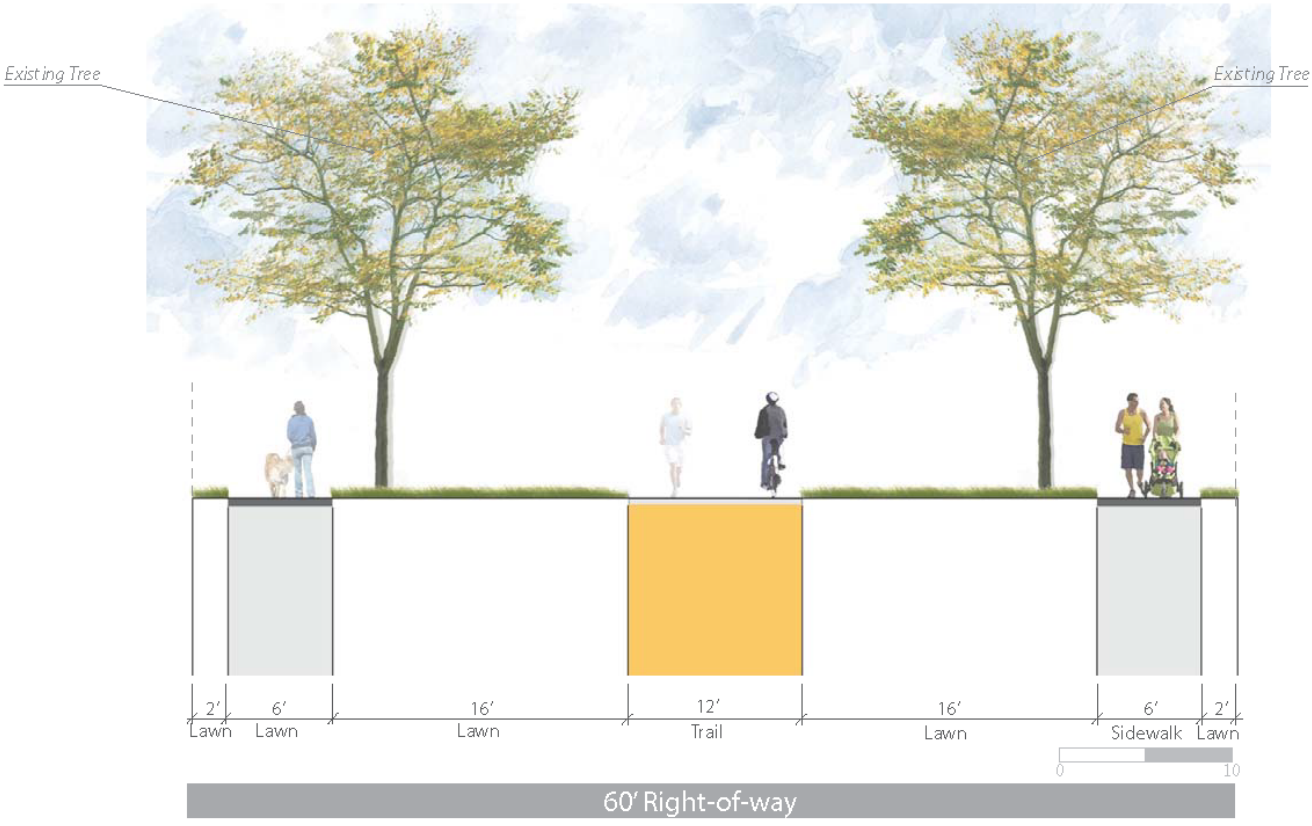


FIGURE 7 **HALF AND HALF, ONE-WAY GREENWAY: PLAN VIEW**

Half and Half with a One-Way Road and Parking
A diagonal diversion is introduced into the intersections. On-street parking is clustered to one side for North-South streets. The off-street bikeway traverses the intersection.

FIGURE 8 **HALF AND HALF, ONE-WAY GREENWAY: ILLUSTRATION**

FIGURE 9 **HALF AND HALF ONE-WAY GREENWAY: SECTION**

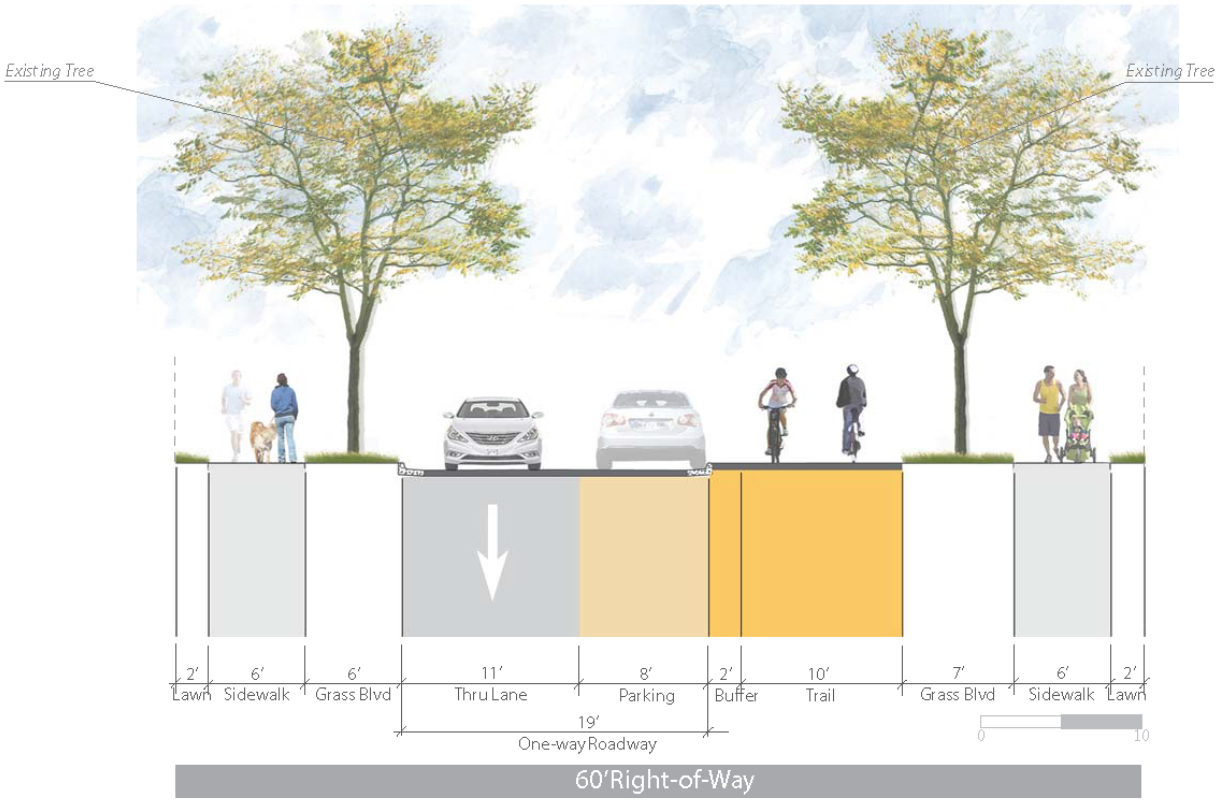
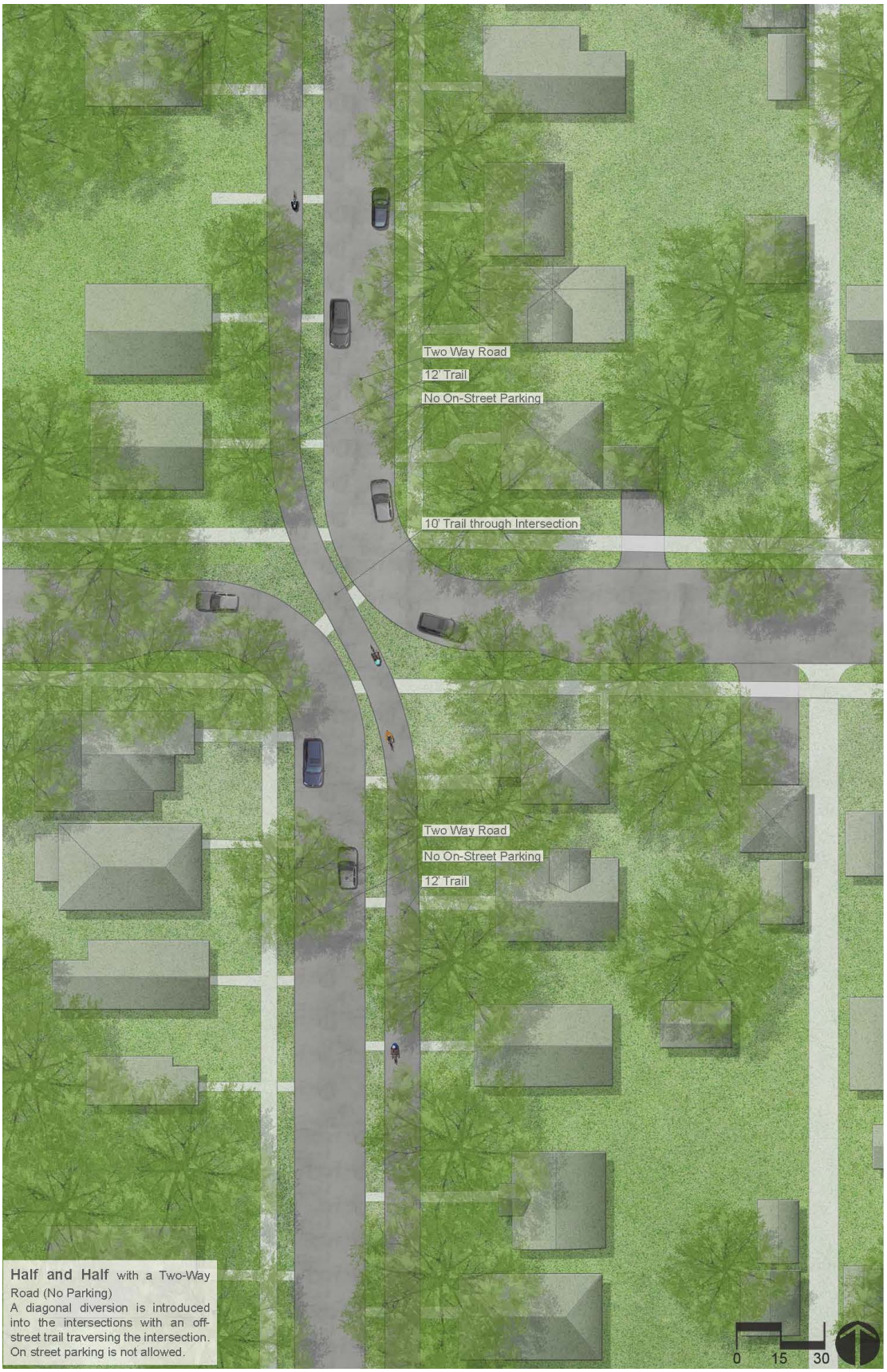


FIGURE 10 **HALF AND HALF, TWO-WAY GREENWAY: PLAN VIEW**



Half and Half with a Two-Way Road (No Parking)
A diagonal diversion is introduced into the intersections with an off-street trail traversing the intersection. On street parking is not allowed.

