6. TRANSPORTATION

OVERVIEW

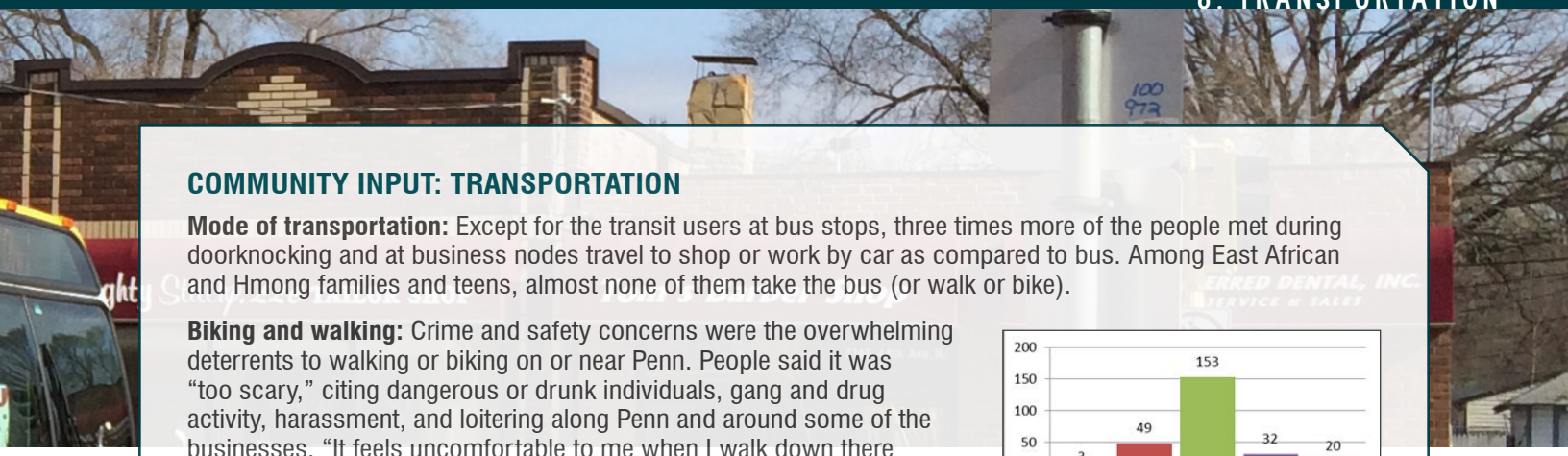
Key Concept:

Penn Avenue and Osseo Road are located in the City of Minneapolis, but they are owned and maintained by Hennepin County

The Transportation chapter provides an overview of the existing and planned transportation network in the multi-modal Penn Avenue corridor.

The chapter is broken into four main pieces. The first piece discusses the existing physical layout of the transportation facilities in the corridor (i.e. roadway width, sidewalk network, etc.). The remaining four sections discuss the following topics in the corridor:

- Pedestrians
- Bicycles
- Motor Vehicle Traffic
- Transit Service

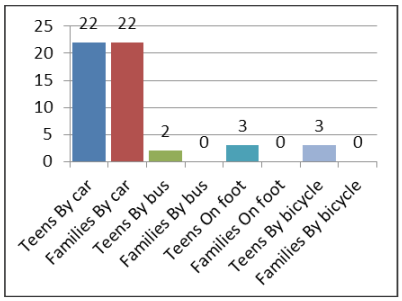


COMMUNITY INPUT: TRANSPORTATION

Mode of transportation: Except for the transit users at bus stops, three times more of the people met during doorknocking and at business nodes travel to shop or work by car as compared to bus. Among East African and Hmong families and teens, almost none of them take the bus (or walk or bike).

Biking and walking: Crime and safety concerns were the overwhelming deterrents to walking or biking on or near Penn. People said it was "too scary," citing dangerous or drunk individuals, gang and drug activity, harassment, and loitering along Penn and around some of the businesses. "It feels uncomfortable to me when I walk down there and makes me scared to go near Penn." One teen said, "It's hard to be independent because I need to use Penn to do a lot of things and I can't because after dark, people start doing bad stuff." Another said, "We don't walk or bike on Penn because our parents will not let us for security reasons."

Speeding cars make walking and biking dangerous." Some people mentioned their age or physical abilities as barriers to walking or biking along Penn. Others are concerned about traffic speed making it dangerous to either bike or walk, and suggest reducing and enforcing the speed limit, or adding stop lights both to reduce speeds and make crossing easier. There were a number of comments regarding more and better-marked crosswalks, and one person said there needs to be more control over pedestrian crossing because some pedestrians cross while the pedestrian signal is red. Residents asked for more and higher-quality bike lanes as well as bike lanes with roundabouts.



Many people cited the need for more and better lighting and for the existing lights to be fixed. Others talked about needing better sidewalks, wider sidewalks, and for sidewalks to be repaired. Other sugguestions from residents included public art in the roadway such as road paintings, and walking paths and walkways to parks. One resident suggested "we could get to local parks more easily if we understood Nice Ride."

Bus stops and access: Transit users asked for better lighting along streets and at bus stops, and longer traffic signals to cross the street. Large numbers of people walked to the stops and noted the need for better sidewalk connections, better sidewalks for those who are disabled and better handicap ramps, and trees by the bus stops to provide shade. Riders asked for relief from harassment from non-transit users and suggested moving the bus stops away from liquor stores. Many asked for benches at every bus stop, better lighting, and heated shelters, and some suggested safer pedestrian walkways and space for bicycles at the stops.

Bus appeal: Lots of transit riders recommended on-time service and cheaper or even free fares, as well as bus passes for college students and discounts for children during rush hour. One resident said he will never take the bus because he can't read English. Transit riders asked for more frequent buses, extended weekend service, and more frequent stops – although also mentioned was the desire for less-frequent stops/more direct routes such as the future BRT would provide. Many asked for more and better connections with other buses as well as light rail – and "distinct places the bus takes me to."

Many riders asked for cleaner buses and bus stops, as well as trash containers, and several wanted Wi-Fi and bathrooms on the bus. There were lots of requests for less crowded/larger-capacity buses and more seats. Concerns were repeatedly voiced from current riders about poorly behaved and rude passengers, fights, driver discrimination, racism, profanity, drunks, and people who will not give up seats for handicapped people. They suggested more bus patrols, security, and police, and drivers who are more strict with drunks and more aware of pedestrians. To meet their family needs, several asked for buses to be more kid-friendly, and to allow kids to stay in strollers with the wheels locked.

Information at bus stops: Riders encountered either walked or transferred to bus stops. Transit riders suggested detailed route and schedule information, a clock in the shelters, information on bus arrival times, connection and transfer information, route and city/area maps, bigger bus stop signs to improve awareness, and instructions on how to use the bus to help improve access and use.

PHYSICAL CONDITIONS

The existing physical conditions and configuration of the roadway, including pedestrian and bicycle infrastructure, on and along Penn Avenue and Osseo Road are detailed in this chapter.

PENN AVENUE

Penn Avenue is a two-lane undivided roadway (i.e. one travel lane in each direction with no median) from I-394 to 44th Avenue with a speed limit of 30 miles per hour (mph). On-street parking is permitted on both sides of the street throughout the majority of the corridor. The public right-of-way in the corridor varies between 54 and 64 feet wide, but the typical distance from street curb to street curb is 44 feet.

The majority of the corridor is not striped with turn lanes, but in most places the roadway is wide enough for two vehicles to occupy the area striped for a single lane. This means that at many intersections in the corridor drivers use the extra space as 'pseudo' right- and left-turn lanes, as shown in Figure 6-1.

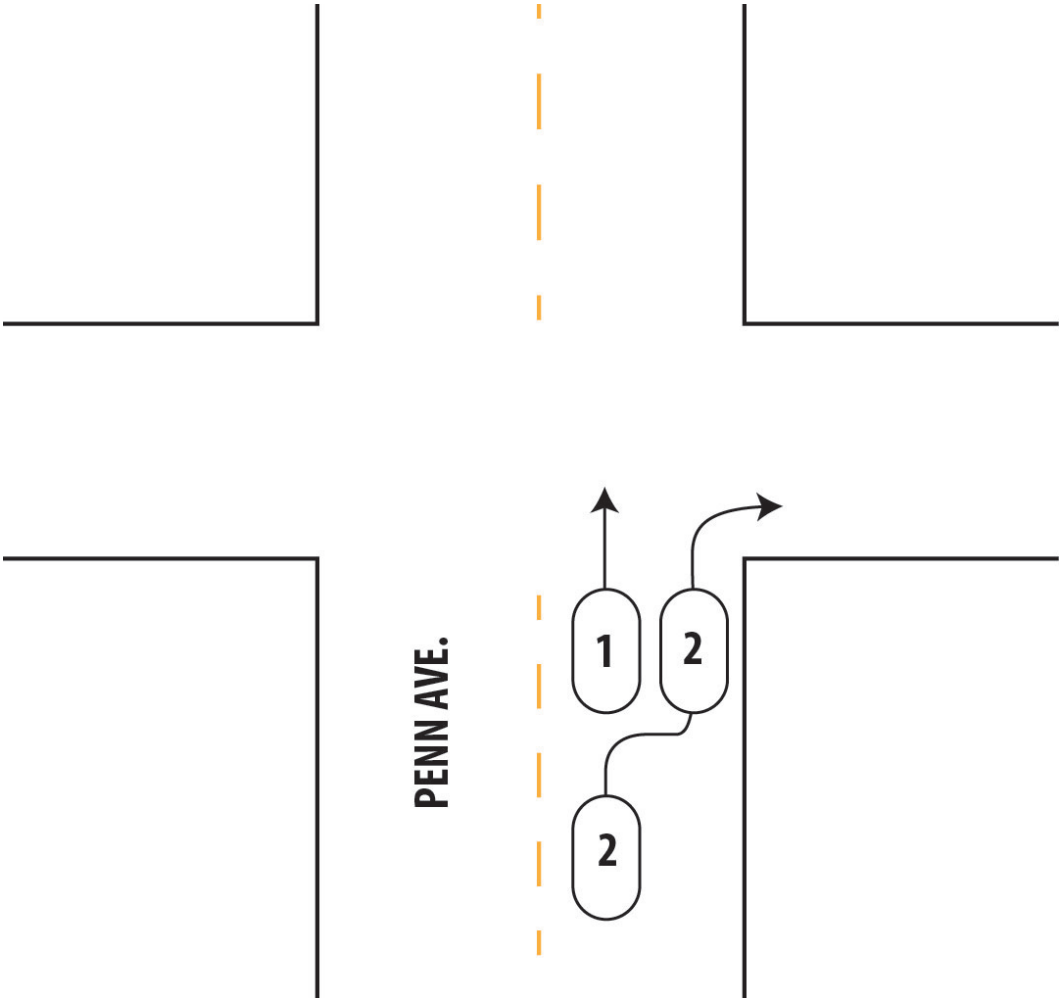
Key Terminology:

Public right-of-way: Land reserved for public access and circulation

OSSEO ROAD

Osseo Road is a three-lane undivided facility within the Penn Avenue corridor. No parking is allowed along Osseo Road within the corridor.

FIGURE 6-1: EXAMPLE OF PSEUDO RIGHT-TURN LANE ON PENN AVENUE



ACCESS TO THE PENN AVENUE CORRIDOR

The Penn Avenue corridor is situated within the urban street grid network of North Minneapolis. There are many public and private roadway facilities (i.e. public streets, residential and commercial driveways, etc.) that intersect the corridor. The entire corridor has approximately 135 access points – approximately one access point every 200 feet. Seventeen of these access points are signalized intersections. For more detailed information on corridor access, please see *Technical Memorandum - Transportation* (under separate cover).

The majority of the Penn Avenue corridor is lined with sidewalks and a grass boulevard along both sides of the street. The sidewalks widths in the corridor vary between six and seven and a half feet wide. A visual review identified some deteriorated sidewalk panels interspersed throughout the corridor; however, the large majority of the panels are in good condition. Hennepin County has recently improved the sidewalks at a number of intersections in the northern portion of the corridor by reconstructing curbcuts and installing truncated domes. Figure 6-2 shows a typical intersection upgrade. Hennepin County is also in the process of upgrading the pedestrian infrastructure at the Osseo Road/44th Avenue intersection near the northern end of the corridor. For more detailed information on this project, please see *Technical Memorandum - Pedestrian* (under separate cover).

In the Penn Avenue corridor, there are currently no bicycle lanes of any type located on Penn Avenue or Osseo Avenue; however, there are multiple bicycle facilities that intersect the corridor. There is one existing Nice Ride station within the corridor, located at Penn Avenue and Lowry Avenue.

Key Terminology:

Signzalized intersection: An intersection controlled by a traffic light

Curbcut: a sidewalk ramp

Truncated domes: the bumpy surface installed in the ground to assist pedestrians who are visually impaired with crossing the street

Nice Ride: Nice Ride is the metropolitan region's bicycle share system.

FIGURE 6-2: TYPICAL INTERSECTION UPGRADE

Example of a Bike Share (Nice Ride) Station (Source: adamsfelt, Flickr)

PEDESTRIANS

CITY AND COUNTY PLANNING DESIGNATIONS FOR THE PEDESTRIAN NETWORK

Hennepin County and City of Minneapolis pedestrian master plans both designate Penn Avenue as an important pedestrian corridor. According to the *Hennepin County Pedestrian Master Plan* (2013), priority pedestrian locations should be considered for pedestrian safety improvements such as pedestrian crossing improvements and sidewalk reconstruction.

PEDESTRIAN TRAFFIC

The residential, commercial, and business nodes along Penn Avenue generate many pedestrian trips in the corridor. To quantify these trips, the City of Minneapolis counts pedestrian every three years at eight intersections in the corridor. As shown in Table 6-1, the City's sample counts show that the Penn Avenue/Lowry Avenue and Penn Avenue/West Broadway Avenue intersections have the highest levels of pedestrian traffic in the corridor.

TABLE 6-1: PEDESTRIAN ESTIMATED DAILY TRAFFIC COUNTS

Location	Pedestrian Estimated Daily Traffic Counts
Osseo Road and Penn Avenue	30 - 100
42nd Avenue and Penn Avenue	90 - 100
37th Avenue and Penn Avenue	130 - 290
Lowry Avenue and Penn Avenue	800 - 960
26th Avenue and Penn Avenue	370
West Broadway Avenue and Penn Avenue	540 - 830
Plymouth Avenue and Penn Avenue	310 - 320
Glenwood Avenue and Penn Avenue	280 - 380
Cedar Lake Road and Penn Avenue	230 -330
Source: Minneapolis Bicyclist and Pedestrian Count Report 2013	

PEDESTRIAN CRASHES

Between 2007 and 2014, 56 crashes between pedestrians and motor vehicles occurred within the Penn Avenue corridor.[1] The location and level of severity of these crashes are shown in Figure 6-3. Over 90 percent of the crashes over the last seven years were recorded as minor incidents. Four of the 56 pedestrian crashes were recorded as 'incapacitating' (i.e. an injury that prevents the injured person from walking, driving, or normally continuing the activities the person was capable of performing before the injury occurred). One incident, which occurred in the winter of 2013, killed a pedestrian at the intersection of Osseo Road and 49th Avenue.