FIGURE 11 **HALF AND HALF, TWO-WAY GREENWAY: ILLUSTRATION**

FIGURE 12 **HALF AND HALF TWO-WAY GREENWAY: SECTION**

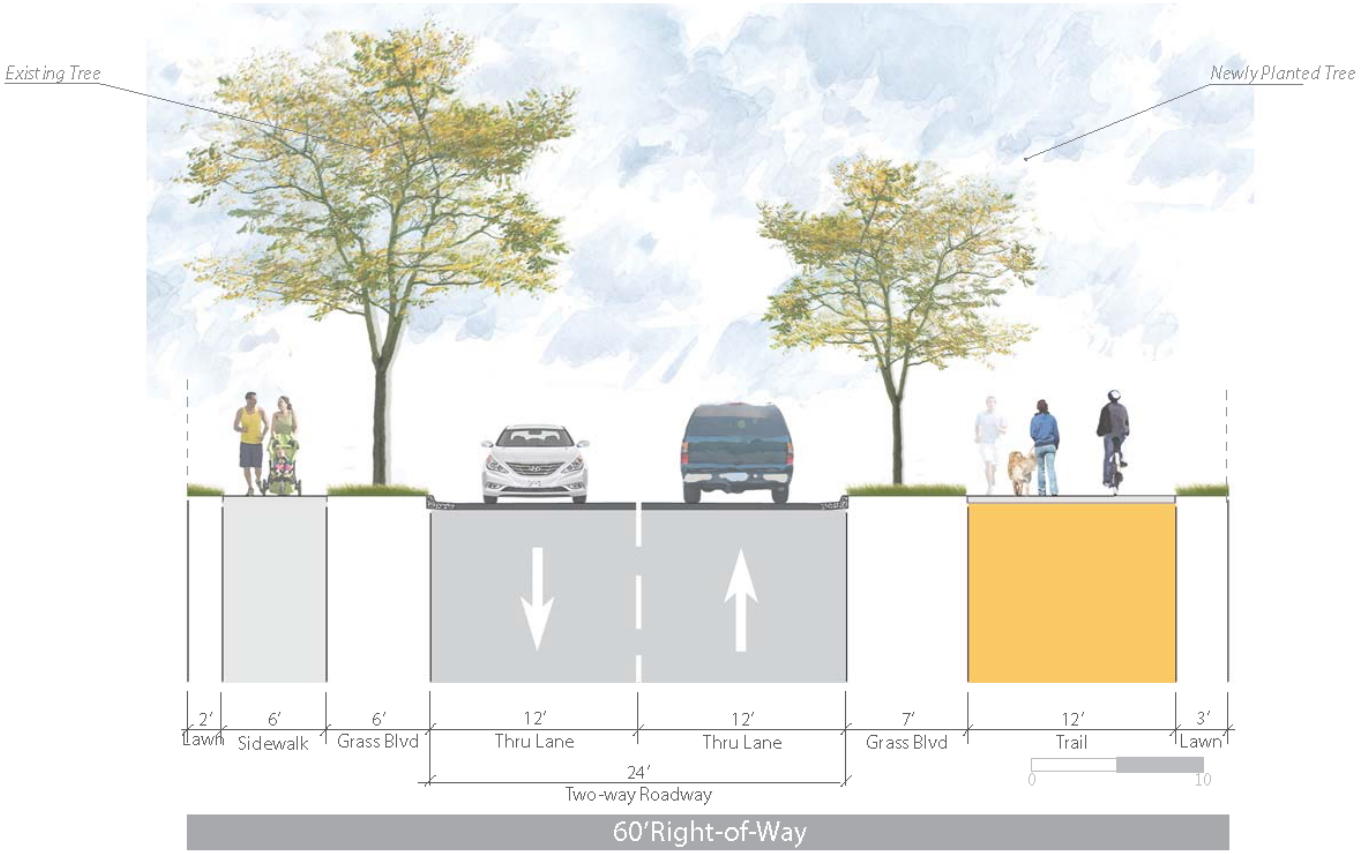


FIGURE 13 **BIKE BOULEVARD: PLAN VIEW**

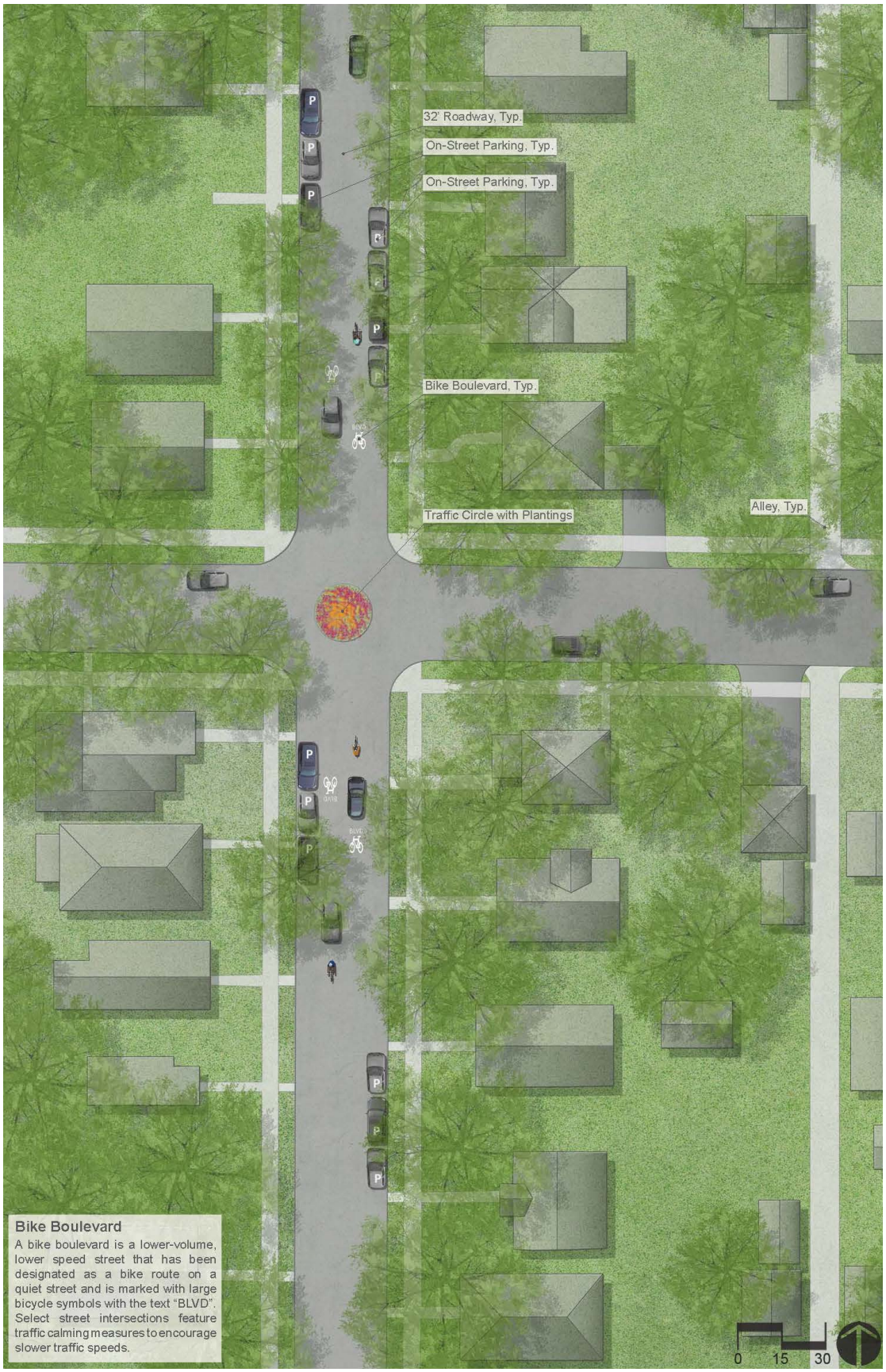


FIGURE 14 **BIKE BOULEVARD: SECTION**

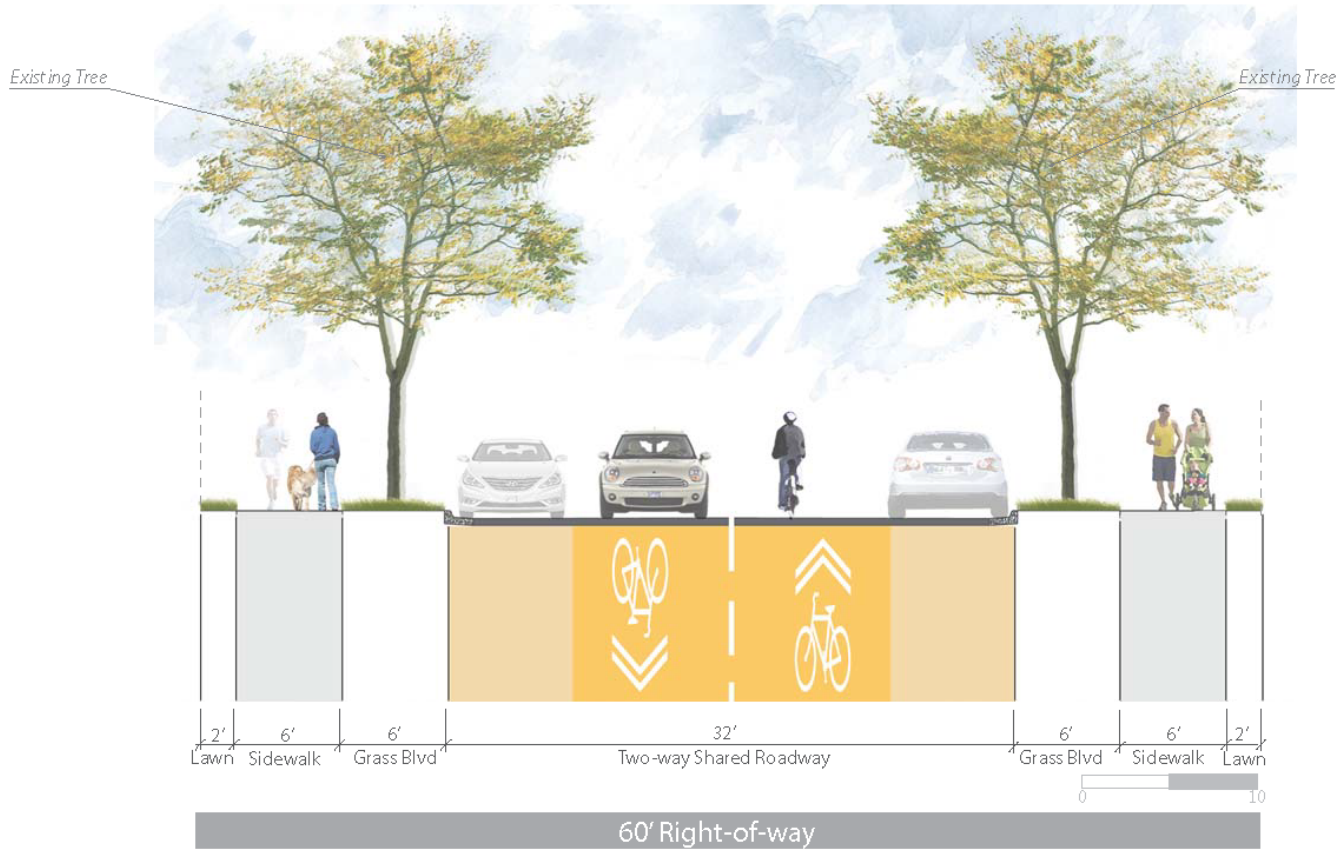


Figure 1 depicts the greenway types that are assigned to various route segments. Table 2 lists the proposed greenway route on a block-by-block basis and highlights the design considerations that influenced the selection of the greenway types assigned to that block. A conceptual greenway layout can be found in Appendix A.

TABLE 2 **PROPOSED GREENWAY ROUTE**

Segment	Street	From	To	Greenway Type	Design Consideration
1A	Humboldt Ave N	47th Ave N	44th Ave N	Half and Half Two-Way	• Two-way vehicular circulation needed along Humboldt Ave • Trail located on west side of street (Allows for direction connection with Shingle Creek Trail north of 47th Ave) • Trail crosses three driveways and three alleys
1A	44th Ave N	Humboldt Ave N	Irving Ave N	Half and Half Two-Way	• Two-way vehicular circulation needed along 44th Ave N • Trail located on south side of street
1A	Irving Ave N	44th Ave N	Alley	Half and Half Two-Way	• Two-way vehicular circulation needed on Irving Ave N to service alley • Trail located on east side of street • Residential driveway on west side of street immediately north of alley
1B	Irving Ave N	Alley	43rd Ave N	Half and Half One-Way	• While could be a full linear greenway, kept consistent with block to south to minimize number of greenway type transitions • Trail located on east side of street • New community green space along 43rd Ave N (east of greenway to driveway)
1B	Irving Ave N	43rd Ave N	42nd Ave N	Half and Half One-Way	• Trail located on east side of street • Third house north of 42nd Ave N on west side of street has driveway access to Irving. Therefore greenway trail located on east side of street
1C	Irving Ave N	42nd Ave N	41st Ave N	Full Linear Park Greenway	• All parcels have access from alley • Extend open space feel from cemetery • Greenway type selected in response to input received from several residents along this block
2A	41st Ave N	Irving Ave N	Humboldt Ave N	Off-Street Trail	• Utilize existing street r/w along cemetery to avoid impacting street
2A	Humboldt Ave N	41st Ave N	40th Ave N	Full Linear Park Greenway	• All parcels have access from alley • Extend open space feel from cemetery • New community green space along 40th Ave N (east of greenway to driveway)
2A	Humboldt Ave N	40th Ave N	39th Ave N	Full Linear Park Greenway	• All parcels have access from alley or side street • Extend open space feel from cemetery • New community green space along 39th Ave N (east of greenway to driveway)

Segment	Street	From	To	Greenway Type	Design Consideration
2A	Humboldt Ave N	39th Ave N	Approximately 100 feet North of Dowling Ave N	Full Linear Park Greenway	• All parcels have access from alley • Extend open space feel from cemetery
2A	Humboldt Ave N	Approximately 100 feet north of Dowling Ave N	Approximately 100 feet south of Dowling Ave N	Bike Boulevard	• Provide driveway access to corner commercial building • Large pavement entrance to cemetery did not make trail feasible on either side of street • Provide driveway access to first residential parcel south of Dowling on east side of Humboldt
2A	Humboldt Ave N	Approximately 100 feet south of Dowling Ave N	37th Ave N	Full Linear Park Greenway	• All parcels have access from alley or side street • Extend open space feel from park • New community green space along 37th Ave N (east of greenway to driveways)
2A	Humboldt Ave N	37th Ave N	36th Ave N	Full Linear Park Greenway	• All parcels have access from alley or side street • Extend open space feel from park
2A	36th Ave N	Humboldt Ave N	Irving Ave N	Off-Street Trail	• Off-Street Trail along the south edge of Folwell Park to avoid impacting street
3A	Irving Ave N	36th Ave N	35th Ave N	Full Linear Park Greenway	• All parcels have access from alley or side street • New community green space along 35th Ave N (west and east of the greenway to driveways)
3A	Irving Ave N	35th Ave N	34th Ave N	Full Linear Park Greenway	• All parcels have access from alley or side street • New community green space along 34th Ave N (west and east of the greenway to driveways)
3A	Irving Ave N	34th Ave N	33rd Ave N	Full Linear Park Greenway	• All parcels have access from alley or side street • New community green space along 33rd Ave N (east of the greenway to driveway) • Convert 33rd Ave N to one-way between alley and greenway
3B	Irving Ave N	33rd Ave N	Lowry Ave N	Half and Half One-Way	• Trail located on east side of street • Existing driveway on west side of street. Reconfiguration of garage towards alley could be considered • Existing alley access on west side of street located approximately 200 feet north of Lowry Ave. Alley access is also provided to James Ave N. Closure may be a possibility
3C	Irving Ave N	Lowry Ave N	30th Ave N	Full Linear Park Greenway	• All parcels have access from alley or side street • School bus loading appears to occur on 30th Avenue N. Needs to be confirmed • Maintain vehicular access to school driveway/ parking from 30th Ave N
3C	Irving Ave N corridor	30th Ave N	29th Ave N	Off-Street Trail	• Trail located on west side of school driveway predominately following existing sidewalk

Segment	Street	From	To	Greenway Type	Design Consideration
4A	Irving Ave N	29th Ave N	27th Ave N	Half and Half One-Way	• Trail located on east side of street • Two residential driveways - one on east side and one on west side. Trail crosses east side driveway (2nd parcel north of 27th Ave N) • New community green space along 27th Ave N (east of the greenway to driveway) • Convert 27th Ave N to one-way between driveway and greenway
4B	Irving Ave N	27th Ave N	26th Ave N	Full Linear Park Greenway	• All parcels have access from alley or side street
4C	Irving Ave N	26th Ave N	25th Ave N (east side of Irving Ave N)	Half and Half One-Way	• Provide access to alley on east side of Irving Ave N • Trail located on west side of street
4C	Irving Ave N	25th Ave N (east side of Irving Ave N)	25th Ave N (west side of Irving Ave N)	Half and Half One-Way	• Trail located on west side of street
4C	Intersection of Irving Ave N/ 25th Ave N			Half and Half One-Way	• Reallocates space in large intersection to green space/trail
4C	Irving Ave N (southbound)	25th Ave N	Ilion Ave N	Half and Half One-Way	• Trail located on east side of street • Reallocates space in large intersection to green space/trail • Irving Ave converted to one-way (southbound)
4C	Irving Ave N (southbound)	Ilion Ave N	23rd Ave N	Half and Half One-Way	• Trail located on east side of street • Three residential driveways and one alley access onto street
4D	Irving Ave N	23rd Ave N	22nd Ave N	Full Linear Park Greenway	• All parcels have access from alley or side street • New community green space on a portion of 22nd Ave N to existing residential driveway • Closure on alley access on west side
4D	Irving Ave N	22nd Ave N	Hillside Ave N	Full Linear Park Greenway	• All parcels have access from alley or side street
4E	Irving Ave N	Hillside Ave N	Broadway Ave N	Half and Half Two-Way	• Two-way vehicular circulation needed along Irving Ave. to provide neighborhood and commercial access • Trail located on east side of street (maintain continuity with trail segment south of Broadway Ave N) • Crossing Broadway Avenue at a signalized intersection
5A	Irving Ave N	Broadway Ave N	Golden Valley Road	Half and Half Two-Way	• Two-way vehicular circulation needed along Irving Ave. to provide commercial access • Trail located on east side of street (no alley on east side)

Segment	Street	From	To	Greenway Type	Design Consideration
5B	Irving Ave N*	Golden Valley Road	18th Ave N	Full Linear Park Greenway	• All parcels have access from alley
5C	18th Ave N*	Irving Ave N	James Ave N	Half and Half One-Way	• Provides greenway access to North Commons Park • Trail located on north side of street
5D	Irving Ave N*	18th Ave N	17th Ave N	Full Linear Park Greenway	• All parcels have access from alley • New community green space along 17th Ave N (east of the greenway to the alley) • New community green space along 17th Ave N (west of the greenway to driveways)
5D	Irving Ave N*	17th Ave N	16th Ave N	Full Linear Park Greenway	• All parcels have access from alley or side street
5E	Irving Ave N*	16th Ave N	15th Ave N	Half and Half One-Way	• Access needed to high school parking lot • Trail located on east side of street • Revisions may be necessary based on location of bus loading areas • Investigate feasibility of relocating parking lot access to 16th Ave N

** This segment may be influenced by the future selection of a southern terminus.*

TRAFFIC AND CIRCULATION

A traffic study was completed in October 2012 to determine the potential traffic diversion associated with providing a greenway in north Minneapolis. At the time of the initial traffic study, three route alternatives were under consideration. This study builds upon and refines the 2012 traffic study in response to the selection of a preliminary proposed route for the North Minneapolis Greenway. In order to evaluate the route, daily traffic volumes and additional parking data were collected. One concern is how greenway users would cross the more heavy volume roadways. A tool box of potential solutions was developed to address to this issue, which may need further evaluation as the project proceeds. The route was broken into smaller segments to assess the changing characteristics of each segment.

Data Collection

Vehicular movements/routes and parking would be impacted by three of the four greenway types. To evaluate the potential impacts, traffic volumes and parking data was collected along the proposed greenway route.

Daily Traffic Volumes

The City of Minneapolis routinely collects daily traffic volumes for many of the higher volume roadways in the study area. However, since the potential greenway route is located on low traffic streets, traffic volumes had not been collected on these streets. To supplement the existing data, daily traffic volumes were collected in September 2012 after schools were in session on the three potential routes under consideration at the time. Data from the September 2012 counts that are applicable to the current proposed route are shown in Table 3. Data along the proposed route from 44th Avenue to 47th Avenue was provided by the City of Minneapolis for 2013. The raw data is presented in Appendix B.

TABLE 3 **EXISTING DAILY TRAFFIC VOLUMES**

Roadway Segment	Proposed Route
47th to 44th	2,800 (2013)
44th to Dowling	400 to 500
Dowling to Lowry	500
Lowry to Broadway	No count was taken
Broadway to Plymouth	900

Upon selection of the proposed route, no additional counts were taken in the Lowry to Broadway segment because the roadway system in this segment contains roadway diverters and the volumes should be low in these areas.

Parking Data

Three of the four greenway types include partial or full removal of on-street parking. The proposed greenway would result in approximately 310 parcels facing onto a full linear park greenway type resulting in the loss of on-street parking directly in front of their house. For the Half and Half, One-Way greenway type, approximately 70 parcels would only have access to on-street parking across the street from their house. Finally, approximately 10 parcels face onto a Half and Half, Two-Way greenway type resulting in the loss of on-street parking directly in front of their house. Residential parcels along the proposed route have alley access, with most parcels also having associated off-street parking for at least one vehicle.

In order to determine the impact of removing parking, data was collected in March 2014 during weekday overnight hours when parking demand should be at its peak. It should be noted that due to a winter parking restriction, parking was banned on one side of the street. This allowed data to be collected that closely relates to future greenway conditions if parking is reduced to one side of the street. The data collected included the following:

- Number of parked cars
- No parking zones and handicapped zones
- One-way streets

This raw data is presented in Appendix B. The data was broken down by segment, which is summarized in Table 4. The measurement used is parking density, which is the counted number of parked cars divided by the estimated number of on-street parking spaces. The March 2014 data is compared to the September 2012 data to provide a comparison.

It was noted during the collection that no parking is available after the parking density is approximately two-thirds full. This was due to snow encroachment into the street and inconsistent parked car placement along the street. Gaps between parked cars were not large enough for another parked vehicle, effectively rendering the remaining one-third of possible parking space unavailable for parking.

TABLE 4 **PARKING DENSITY**

Roadway Segment	Proposed Route (September 2012)*	Proposed Route (March 2014)**
44th to Dowling	16%	46%
Dowling to Lowry	16%	42%
Lowry to 26th	18%	61%
26th to Golden Valley	20%	36%
Golden Valley to Plymouth	22%	44%

** Parking allowed on both sides of the street during data collection.*

*** Parking restricted to one side of the street during data collection.*

In addition to the weekday overnight parking count, a weekend peak demand parking count could be considered in the future if it is deemed that weekend days have a potential for a higher parking demand than the typical weekday overnight.

Diversion Analysis

North-South Street Closure Evaluation

The majority of the north-south streets that correspond with the proposed greenway route have traffic volumes that range from 400 to 600 vehicles per day (i.e., approximately 40 to 60 vehicles in the p.m. peak hour). The diversion of these volumes to other existing roadways could be accommodated based on the capacity of the roadways. However, it should be noted that the volume diversions may increase traffic on local streets by up to 50 percent. This would result in a diversion of approximately 20 to 30 additional vehicles onto adjacent north-south roadways during the p.m. peak hour (approximately one additional car every two minutes).

The segment of Humboldt Avenue between 47th Avenue and 44th Avenue has traffic volumes that range from approximately 2,800 to 3,000 vehicles per day. The proposed greenway route would need to accommodate two-way traffic in this segment, as no diversion is possible due to the lack of additional railroad crossings (see Figure 15). The adjacent minor arterial system of Penn Avenue, Fremont/Emerson Avenues, and Lyndale Avenue would be able to accommodate longer trips within the community. The local trips would use the immediately adjacent roadways to arrive at their destinations. It should be noted that special consideration should be provided for roadways that include restricted handicap parking along the north-south streets.

Intersection Closure Evaluation

The intent of the greenway is to provide a continuous and efficient non-motorized transportation route and not require greenway users to stop at every intersection. Therefore, a traffic evaluation was completed to determine which east-west roadways could be closed at the greenway. A closure is defined by the east/west movement through the intersection being closed to through traffic. While an intersection could be closed based on this evaluation, input from the community, emergency responders, and school bus service providers would ultimately determine which cross streets are closed to vehicular traffic. The following methodology was used in completing the evaluation.

Higher Function Roadways

Roads are typically classified based on the extent that they provide mobility (higher function roadways) versus access to adjacent land uses (lower function roadways). Given the important mobility function they play, it is recommended that the roadways listed in Table 5 remain open to east-west traffic at greenway crossings. Closing these roads would likely result in high traffic volumes diverting to adjacent local streets that are not designed to accommodate these traffic volumes. Many, if not all, of these east-west roadways provide connections across Victory Memorial Parkway to overpasses of, or interchanges on, I-94 or Mississippi River crossings.