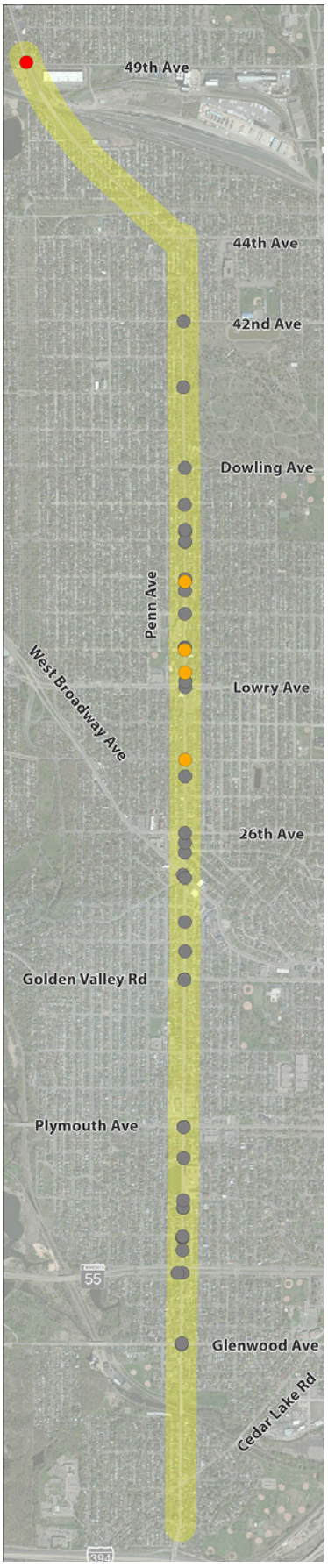


FIGURE 6-3: LOCATION AND SEVERITY OF PEDESTRIAN CRASHES

[1] *Minnesota Crash Mapping Analysis Tool*

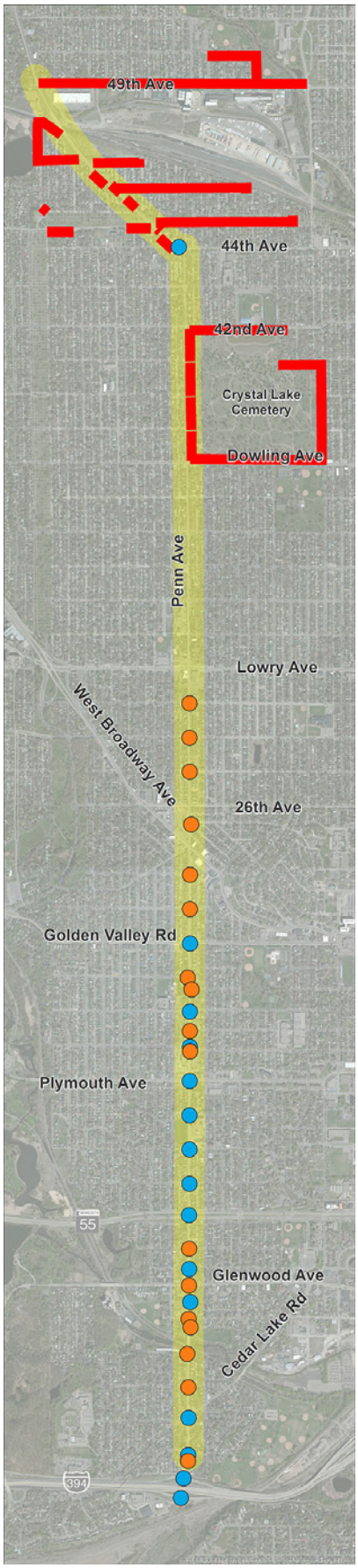


FIGURE 6-4: SIDEWALK GAPS AND UNIMPROVED INTERSECTIONS

PEDESTRIAN ISSUES ANALYSIS

The pedestrian issues analysis reviewed the existing pedestrian network and identified issues and barriers to pedestrian travel.

Gaps in the Sidewalk Network

Some locations in the northern end of the corridor are missing sidewalks. The largest sidewalk gap is adjacent to the Crystal Lake Cemetery, as shown in Figure 6-4. There are also multiple smaller gaps along Osseo Road. Lastly, sidewalks are missing along 45th Avenue, 46th Avenue, 47th Avenue and 49th Avenue. Gaps in the network make traveling by foot difficult and discourage walking.

Sidewalk Barriers

In multiple locations along the Penn Avenue corridor, utility poles and traffic signals significantly narrow the width of the available sidewalk. For example, as shown in Figure 6-5, a poorly placed utility pole severely narrows the pedestrian zone directly across from Cleveland Park Community School, north of 33rd Avenue.

Poor Pedestrian Facilities at Signalized Intersections

There are seventeen signalized intersections in the Penn Avenue corridor, but more than half are pedestrian actuated, meaning a pedestrian trying to cross the street must push a button to activate the signal's walk phase. Using pedestrian actuated signals can improve traffic flow by providing more green time to cars moving through the intersection. However, if the pedestrian button is not pushed at the correct time during the signal cycle pedestrians can end up waiting for multiple signal phases for a walk sign. Also, there is only one accessible pedestrian signal (located at Penn Avenue and Highway 55), zero signals with leading pedestrian intervals, and zero pedestrian countdown signals. These types of higher quality pedestrian facilities make it easier to travel by foot and increase pedestrian safety at intersections.

Unimproved Intersections

While Hennepin County has improved many intersections along Penn Avenue, there are still intersections in the corridor that currently do not meet the standards set for pedestrian safety in the Americans with Disabilities Act (ADA). As shown in Figure 6-4, 16 intersections in the corridor are missing truncated domes on at least one pedestrian ramp and seventeen intersections are missing at least one pedestrian ramp. Both truncated domes and pedestrian ramps are required by ADA standards.

FIGURE 6-5: POOR UTILITY POLE PLACEMENT

Key Terminology:

Pedestrian walk phase: The time during a signal cycle dedicated to allow pedestrians to cross the street. Cross traffic is stopped during this phase, but in many cases right turns across the crosswalk are allowed.

Pedestrian actuated signals: A signal where a pedestrian uses a push button to activate the signal's walk phase.

Accessible pedestrian signals: Signals that communicate information about the 'walk' and 'don't walk' intervals at signalized intersections in audible formats to pedestrians who are blind or who have low vision.

Leading pedestrian interval: Leading pedestrian phase timing give pedestrians a few seconds head start to begin crossing the street while all other signals are still red.

Pedestrian countdown signals: Signals that countdown the amount of time left during the pedestrian phase.

Intersection of Penn Avenue and West Broadway Avenue

The busy intersection of Penn Avenue and West Broadway Avenue has some of the highest pedestrian traffic in the corridor. The intersection also has some of the highest transit ridership in the corridor. However, the five-legged skewed configuration of the intersection makes circulation complicated for pedestrians and motorists alike. Pedestrian crossing distances are long (up to 87 feet), and crosswalk markings are faded, as shown in Figure 6-6. This intersection was identified as an intersection with a high need for improvements as part of the *Minneapolis Pedestrian Master Plan*. The Minneapolis Pedestrian Advisory Committee (PAC) also recently recommended the intersection for inclusion on the five-year Capital Improvement Project (CIP) list. For more information on this intersection, please see *Technical Memorandum - Pedestrian*.

FIGURE 6-6: INTERSECTION OF PENN AVENUE AND WEST BROADWAY

TABLE 6-2: UNCONTROLLED INTERSECTIONS WITH MORE THAN 100 AVERAGE DAILY RIDERS

On Street	Intersecting Street	Average Total Daily Boardings/Alightings
Penn Ave	8th Avenue	114
Penn Ave	30th Avenue	323
Penn Ave	35rd Avenue	106
Penn Ave	36th Avenue	404
Penn Ave	43rd Avenue	418

Busy Transit Stops at Uncontrolled Intersections

Nearly every transit rider is a pedestrian at both ends of his or her transit trip, making transit stops important pedestrian areas. Multiple high-ridership bus stops within the corridor are located at uncontrolled intersections. Uncontrolled intersections can be difficult locations for pedestrians to navigate, because traffic never comes to a stop at these locations. This is especially true for pedestrians with limited mobility who need more time to cross the street. As shown in Table 6-2, there are five intersections with greater than 100 average daily riders located at uncontrolled intersections. These transit riders must navigate traffic at these locations without the aid of a pedestrian signal.