TABLE 5 **EXISTING DAILY TRAFFIC VOLUMES AND CLASSIFICATIONS**

Roadway	Daily Traffic Volume (vehicles per day)	Roadway Classification
Victory Memorial Parkway	3,100	Major Collector
44th Avenue	4,000 to 5,000	A Minor Arterial
42nd Avenue	4,000	Major Collector
Dowling Avenue	6,000 to 10,000	Major Collector
Lowry Avenue	10,000	B Minor Arterial
26th Avenue	4,000 to 5,000	Major Collector
Broadway Avenue	12,000 to 14,000+	A Minor Arterial
Golden Valley Road	4,000 to 5,000	Major Collector
Plymouth Avenue	12,000	A Minor Arterial

FIGURE 15 **NORTH-SOUTH STREET CLOSURE EVALUATION**

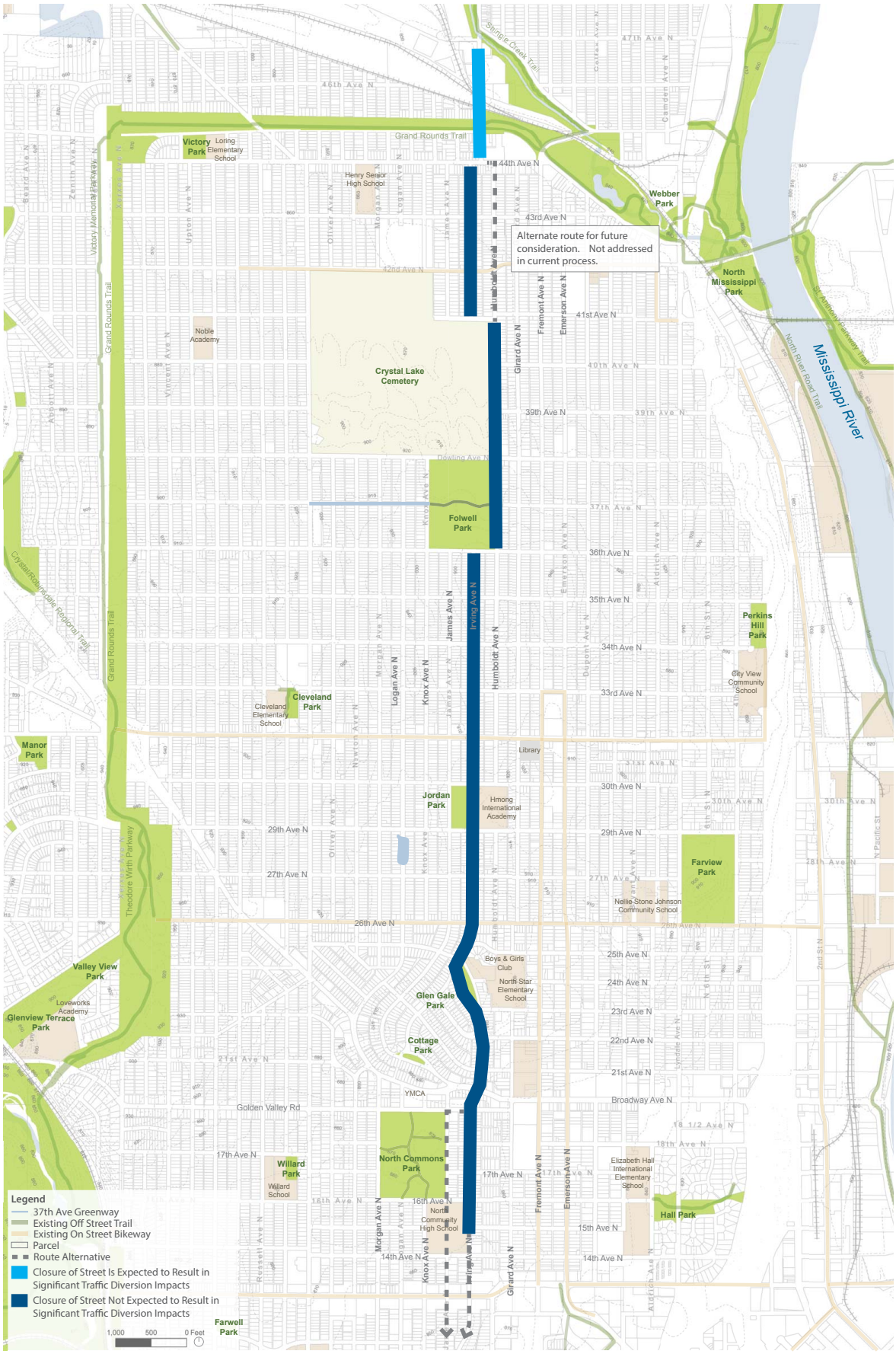


FIGURE 16 **EAST-WEST STREET CLOSURE EVALUATION**

Local Roadways

The proposed greenway route was evaluated for potential impacts associated with intersection closures. The closures would result in traffic diversion, but would not significantly impact the operation of the adjacent roadway network. The results of the evaluation are shown in Figure 16. Based on the daily traffic volumes previously collected, local roadways typically carry 400 to 600 vehicles per day (vpd).

Additional input from residents, emergency responders, and school bus service providers would be necessary before a determination could be made regarding the closure of select east-west connections. Additionally, all efforts should be made to provide advance warning signs of the selected east-west closures to reduce the likelihood of alley cut-through activity. Alleys typically do not provide an efficient route due to minimal alley width, high access, and potential speed humps. Advance signing should help minimize alley cut-through activity. The following east-west crossings were evaluated:

47th Avenue to 44th Avenue

- No roadway closures are possible within this segment.

44th Avenue to 42nd Avenue

- 43rd Avenue could be closed and would expect daily traffic diversion of 500 vpd to the remaining open roadways.

42nd Avenue to Dowling Avenue

- 41st Avenue should remain open to provide a secondary access into the alley and 4100 block of James Avenue.
- 40th and 39th Avenues could be closed. The Crystal Lake Cemetary already severs the connection of these east-west roadways, and therefore, traffic is already being accommodated on 42nd Avenue and Dowling Avenue.

Dowling Avenue to Lowry Avenue

- 37th Avenue could be closed. Folwell Park already severs the east-west connection.
- 36th Avenue to 33rd Avenue
  - Traffic counts were taken for 36th Avenue during the previous phase of the project to determine the number of vehicles using this connection as it provides a connection across Victory Memorial Parkway. 36th Avenue had a traffic count of 1,100 vpd, which is higher than the typical local streets in the area. With this higher than typical daily traffic and the connection across Victory Memorial Parkway, this road should remain open.
  - 34th and 35th Avenues could be closed. These roadways are expected to carry lower traffic volumes.
  - 33rd Avenue could be closed. Lucy Laney Elementary School severs the east-west connection of this street.

Lowry Avenue to 26th Avenue

- 30th Avenue may need to remain open as sidewalks and signing adjacent to the Hmong International Academy would indicate that 30th Avenue is used for school bus staging. This should be confirmed with the school.
- 29th and 27th Avenues could be closed. This area is already severed by roadway diverters resulting in regional traffic using the higher functional roadways.

26th Avenue to Broadway Avenue/Golden Valley Road

- The roadway system in this area is not a grid system, and the extensive use of one-way streets causes some challenges in closing roadways and determining potential diversions.
- All east-west roads are recommended to remain open in this segment, with the exception that Irving Avenue (Northbound) could be disconnected from 25th Avenue at Ilion Avenue.
- Accommodation of the greenway may require that select one-way streets may need to convert to two-ways streets or to one-way streets in the reverse direction.

Golden Valley Road to Plymouth Road

- 18th and 17th Avenues could be closed. These roadways are severed already by the North Commons Park. While 17th Avenue does provide the first east-west connection south of the North High School Football Field for southbound Fremont Avenue, it is expected that vehicles destined to the North Commons Park would turn at Broadway Avenue and not 17th Avenue to access the parking lot. Additionally, 16th Avenue also provides a connection just south of 17th Avenue.
- 16th Avenue should remain open. It carries 1,350 vpd and has a traffic signal at Emerson Avenue and Penn Avenue.
- 15th Avenue could be closed. This roadway is severed already by North Community High School. It should be noted that access would need to be provided to an existing parking lot on the east side of the high school. The lot currently has two driveways onto Irving Avenue.
  - Additionally, as part of the proposed route, Irving Avenue would be a southbound one-way roadway. Due to safety concerns for both vehicles and greenway users, 15th Avenue could be closed resulting in fewer conflicts and illegal vehicle maneuvers of vehicles going northbound on Irving Avenue from 15th Avenue to access the high school parking lots.
- 14th Avenue should remain open as it carries 1,350 vpd.

Greenway and Roadway Crossings

The greenway would cross roadways of varying traffic volumes. The following is a guide of traffic control devices and roadway improvements to consider for appropriately responding to roadway traffic volumes. All roadway crossings would be studied for individual crossing treatment.

All Crossings

- Provide lighting for the greenway/roadway crossing.
- Clear and maintain crossing/stopping sight distance for bicyclists, pedestrians, and motorists.
- Install appropriate trail crossing warning signs.

Local Roadways

Roadways with less than 1,000 vpd.

- Depending on the greenway type, most of these street crossings could be closed. The greenway would have unimpeded movement, which results in the safest crossing for greenway users.
- In the case of a full east-west closure, additional parking may be provided in the right-of-way of the closed east-west streets to accommodate lost parking from north-south closures. Additionally, a turn-around area for vehicles should be provided to accommodate vehicles that did not divert from the east-west route.
- The greenway route could have the right-of-way at intersections. The roadway being crossed would be stop controlled.
- Curb bump-outs and/or median islands could be installed in the roadway being crossed to reinforce the greenway crossing.

Moderate Volume Roadways

Roadways with 1,000 to 8,000 vpd; 44th, 42nd, 26th, and 14th Avenues, and Golden Valley Road.

- A nearby all-way stop intersection could possibly be relocated to the greenway crossing.
- The pathway alignment for the greenway could be offset at the roadway, which would require bicyclists to slow down as they approached the roadway.
- An activated pedestrian warning system could be installed.
- Curb bump-outs and/or median islands could be installed in the roadway being crossed to reinforce the greenway crossing.
- Mark the crosswalk with high visibility markings.

Higher Volume Roadways

Roadways with more than 8,000 vpd; Dowling, Lowry, and Broadway Avenue.

- The pathway alignment for the greenway could be offset at the roadway, which would require bicyclists to slow down as they approached the roadway.
- An activated pedestrian warning system could be installed.
- Curb bump-outs and/or median islands could be installed in the roadway to reinforce the greenway crossing.
- A traffic signal could be installed.

Traffic and Circulation Findings

The following findings are based on traffic volume data, roadway classifications, and parking data for the proposed greenway route and greenway types under consideration:

- The following east-west roadways should not be closed by the greenway:
  - 44th Avenue/Webber Parkway
  - 43rd Avenue
  - 42nd Avenue
  - 41st Avenue
  - Dowling Avenue
  - 36th Avenue
  - Lowry Avenue
  - 27th Avenue
  - 26th Avenue to Golden Valley Road
  - 16th Avenue
  - 14th Avenue
- The east-west roadways along the remainder of the route are estimated to carry 400 to 600 vpd and could be closed to accommodate approximately one-quarter mile stretches of continuous, unimpeded greenway. An east-west roadway closure would provide the safest greenway crossing due to the elimination of vehicle conflicts.
- While these remaining east-west crossings could be closed, additional input from residents, emergency responders, and school bus service providers would be necessary before any recommendations on which east-west connections would be closed.
- The continuous, unimpeded greenway should be balanced with providing adequate neighborhood and emergency vehicle access. Options to closure that could be considered include bump-outs and medians at intersections to reduce speeds through intersections and provide a safer crossing for bicycles using the greenway.
- All of the blocks along the proposed greenway route have alleys that could provide vehicular access to individual parcels if north-south roadways are removed or converted to one-way streets. Alleys do not provide a quick cut-through route because of the minimal roadway width, high access, and potential for speed humps; therefore, it is expected that there would be minimal vehicular traffic using the alley as a cut-through. Fur-

thermore, proper roadway closure signing provided ahead of the intersection should minimize alley cut-through activity.

- Parking density or utilization for the proposed greenway route ranged from 20 to 30 percent during the fall typical peak parking demand and from 40 to 60 percent during the winter (restriction in effect; parking on one-side only) typical peak parking demand. Therefore, if on-street parking is removed from the greenway, the displaced parking could be accommodated on adjacent streets. Providing parking on one-side of the roadway would also provide an adequate supply. In the winter months, issues may arise with parking supply if the one-sided parking ban is in effect. Since these parking bans are not of a constant duration, it is expected that vehicles may have to park along adjacent roadways.