Poor Lighting for Pedestrians

Human scale lighting is important for pedestrian comfort and safety. The Minneapolis Pedestrian Master Plan shows that the only human scale lighting in the corridor (i.e. light posts less than 20 feet tall) is located at the Osseo Road/Victory Memorial Parkway intersection and the intersections along Penn Avenue at, West Broadway Avenue, Golden Valley Road, and Glenwood Avenue. In total, there are approximately eight pedestrian scale light poles in the Penn Avenue study area, which is approximately five miles. This level of lighting is not consistent with Penn Avenue's status as a Pedestrian Priority Corridor.

Minimal Street Trees

The majority of Penn Avenue has no boulevard space which limits the inclusion of street trees in the study area. Also, the 2012 tornado that hit the area killed some street trees in the corridor.

Key Terminology:

Human Scale Lighting: Lighting designed to illuminate areas designed for pedestrians. Human scale lighting is close to the ground (as opposed to standard roadway lighting designed for cars) and tigthly spaced to provide a continuous lighted path.

BICYCLES

A map showing the existing and planned bicycle network in the corridor is shown in Figure 6-7. For more detail on the existing and planned bicycle network in the area, please see *Technical Memorandum - Bike* (under separate cover).

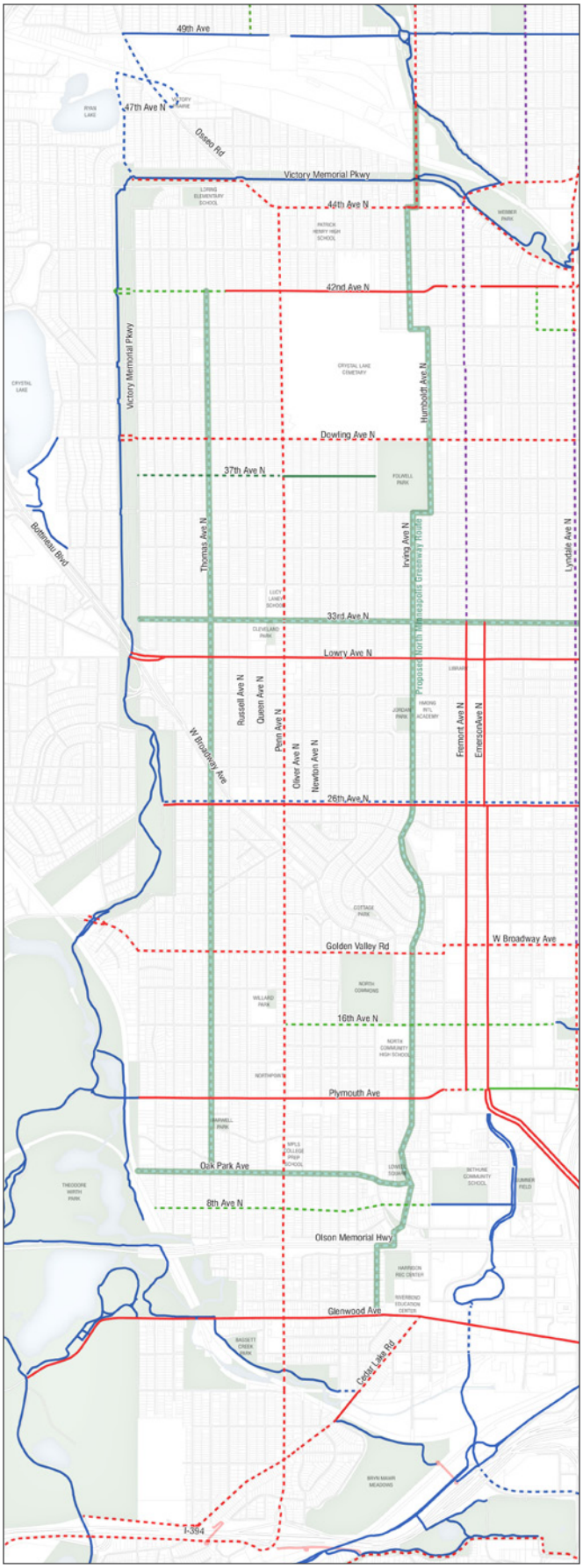


FIGURE 6-7: EXISTING AND PLANNED BIKEWAYS NEAR THE PENN AVENUE CORRIDOR – SHOWN BY FACILITY TYPE

EXISTING / PLANNED BIKE ROUTES (BY TYPE)

- Existing Facility
- Planned Facility
- Trails
- Bike Lanes
- Bicycle Boulevards (Long-Term Greenways)
- Greenways
- Signed Bike Routes

NORTH

Based on recommendations in the Minneapolis Bicycle Master Plan, 2011

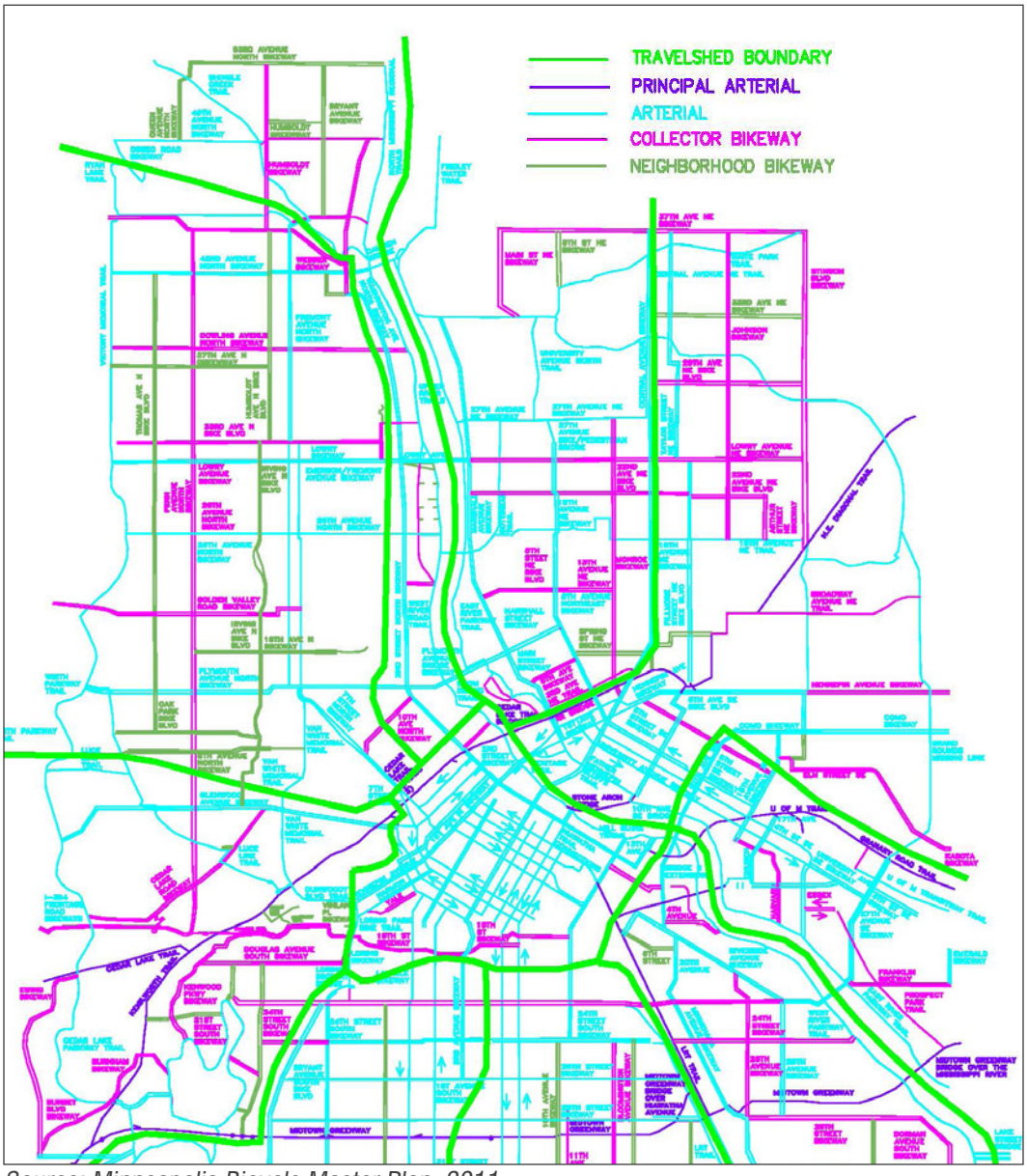
CITY AND COUNTY PLANNING DESIGNATIONS FOR THE BICYCLE NETWORK

Although there is currently no bicycle infrastructure on Penn Avenue, the 2011 Minneapolis Bicycle Master Plan defines Penn Avenue as a collector bikeway which should serve as a feeder to intersecting arterial bikeways, including Victory Memorial Parkway, 42nd Avenue, Lowry Avenue, 26th Avenue, Plymouth Avenue, and Glenwood Avenue.

Figure 6-8 shows Minneapolis' planned bicycle network near the Penn Avenue corridor by bicycle functional class. The north-south bikeways along Victory Memorial Parkway and Emerson and Fremont Avenues are the nearest arterial bikeways parallel to the Penn Avenue corridor. The Emerson/Fremont bikeway is about 0.6 mile east of Penn and Victory Memorial is about 0.5 miles west, making the overall distance between the two arterial bikeways a little over 1 mile (the Bicycle Master Plan recommends one-mile spacing between arterial routes).

BICYCLE TRAFFIC

FIGURE 6-8: BICYCLE FUNCTIONAL CLASSIFICAION – NORTH MINNEAPOLIS DETAIL



Source: Minneapolis Bicycle Master Plan, 2011

Key Terminology:

Collector Bikeways: Collector bikeways feed into arterial bikeways similar to how smaller rivers flow into larger ones. Collector bikeways should be spaced about 1/2 mile apart to capture bicyclists in every part of the city.

Arterial Bikeways: Arterial bikeways have regional significance and attract the highest numbers of bicyclists. Ideally arterial bikeways should be spaced 1-2 miles apart and should form a spider web throughout the city, becoming the spine for the bikeway network. Due to limited resources, the City's strategy is to maintain arterial routes at a high standard, but give lesser attention to collector and neighborhood bikeways.

Bicycle Functional Class: Bicycle functional class is a set of terms defined in the Minneapolis Bicycle Master Plan that assigns a role and priority to bikeways in the City's proposed bike network. By assigning designations for every bikeway in the Master Plan, limited resources can be applied appropriately. It is important not to confuse roadway functional classification with bicycle functional classification as many arterial bikeways are located on collector streets and some collector bikeways are located along minor arterial roads (defintion based on the 2011 Minneapolis Bicycle Master Plan)

Bicycle Traffic Volumes

The City of Minneapolis counts bicyclists every three years at eight locations along Penn Avenue and nine locations just east of Penn Avenue along connecting east-west streets. As detailed in Table 6-3, the City's counts shows generally low volumes of bike traffic along Penn Avenue, with the exception of the locations near Plymouth Avenue and Glenwood Avenue. East-west streets intersecting Penn Avenue carry generally higher volumes of bicycle traffic, particularly along major bicycle routes such as the Victory Memorial trail and the Lowry, Plymouth, and Glenwood Avenue bikeways.

TABLE 6-3: BICYCLE ESTIMATED DAILY TRAFFIC COUNTS

Location	Pedestrian Estimated Daily Traffic Counts
Bicycle Counts Along Penn Avenue	
Osseo Road and 45th Avenue	30
Penn Avenue and 42nd Avenue	20
Penn Avenue and 37th Avenue	50
Penn Avenue and Lowry Avenue	90
Penn Avenue and West Broadway Avenue	40
Penn Avenue and Plymouth Avenue	100
Penn Avenue and Glenwood Avenue	130
Penn Avenue and Cedar Lake Road	90
Bicycle Counts Along East-West Streets	
Victory Memorial Parkway and Penn Avenue	160
42nd Avenue and Penn Avenue	70
37th Avenue and Penn Avenue	20
Lowry Avenue and Penn Avenue	240
26th Avenue and Penn Avenue	70
West Broadway Avenue and Penn Avenue	70
Plymouth Avenue and Penn Avenue	140
Glenwood Avenue and Penn Avenue	140
Cedar Lake Road and Penn Avenue	80
Source: Minneapolis Bicyclist and Pedestrian Count Report 2013	

Bicycle Crashes

The bicycle crash data shown in shown in Figure 6-9 reveals a relatively small number of crashes along the corridor between 2007 and 2014.[2] Reported crashes on Penn Avenue during this period all resulted in only minor injuries. While the overall frequency and severity of crashes on Penn Avenue is low, crashes do appear to cluster between Lowry Avenue and West Broadway Avenue, as well as around the 44th/Penn/Osseo intersection. This corresponds with higher volumes of car traffic (5,000+ annual average daily traffic) and bicycle traffic along these east-west connections to Penn Avenue.

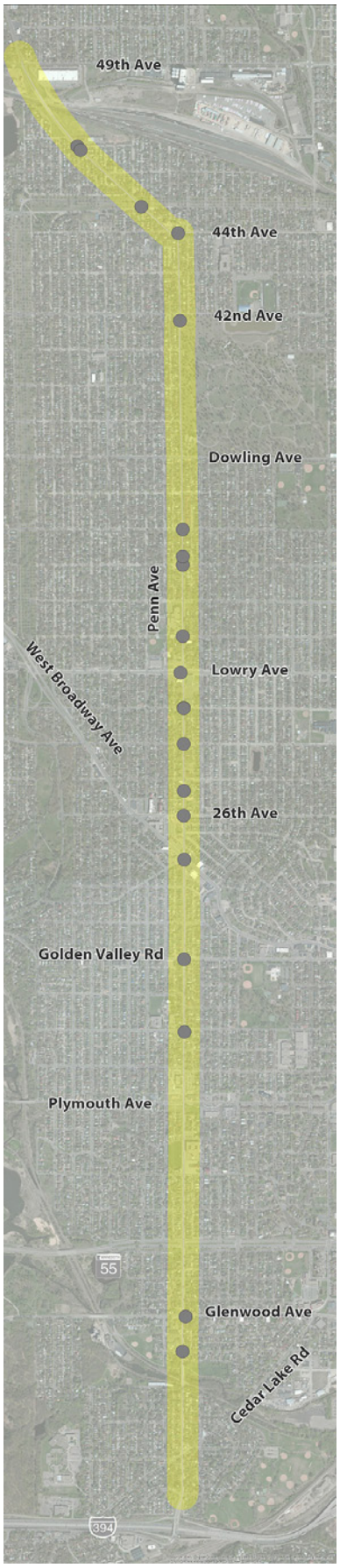


FIGURE 6-9: LOCATION AND SEVERITY OF BICYCLE CRASHES

[2] *Minnesota Crash Mapping Analysis Tool*

BICYCLE ISSUES ANALYSIS

The bicycle issues analysis examined the physical barriers and limitations to creating a continuous north-south bikeway connection along or parallel to the Penn Avenue corridor. The analysis examined potential bicycle routes along Penn Avenue/Osseo Road, as well as along the two streets immediately east and west of Penn Avenue that could potentially support alternate bikeway routes (Parallel North-South Routes). The potential routes and physical barriers/challenges are illustrated in Figure 6-10.