ALTERNATIVE INTERSECTION CONCEPTS

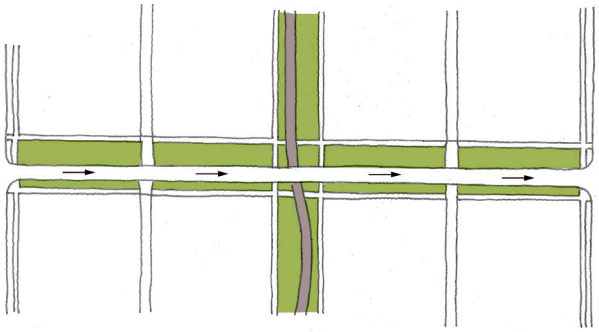
While some intersections could be closed as they are not critical to cross-city movement and the diversion of traffic from these closed intersections could be adequately handled by adjacent intersection, the community may not want to close them or there may be planning or operational issues that discourage closure. To address this situation, several concepts (see Figure 17) were developed that would maintain priority for greenway users, yet still allow vehicles to cross the greenway:

- **Concept A** converts the cross street for one block on either side of the greenway into a one-way street with parking on one side. Traffic on the one-way cross street could be signed to stop prior to crossing the greenway or signed to yield to greenway users.
- **Concept B** uses a raised intersection constructed of an alternative paving material to indicate to vehicles that they are entering a unique area. Traffic on the cross street could be signed to stop at the raised intersection to provide priority to the greenway users.
- **Concept C** incorporates a choker at the intersection. The cross street would be narrowed to one travel lane with vehicles needing to give way to opposing traffic. As with the previous concepts, traffic on the cross street could be signed to stop at the choker to provide priority to the greenway users.
- **Concept D** uses an approach where the intersection is designed for shared use by all modes of transportation. Physical obstructions placed in the intersection require vehicles to pass through the intersection at very slow speeds.

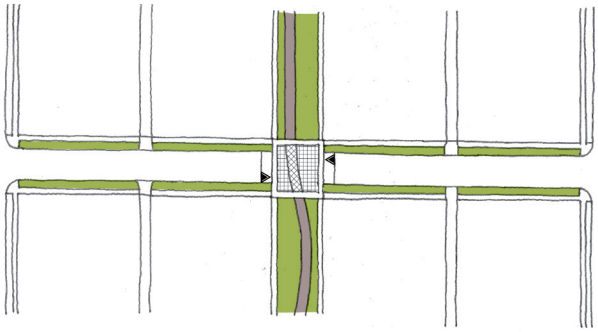
In addition, concern was expressed regarding how snow plowing could be accommodated on streets where the intersections are closed. These concepts would allow snow plows to pass through the intersection.

FIGURE 17 **ALTERNATIVE INTERSECTION CONCEPTS**

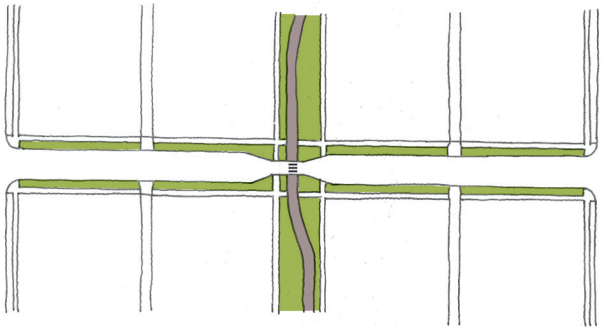
Concept A



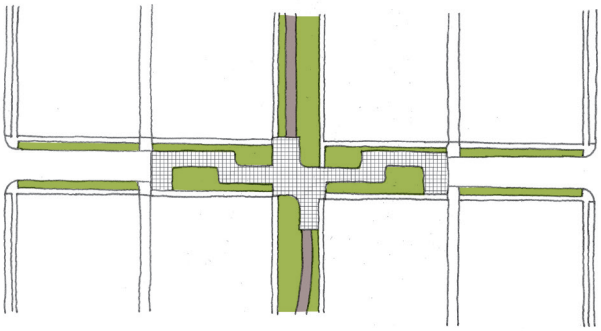
Concept B



Concept C



Concept D



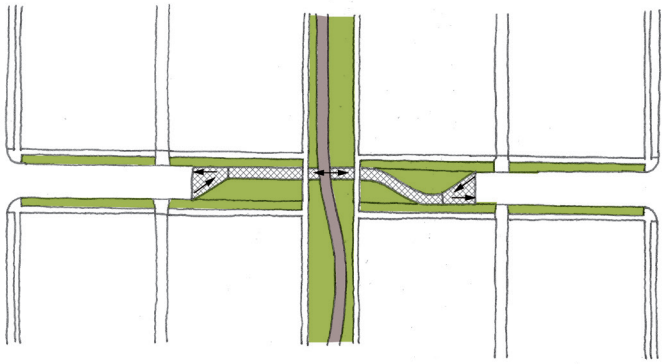
ALTERNATIVE CROSS STREET CLOSURE CONCEPTS

If it is determined that select intersections should be closed, an intersection concept was developed that expands upon the concept of cross street trail access that could be used by emergency vehicles and snow plows as depicted in Concept A (see Figure 18). Instead of a bituminous trail, the cross access narrows to a single, narrow travel lane constructed from an alternative paving material, such as concrete pavers that provide a visual clue, in addition to signage, that this pathway is not for vehicular use.

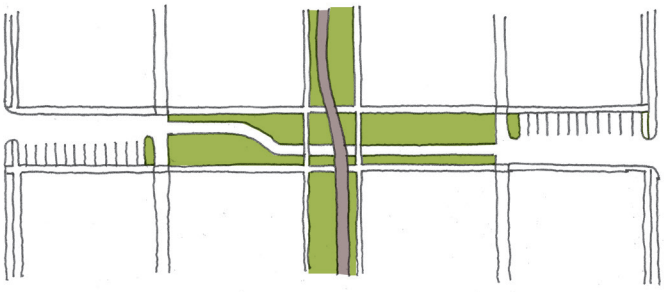
An alternative approach repurposes the cross street to a parking lot that still provides alley access. In Concept B (see Figure 18), the drive aisle of the parking lot also provides access to the alley. Emergency vehicle access would be provided via a bituminous trail off of the parking lot. This approach replaces some of the on-street parking that would be lost to the Full Linear Park greenway type. The challenge of this approach is for the community to take ownership and maintenance responsibility for the newly created parking lot located on the cross street.

FIGURE 18 **ALTERNATIVE CROSS STREET CLOSURE CONCEPTS**

Concept A



Concept B



POTENTIAL UTILITY IMPACTS

The following city utility mapping was reviewed to determine if any of the greenway types would pose significant impacts to existing underground utilities, which are typically located within the street right-of-way:

- Storm drainage
- Sanitary sewer
- Watermain

While significant impacts are not anticipated based on overlaying the proposed greenway route over the city's utility mapping (see Appendix C), some utility impacts are expected. Anticipated typical utility impacts include:

- Storm inlet modifications due to roadway narrowing and intersection closures
- Fire hydrant relocations
- Potential manhole adjustments due to street narrowing or changes in grades
- Traffic signal pole or cabinet relocations
- Street light or cabinet relocations due to road narrowing, intersection modifications, or street light replacement

LIGHTING

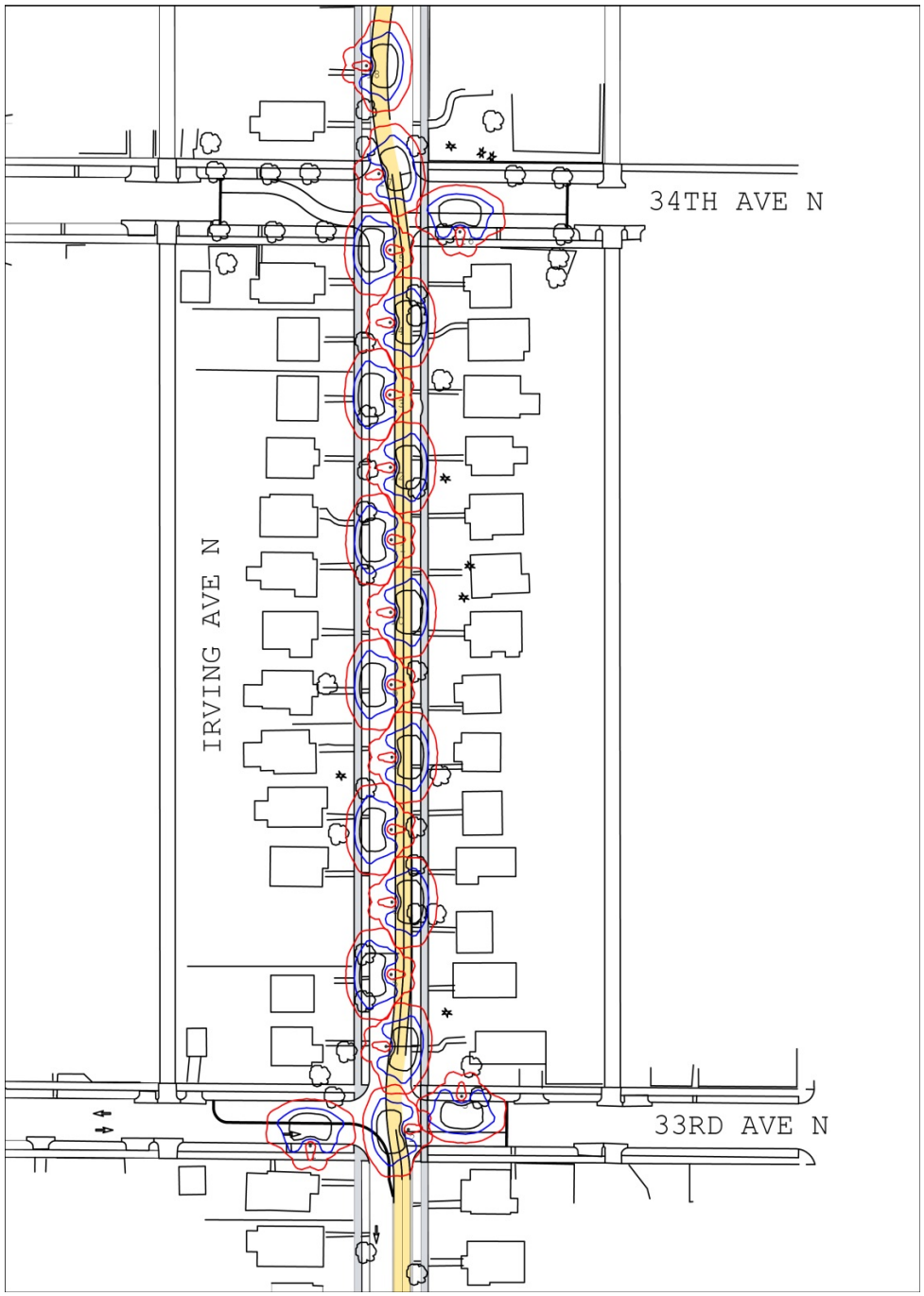
Early in the public engagement process, the desire for enhanced lighting along the greenway was expressed by the Greenway Outreach Steering Committee. Many residential street intersections in the city are lit by a luminaire that is affixed to a tall wooden pole. One additionalluminaire/wood pole is placed mid-block to supplement the intersection lighting. The Committee expressed interest in lighting all sidewalks and the trail in the greenway to be consistent with the City's pedestrian corridor light level standards.

Lighting concepts were developed for one representative block of the Full Linear Park; Half and Half, One-Way; and Half and Half, Two-Way greenway types. The layout concepts were based on the following assumptions:

- Use of a city standard luminaire and 15-foot pole
- Desired average illumination levels of 0.8 to 1.2 foot candles on the trail, all sidewalks, and roadway (if applicable)
- Desired average/minimum illumination ratio of 3:1 for trails, sidewalks, and roadways

For the Full Linear Park greenway type, the lights were placed 3.25 feet from the west edge of the trail with alternating luminaire orientations. For both Half and Half greenway types, lights were placed on both sides of the street in the boulevards. The representative lighting layouts that met the desired illumination levels, along with detailed lighting results are presented in Figures 19 – 21.