Penn Avenue/Osseo Road - Barriers and Opportunities

Major Roadways/Intersections/Nodes:

All of the intersections where Penn Avenue crosses a major roadway have traffic signals today with the exception of 35th Avenue. While signalized intersections may be beneficial in the design of a potential bikeway route along Penn Avenue, future scenario planning should consider how potential bike facilities on Penn Avenue might mitigate conflicts with other modes particularly around these higher traffic intersections and activity centers. Locating bike facilities along Penn Avenue may also help to drive traffic to local businesses located along the corridor.

Breaks in the Street Grid:

While there are several areas along the roadways on either side of Penn Avenue where the street grid does not allow for continuous north-south movement, this is not an issue along the Penn Avenue/Osseo Road route.

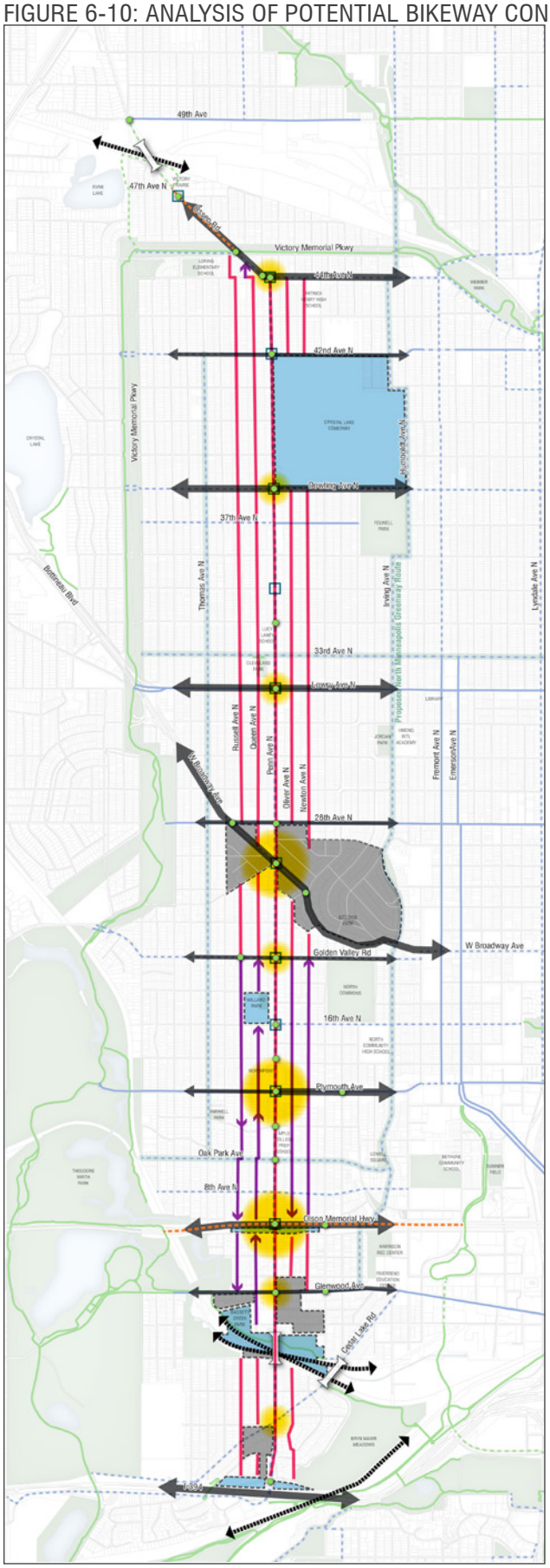
Railways:

The Penn Avenue corridor bridges over several railways at Bassett Creek Park south of Glenwood Avenue and along Osseo Road between 47th and 49th Avenue. These bridges over the rails allow for a continuous north-south roadway connection and eliminate the potential for railway/bikeway conflict if bike facilities are added on Penn Avenue. Further analysis is needed to understand if existing bridge widths will accommodate a bikeway connection either on or off-street.

Available right-of-way:

One potentially constraining factor for accommodating a bikeway on Penn Avenue is the available right-of-way. While previous studies in the corridor have explored the feasibility of bike lanes on Penn Avenue between 49th Avenue and Dowling Avenue (with some parking removal), additional study is needed to understand the impacts and potential design of such facilities along the full length of the corridor, particularly where the right-of-way is more limited and where Penn Avenue intersects with major activity centers. Future scenario planning will have to consider how different roadway configurations might or might not accommodate bikes and the potential trade-offs in terms of impacts to overall traffic operations, parking, pedestrian right-of-way, bike safety/accessibility, and transit.

FIGURE 6-10: ANALYSIS OF POTENTIAL BIKEWAY CONNECTIONS IN THE PENN AVENUE CORRIDOR



Parallel North-South Routes - Barriers and Opportunities

This analysis looks at physical barriers and limitations along the two parallel north-south streets immediately east and west of Penn Avenue (Queen Avenue and Russell Avenue to the west, and Oliver Avenue and Newton Avenue to the east) that could potentially support alternate bikeway routes. These streets contain both two-way and one-way segments, as shown in Figure 6-10. For this initial analysis, all four streets are discussed in general terms as they possess similar characteristics and challenges.

Major Roadways/Intersections/Nodes:

None of the intersections where these parallel routes cross a major roadway have traffic signals today, with the exception of where Russell Avenue crosses Golden Valley Road. Having a controlled intersection or enhanced bike/pedestrian crossings at these locations should be considered in the design of a potential bikeway route.

While locating bike facilities off of Penn Avenue may have some advantages in terms of available space and lower traffic volumes, there may be a missed opportunity to increase bike ridership to and through activity nodes. Additionally, lower visibility/lighting levels/foot traffic along these parallel routes would need to be addressed in the design of a parallel facility.

Breaks in the Street Grid:

There are several areas along either side of Penn Avenue where the street grid does not allow for continuous north-south movement. These are areas where the street grid is skewed and/or the development pattern does not permit a continuous north-south on-street connection. These areas are coded on the map in Figure 6-10 as either public use/civic uses (parks/schools/community centers/excess right-of-way) or private use (existing privately owned developments). Where breaks in the grid are created by public uses, there may be opportunities to create relatively continuous off-street connections (e.g. marked trails through a park / school site). Where private development obstructs a continuous path, private trail easements may be possible, but a more difficult option to implement. More likely in these cases, an alternate and more circuitous route may be necessary. The largest areas of discontinuity in the street grid are located immediately north and south of West Broadway Avenue (which cuts across the grid at a diagonal) and between Glenwood Avenue and Bassett Creek.

Railways:

The railways crossings along Bassett Creek south of Glenwood Avenue are a major physical barrier along these parallel routes in addition to the Creek itself. A bikeway on a parallel route would either require a dedicated bike/pedestrian crossing over the rails/creek or need to reconnect with the existing Penn Avenue bridge or Cedar Lake Road bridge.

Available right-of-way:

While the curb-to-curb width along these parallel routes is narrower than the typical width on Penn Avenue, the lower traffic volumes and parking demand, and potential to use one-way streets, may provide opportunities to create continuous segments of north-south bike lanes or other on-street facilities. Additionally, whereas Penn Avenue is a high-frequency bus corridor today and designated as an arterial BRT corridor, these parallel routes are not bus corridors, reducing the potential for bus-bike conflicts. These parallel routes should be explored as possible alternatives to a bikeway on Penn Avenue. Future scenario planning will have to consider how different roadway configurations might or might not accommodate bikes on or off the corridor- and the potential trade-offs in terms of impacts to overall traffic operations, parking, pedestrian right-of-way, bike safety/accessibility, and transit.

East-West Connections to the Corridor

In general, the bikeway network (existing and proposed routes) presented in the Minneapolis Bicycle Master Plan provides adequate spacing and coverage for east-west connections to and through the Penn corridor. A number of the proposed east-west bikeways have yet to be constructed, leaving wide spacing between some of the existing east-west connections particularly between Lowry Avenue and 42nd Avenue (the 37th Avenue greenway is a partial east-west connection in this area) and between Plymouth Avenue and 26th Avenue. The planned Golden Valley Road/West Broadway Avenue bikeway will help to fill network gaps, and provide an important connection between the Mississippi River trail network to the east and Theodore Wirth Park/Parkway to the west.

The current Minneapolis Bicycle Master Plan does not identify the full segment of Osseo Road from Victory Memorial Parkway to 49th Avenue as a future bikeway. Given the potential for this area to become a more prominent gateway into the City of Minneapolis, as well as recent proposals to add bike facilities around the 44th/Penn/Osseo intersection, future scenario planning should explore the possibility of Osseo Road as a future bikeway route.

Street and Pedestrian Lighting in the Corridor

Street and pedestrian lighting are important safety features for all modes of travel. In addition to increasing visibility at night, lighting (particularly pedestrian lights) impacts the perceptions of safety along the corridor for pedestrians and bicyclists. The streetscape inventory conducted as part of this planning process shows that the distribution of street lights is fairly consistent along the length of Penn Avenue with some gaps/inconsistencies in coverage; however, only a small number of pedestrian lights are present on Penn Avenue. Parallel routes east and west of Penn Avenue were not included in the streetscape inventory, but anecdotal reports and informal observation suggest that lighting in these areas is worse than on Penn Avenue. Any potential bikeway connection on Penn Avenue or parallel routes should consider the type and coverage of lighting necessary to create a safe and visible bike connection.

MOTOR VEHICLE TRAFFIC

TRAFFIC VOLUMES

Penn Avenue

Traffic volumes in the study area vary by roadway segment, as shown in Figure 6-12. The figure shows that average daily traffic (ADT) volumes are approximately 10,000 vehicles per day (vpd) along many sections of Penn Avenue. Traffic on Penn Avenue is lightest between 44th Avenue and Lowry Avenue and between Highway 55 and Cedar Lake Road.

Cross Streets

As shown in Figure 6-12, some segments of Highway 55, West Broadway Avenue, and Plymouth Avenue have higher ADT volumes than most of Penn Avenue. Highway 55 is the busiest of these three cross streets with volumes ranging from 16,000 to 23,000 vpd. The remaining major cross streets have ADT volumes less than 6,500 vpd.

Hourly Traffic Profile on Penn Avenue

Hourly traffic volumes in the Penn Avenue study area peak slightly during the a.m. peak hour, but then gradually build to higher levels throughout the day, reaching the highest traffic peak during the p.m. peak period. This pattern is illustrated in Figure 6-11, which shows total traffic volumes (i.e. all traffic that passes through an intersection) at key intersections along Penn Avenue. For example, following the orange line representing volumes at the Penn Avenue/Lowry Avenue intersection, traffic volumes start at approximately 800 vehicles per hour (vph) at 6:30 a.m. and rise to approximately 1,000 vph at their peak during the a.m. peak period - decreasing around 8:30 a.m. After 9:30 a.m., volumes rise throughout the day until reaching their highest peak of approximately 1,800 vph during the p.m. peak period. This pattern is repeated at all eight key intersections shown, demonstrating that traffic levels in the study area are highest during the p.m. peak period.

Key Terminology:

Peak hour: The morning peak hour for this study is defined as a weekday between 7:30 – 8:30 a.m. The afternoon peak hour is defined as a weekday between 4:45 – 5:45 p.m.

FIGURE 6-11: PENN AVENUE HOURLY TRAFFIC PROFILE

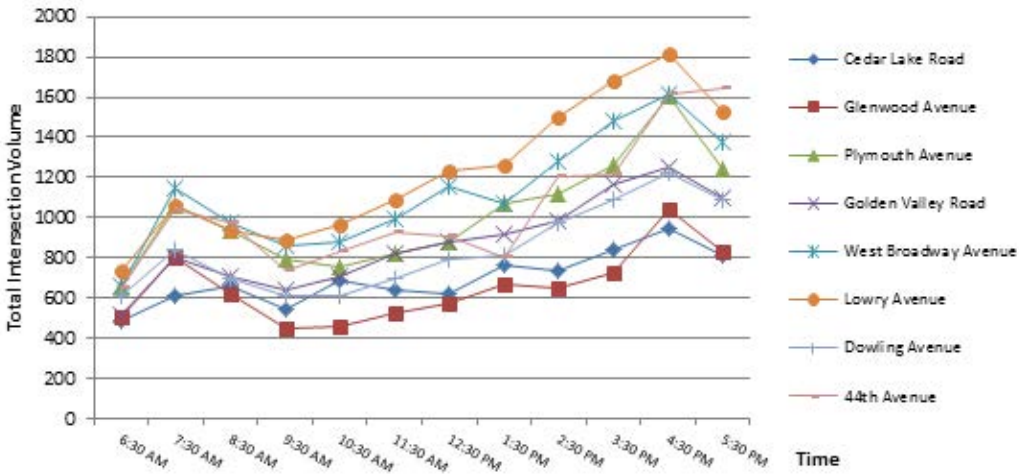
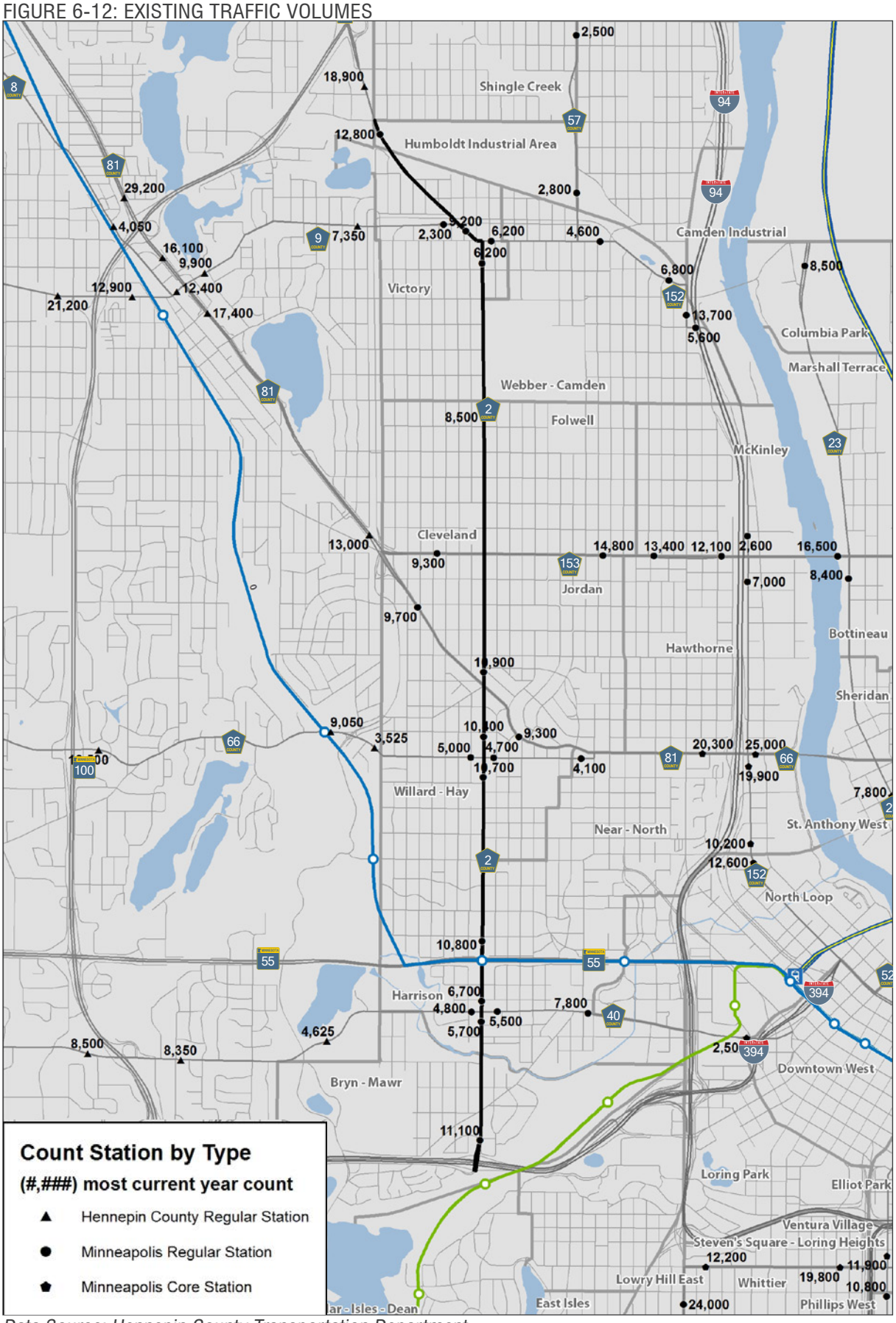