FIGURE 19 **LIGHTING ANALYSIS: FULL LINEAR PARK GREENWAY**



Luminaire Schedule

Symbol	Qty	Label	Arrangement	LLF	Description
	18	AUL0704KASXL3X	Single	0.900	Holophane Arlington Lantern, 70W LED, Post Top, L3 Full Cutoff Flat Glass

Calculation Summary

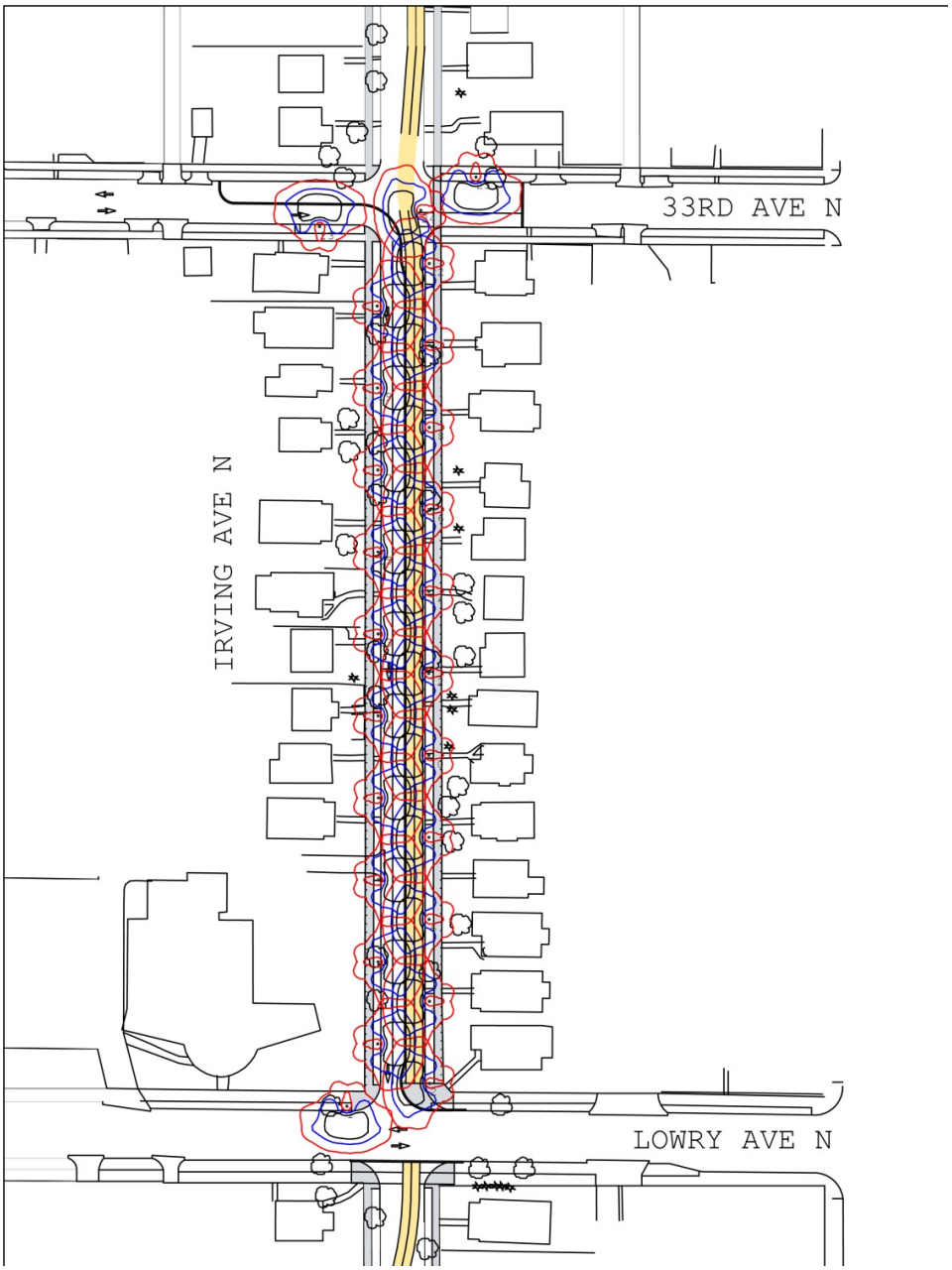
Label	CalcType	Units	Ave	Max	Min	Ave/Min
01 - SW East	Illuminance	Fc	0.74	1.80	0.25	2.96
01 - SW West	Illuminance	Fc	0.79	1.92	0.28	2.82
01 - Trail	Illuminance	Fc	1.29	3.01	0.45	2.87

Requirements:
Average: 0.8 To 1.2 Fc
Ratio: 3:1

Trail, East Sidewalk, and West Sidewalk
Spacing: 51.5'
Offset: 3.25' from west edge of trail

The use of the city standard luminaire, which is configured to throw most of the light onto a street surface, makes it difficult to achieve the desired illumination levels on the sidewalks without overlighting the street. The combination of luminaire and desired illumination levels results in tight light spacing and high estimated cost, particularly for the Half and Half greenway types. In addition, the layout results in high maximum light levels and average/minimum ratios on the street and trail. The bright light levels in these areas may not be well received by adjacent property owners.

FIGURE 20 **LIGHTING ANALYSIS: HALF AND HALF, ONE-WAY**



Luminaire Schedule

Symbol	Qty	Label	Arrangement	LLF	Description
	25	AUL0704KASXL3X	Single	0.900	Holophane Arlington Lantern, 70W LED, Post Top, L3 Full Cutoff Flat Glass

Calculation Summary

Label	CalcType	Units	Ave	Max	Min	Ave/Min
03 - Irving Ave N	Illuminance	Fc	2.67	3.80	0.72	3.71
03 - SW East	Illuminance	Fc	0.82	1.69	0.37	2.22
03 - SW West	Illuminance	Fc	0.82	1.67	0.34	2.41
03 - Trail	Illuminance	Fc	2.78	4.04	1.04	2.67

Requirements:
Average: 0.8 To 1.2 Fc
Ratio: 3:1

Trail and East Sidewalk
Spacing: 58.0'
Offset: 3.25' from west edge of east sidewalk

West Sidewalk
Spacing: 58.0'
Offset: 3.25' from east edge of west sidewalk

FIGURE 21 **LIGHTING ANALYSIS: HALF AND HALF, TWO-WAY**

Luminaire Schedule

Symbol	Qty	Label	Arrangement	LLF	Description
	28	AUL0704KASXL3X	Single	0.900	Holophane Arlington Lantern, 70W LED, Post Top, L3 Full Cutoff Flat Glass

Calculation Summary

Label	CalcType	Units	Ave	Max	Min	Ave/Min
04 - East SW	Illuminance	Fc	0.84	1.77	0.34	2.47
04 - Humboldt Ave N	Illuminance	Fc	2.95	4.94	1.35	2.19
04 - Trail	Illuminance	Fc	0.81	2.89	0.33	2.45

Requirements:
Average: 0.8 To 1.2 Fc
Ratio: 3:1

Trail
Spacing: 50.0'
Offset: 3.25' from east edge of trail

Sidewalk
Spacing: 60.0'
Offset: 3.25' from west edge of sidewalk

STORMWATER MANAGEMENT OPPORTUNITIES

There are several locations along, or adjacent to, the proposed greenway route where there are known flooding problems. New open space associated with the greenway could provide a community amenity and also help manage known flooding problems in the community. Figure 22 depicts existing storm pipes in North Minneapolis and their associated pipesheds, along with known flood areas. This study did not research the extent of flooding associated with the designated flood areas. Rather, several feasible stormwater management approaches were developed that could address some or all of the flooding issues dependant on underlying soil conditions. If the TAC finds any of these approaches of interest, additional analysis would need to be performed to test their effectiveness using actual flood and soils data.

Flood area #6, shown in Figure 22, could receive the most benefit from the addition of stormwater management within the greenway as the greenway is located upstream of the capacity restriction at Lyndale Avenue N. Stormwater management approaches that may be appropriate for incorporation into the greenway include deep rain gardens or large pipe storage. Deep rain gardens could capture and infiltrate runoff from the adjacent trail, sidewalks, and front yards and reduce the volume of runoff reaching the flood area. Large pipe storage could intercept runoff from the upstream pipes and adjacent surface runoff. The captured runoff could be held in oversized pipes and then slowly released after the peak flood period or infiltrated. Figures 23-25 depict how the deep rain garden and large pipe storage could fit into the greenway. For the large pipe storage, the trail would need to be located either over the large pipe (Option A) or over the watermain (Option B).

Implementation of shallow rain gardens within the greenway could provide benefits to flood areas #5 and #55, as runoff from the greenway passes through these areas. If runoff could be captured and infiltrated in the greenway, this would reduce the volume of water passing through these flood areas. While flood areas #3 and #37 already have projects completed to address flooding for these areas, additional benefit could be achieved by providing shallow rain gardens in the greenway to reduce the volume of water reaching these flood prone areas. Figures 26 and 27 depict how the shallow rain gardens could fit into the greenway. The rain gardens would need to be located either in close proximity to the watermain and sanitary sewer (Option A) or the trail would need to be located over the watermain (Option B).

Stormwater management in the greenway would likely not impact flood areas #8 and #64 as the drainage from the greenway does not pass through these flood areas.

In addition to benefits provided to known flood areas, stormwater management opportunities exist in the greenway to further reduce the volume and improve the quality of stormwater runoff reaching the Mississippi River through the use of pipe storage with infiltration, shallow and deep rain gardens, SAFL baffles, or hydrodynamic devices. Figure 22 depicts locations where these measures could be incorporated into the greenway. Table 6 provides definitions of these various approaches and benefits they provide.

TABLE 6 **STORMWATER FEATURES**

Stormwater Feature	Description	Stormwater Treatment			Greenway Type
		Volume Control	Rate Control	Water Quality	
Shallow Rain Garden	Treats runoff from trail, sidewalks, and front yards.	X		X	Full Linear Park Greenway
Deep Rain Garden	Treats runoff from trail, sidewalks, and front yards upstream of known flood areas.	X	X	X	Full Linear Park Greenway
Large Pipe Storage	Flow rate reduction upstream of known flood areas.		X		Full Linear Park Greenway Half and Half, One-Way
Large Pipe Storage (Infiltration)	Flow rate reduction upstream of known flood areas/infiltration.	X	X	X	Full Linear Park Greenway Half and Half, One-Way
Hydrodynamic Device	Reduces sediments and floatables from trunk systems crossing the greenway when upstream watershed could be adequately treated (approximately 30 acres or less).			X	All
SAFL Baffle	Reduces sediment and floatables from greenway runoff prior to runoff entering trunk system.			X	All

FIGURE 22 **STORMWATER MANAGEMENT OPPORTUNITIES**

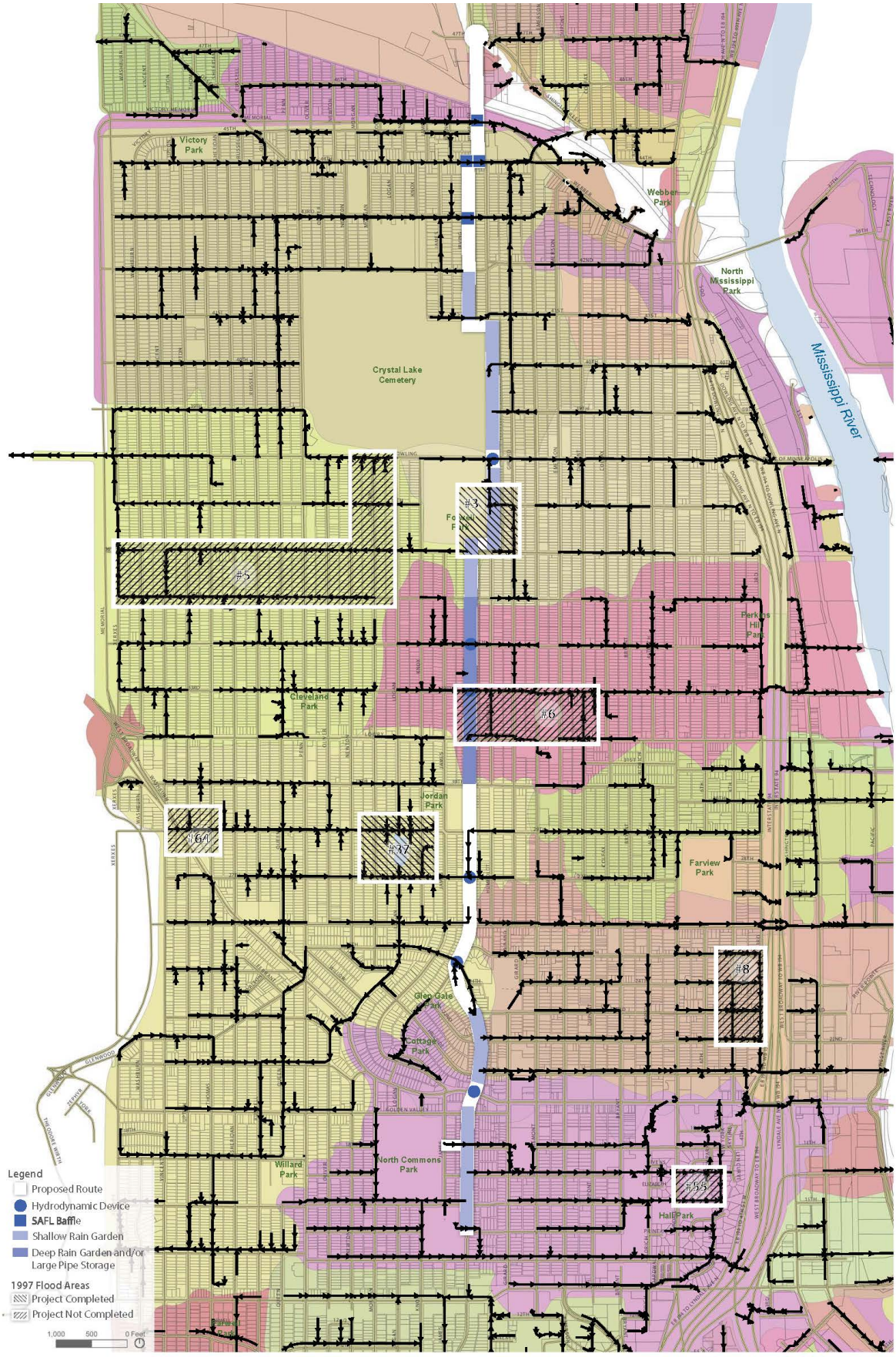


FIGURE 23 **DEEP RAIN GARDEN: SECTION**

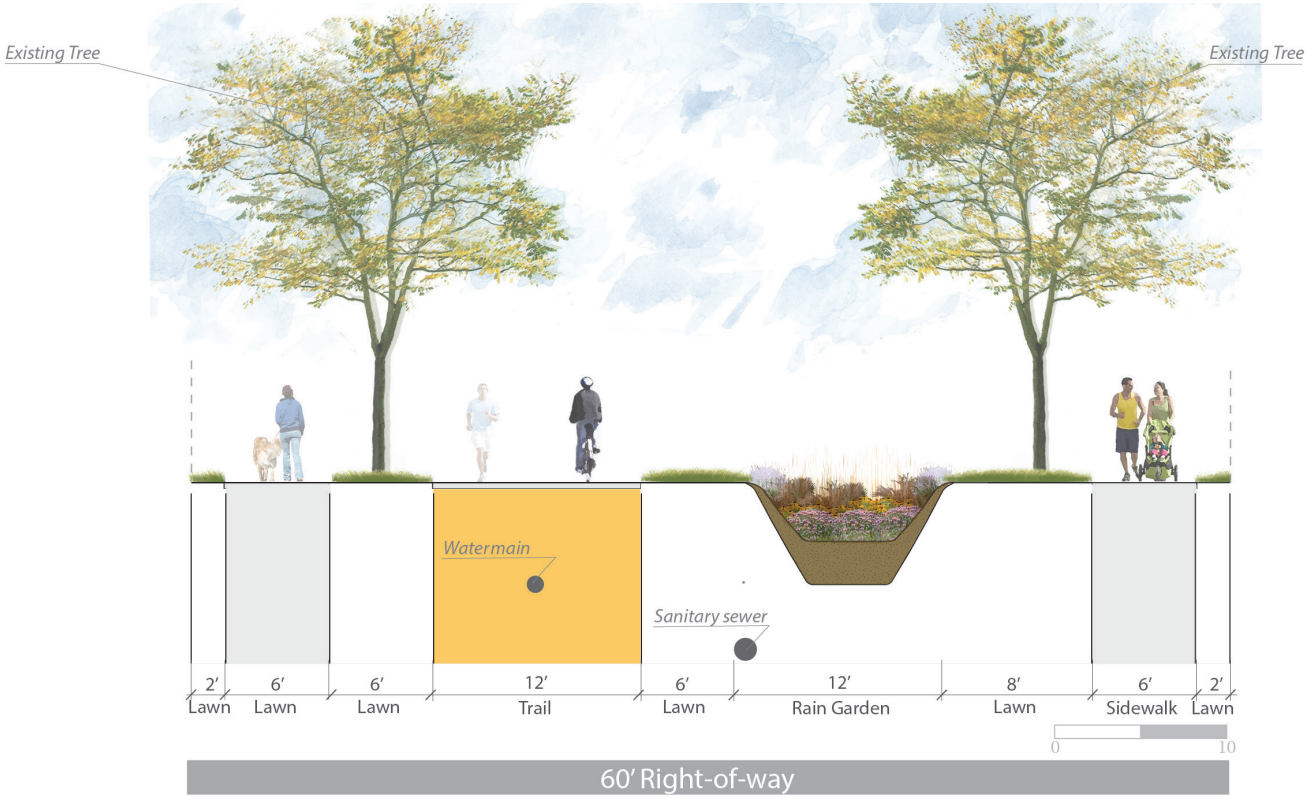


FIGURE 24 **LARGE PIPE STORAGE (OPTION A): SECTION**

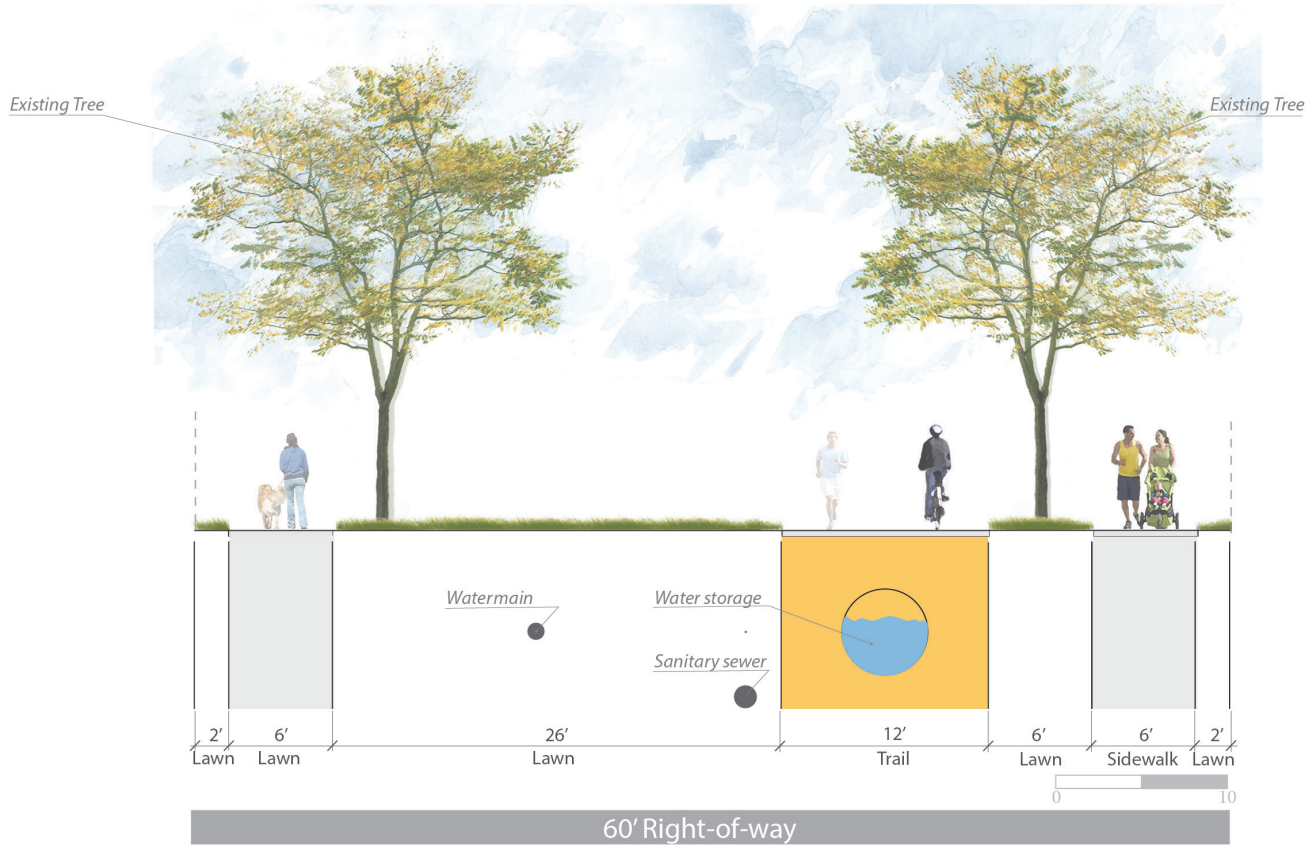


FIGURE 25 **LARGE PIPE STORAGE (OPTION B): SECTION**

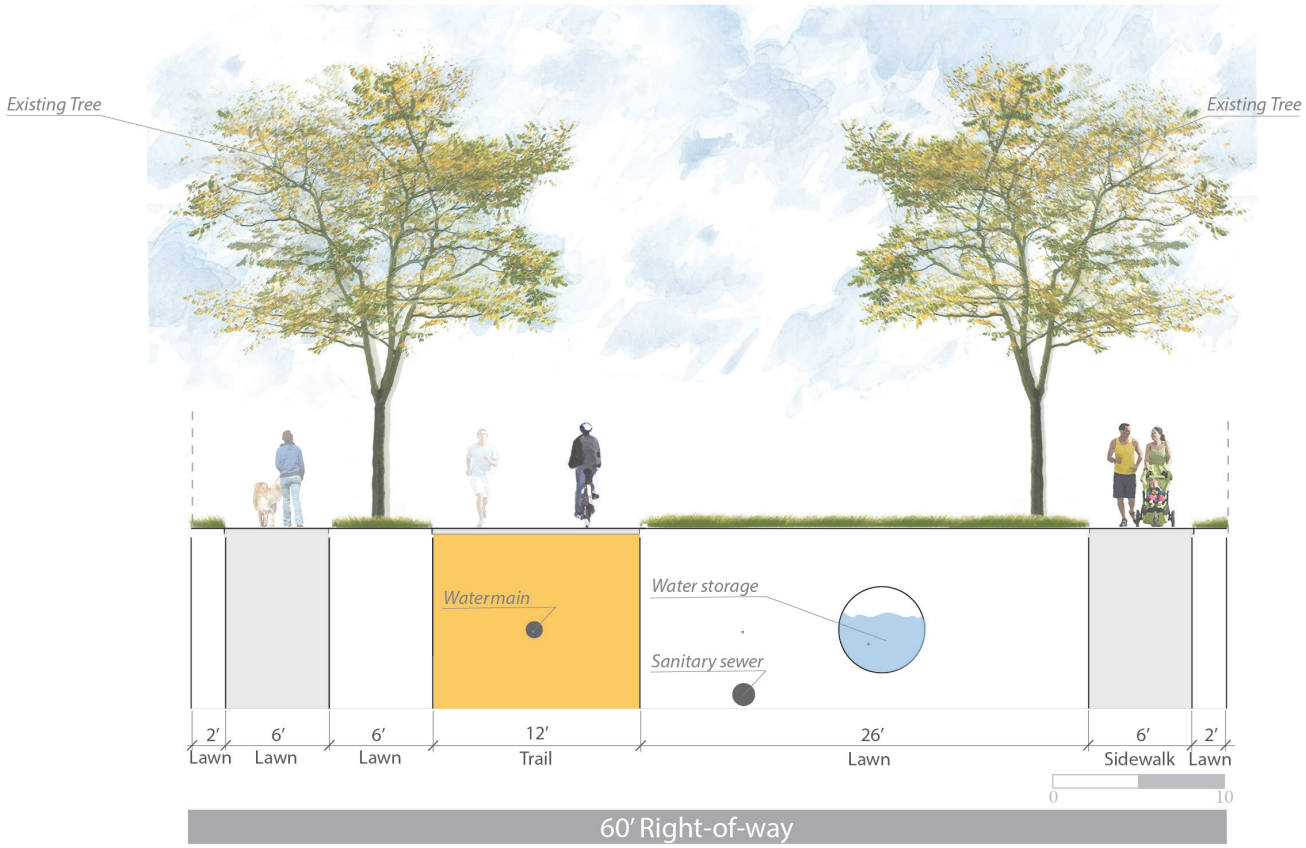


FIGURE 26 **SHALLOW RAIN GARDENS (OPTION A): SECTION**

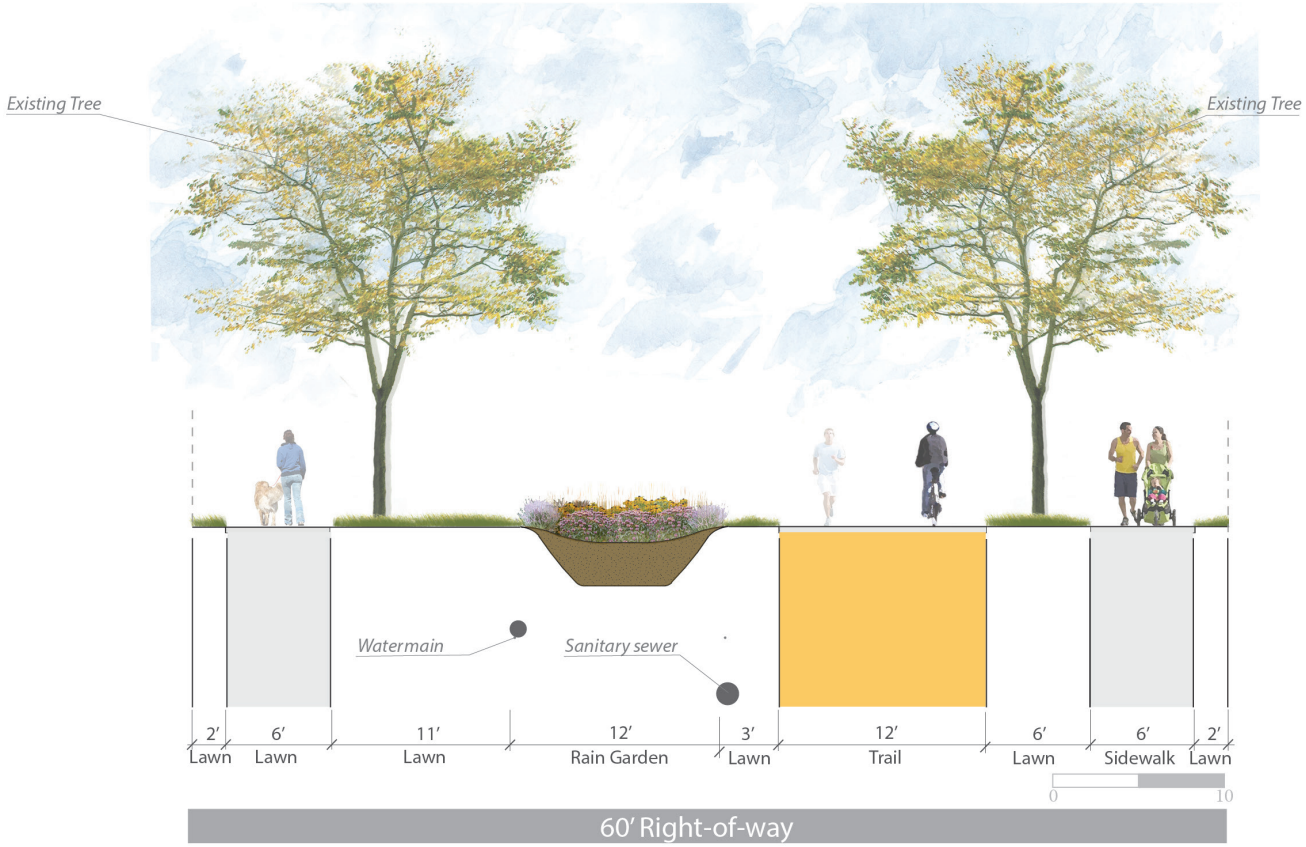
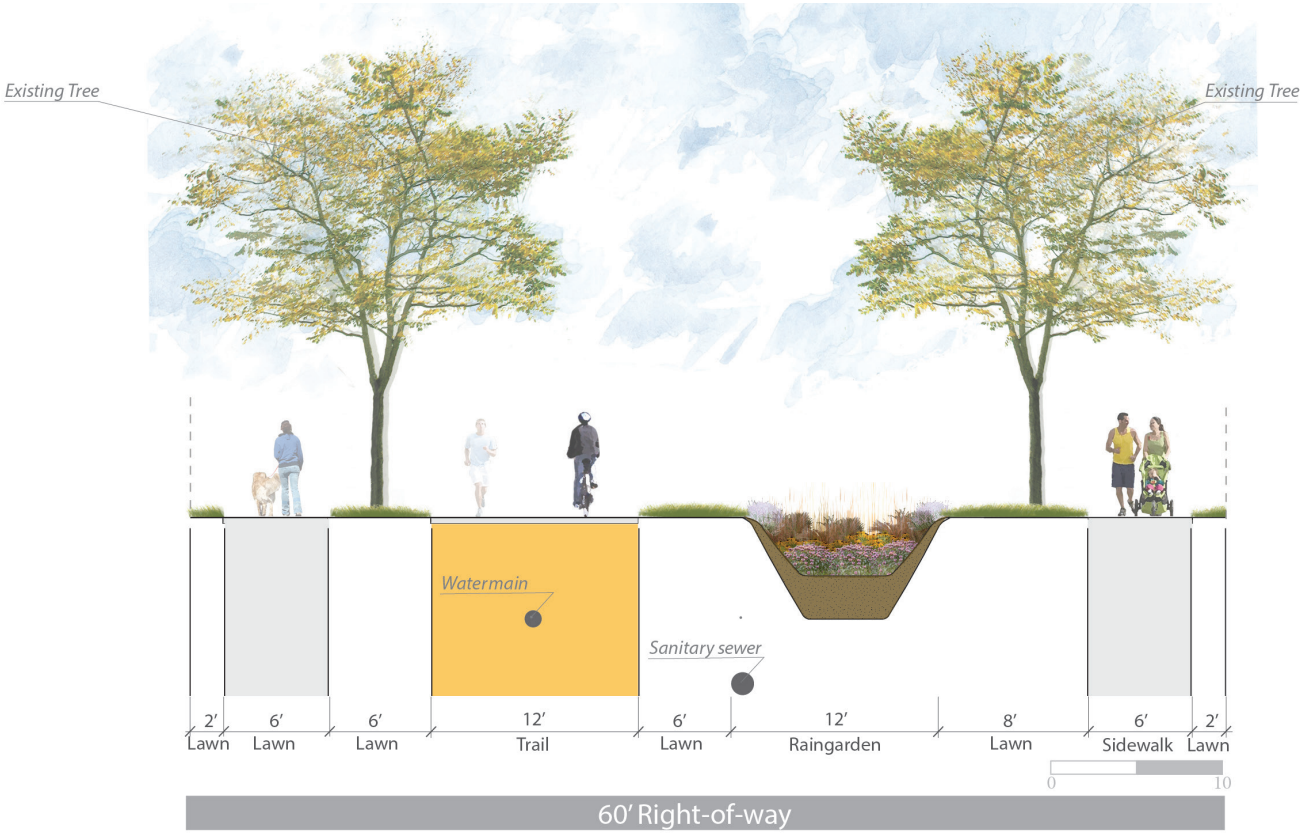


FIGURE 27 **SHALLOW RAIN GARDENS (OPTION B): SECTION**



PRELIMINARY ESTIMATED COST

A preliminary estimated cost was developed for the proposed route from Humboldt Ave N at 47th Ave N to Irving Ave N at 15th Ave N that reflects the greenway types depicted in Figure 1. Estimated costs were developed for each greenway type segment along the proposed route as summarized in Table 7.

Given the conceptual nature of the greenway at this stage of the process, the preliminary estimated cost is based on a number of assumptions:

- Costs assume 2014 construction.
- Amenities that could be included in the greenway are not yet defined, but could include a range of features, such as stormwater management elements, garage and driveway reconstruction, public art, landscaping, play equipment, safety cameras and call boxes, and site furniture. For the purpose of this exercise, an estimated amenity cost equaling 50 percent of the total estimated greenway construction cost was assumed for the full Linear Park greenway type and an estimated amenity cost equaling 25 percent of the total estimated greenway construction cost was assumed for both of the Half and Half greenway types.
- Land acquisition would not be required.
- Major private or public utility relocation would not be required.
- Most existing street trees would be preserved for the Full Linear Park and Half and Half, One-Way greenway types.
- Street trees adjacent to the new trail would need to be replaced for the Half and Half, Two-Way greenway type.
- Trails that provide emergency vehicle access would be designed to withstand the additional vehicle weight load.

Additional detailed cost assumptions are presented in Appendix C.

As the project progresses, these assumptions will need to be clarified and refined. Detailed cost estimates for each of the route segments are presented in Appendix C.

TABLE 7 **PRELIMINARY CONSTRUCTION ESTIMATE**

Segment	Greenway Type	Preliminary Construction Estimate
1A	1/2 & 1/2 Two-way	$1,800,000
1B	1/2 &1/2 One-way	$1,153,000
1C	Full Linear	$386,000
2A	Full Linear	$3,508,000
3A	Full Linear	$1,669,000
3B	1/2 &1/2 One-way	$606,000
3C	Full Linear	$1,039,000
4A	1/2 &1/2 One-way	$606,000
4B	Full Linear	$542,000
4C	1/2 &1/2 One-way	$1,187,000
4D	Full Linear	$766,000
4E	1/2 & 1/2 Two-way	$314,000
5A	1/2 & 1/2 Two-way	$319,000
5B	Full Linear	$386,000
5C	1/2 &1/2 One-way	$304,000
5D	Full Linear	$798,000
5E	1/2 &1/2 One-way	$352,000
Total		**$15,735,000**

NEXT STEPS

ADDITIONAL GREENWAY ANALYSES

Work tasks performed as part of this effort helped the TAC to identify additional analysis that could be performed as the project moves into the next phase of conceptual design.

Parking, Traffic, and Circulation

- Feedback received on the parking analysis indicated that weekend day parking demand may exceed weekday overnight parking demand. There was also interest expressed in knowing the parking counts on the adjacent east-west cross streets, as it was expected that vehicle parking would likely migrate to these cross streets if it is removed from the predominantly north-south oriented greenway route. Therefore, there may be interest in performing another parking count to better understand the full potential impact of eliminating parking on the full Linear Park and Half and Half, Two-Way greenway type segments and restricting parking to one side of the street for the Half and Half, One-Way greenway type. The parking study could also investigate potential parking impacts to the adjacent cross streets.
- Minneapolis streets typically use a stop sign basket weave approach to control traffic, where stop signs are placed every two blocks along both north-south streets and east-west streets; essentially creating a "basket weave" of stop signs. The existing stop sign basket weave should be reviewed on adjacent streets. This step would take place after a preferred greenway route is selected. Due to the current uncertainty of the proposed route and assignment of greenway types to route segments, a final recommendation on the stop sign basket weave, would be premature at this time. It is also a possibility that the existing stop sign basket weave would remain the same with the greenway providing minor interruptions in the pattern.
- In areas of existing roadway diverters and one-way streets, additional evaluation would be needed to ensure that appropriate access could be provided to all roadways. This may result in some of the existing roadway diverters being opened or changing the direction of one-way traffic. This task must also be performed after selection of a preferred greenway route.
- The concept is at a point where a review could be performed by emergency responders and school bus service providers to determine if the greenway concept needs modification to minimize or avoid impacts to emergency and school bus service.

Lighting

The TAC may want to perform additional lighting analysis to develop an approach that reduces excessive illumination levels on the street and trail and reduces lighting costs. The TAC may want to investigate modifying the illumination levels for the sidewalks or the luminaire styles or pole heights used.

Utilities

If the greenway concept advances to a stage where the City has selected a preferred greenway route, the City may want to perform a Gopher State One Call design locate for private utilities. This would identify any significant underground utilities along the proposed route. In addition, site surveys and visits could be performed to better identify and locate utilities (e.g., service cabinets, light poles) along the preferred greenway route.

Stormwater Management

The concept is at a point where City water resource staff could review the proposed stormwater management concepts to determine if they are interested in investigating and refining the proposed stormwater management approaches further.

The North Minneapolis Greenway would pass through three watershed management organizations:

- Mississippi Watershed Management Organization
- Bassett Creek Watershed Management Commission
- Shingle Creek Watershed Management Commission

If the TAC chooses to pursue any of the stormwater management or treatment approaches suggested in the progress report, discussions should be initiated with the appropriate watershed management organization to see if that organization has interest in jointly pursuing the implementation of the suggested stormwater management approach as part of the greenway.

Operations and Maintenance Implications

The concept should be reviewed by City operations and maintenance staff to determine if the greenway concept needs modification to minimize future operations and maintenance activities. In addition, future greenway operation and maintenance tasks and frequency should be identified and estimated operations and maintenance costs developed to gain a better understanding of operation and maintenance implications for the greenway.

Refine Layout and Estimated Construction Costs

Based on outcomes of related planning studies, review by other City departments, and feedback received as part of the related community engagement process, the following modifications should be made to the greenway concept:

- Revise the proposed greenway route and greenway types along the route.
- Select a proposed route and terminus for the greenway south of Golden Valley Road.
- Investigate potential driveway/garage modifications that would allow blocks that are currently shown as a Half and Half, One-Way greenway type to be changed to the Full Linear Parkway greenway type, if community input indicates interest in this greenway type.
- Revise the trail alignment within the street right-of-way to minimize utility impacts.
- Develop detailed intersection treatments and crossing concepts.
- Add desired amenities to the greenway concept. This would entail defining a process to identify and evaluate various amenity options.