FIGURE 6-12: EXISTING TRAFFIC VOLUMES



Data Source: Hennepin County Transportation Department

CRASHES IN THE CORRIDOR

Crash Analysis

A crash analysis was performed for select intersections and roadway segments within the Penn Avenue corridor. The analysis calculated the average crash rate as well as the critical crash rate for these locations. Calculating the average crash rate involves comparing the number of crashes at a location to the number of crashes at a similar location type (i.e. same number of lanes, same type of signal, etc.) in Hennepin County. However, this calculation alone does not account for the variation in traffic volumes or the random nature of crashes. Therefore a statistical analysis was used to also calculate the critical crash rate by intersection and roadway segment. The critical crash rate identifies locations that have a crash rate higher than similar locations at a statistically significant level. The critical crash rate takes varying traffic volumes into account and controls for the random nature of crashes. For more detailed information on the crash analysis please see *Technical Memorandum - Transportation*.

Key Terminology:

Average Crash Rate: The average crash rate involves comparing the number of crashes at a location to the number of crashes at a similar location type (i.e. same number of lanes, same type of signal, etc.) in Hennepin County.

Critical Crash Rates: The critical crash rate identifies locations that have a crash rate higher than similar locations at a statistically significant level.

Crash Analysis Results

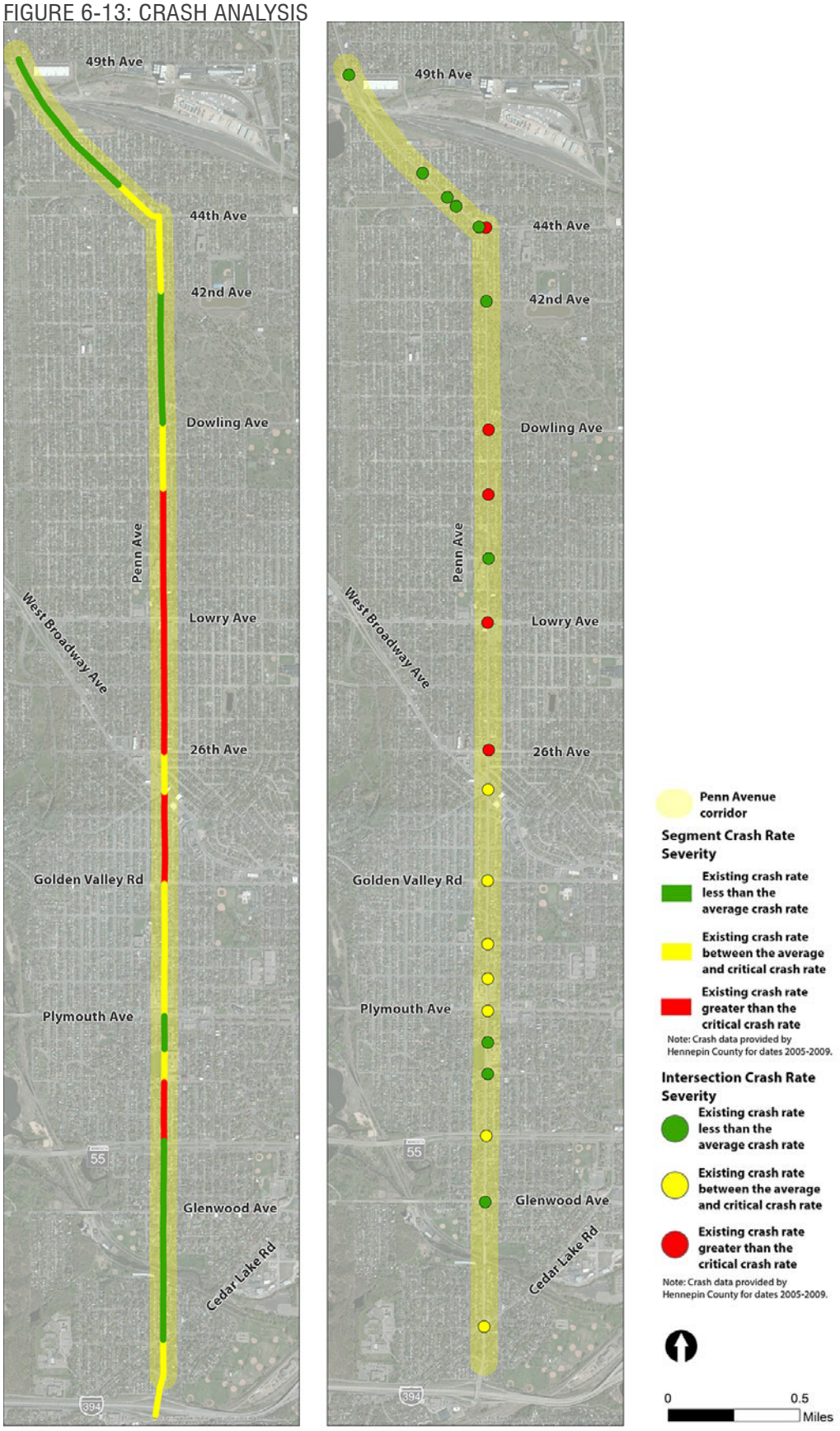
The results of the analysis, shown in Figure 6-13, demonstrate that five corridor intersections and five Penn Avenue segments have crash rates higher than their respective critical crash rates. This indicates that there may be a significant crash issue at these locations and design improvements should be considered to address the crash issue. The analysis also demonstrated that 12 corridor intersections and 13 Penn Avenue segments have crash rates above their respective average crash rate. These segments should be monitored in the future to determine if a statistically significant pattern of crashes continues.

The majority of the crashes within the Penn Avenue study area, particularly at the intersections/segments identified as being over the critical crash rate, were rear-end, side-swipe same direction, and right-angle crashes; these crash types are discussed further in Table 6-4. The table also includes potential mitigation measures by crash type. These mitigation measures are meant for illustrative purposes. As the Penn Avenue Community Works process moves forward, specific design recommendations will be addressed during concept development.

Concentration of Head-On Collisions

The analysis found a concentration of five head-on collisions at the Penn Avenue/33rd Avenue intersection from January 1, 2005 through December 31, 2009. Two of the crashes involved motorists that were under the influence of drugs/alcohol and three of the crashes involved pedestrians or bicyclists. Since this timeframe, a pedestrian signal was installed (push button activated), and no head-on collisions have been reported at this intersection after the installation of the pedestrian signal.

FIGURE 6-13: CRASH ANALYSIS



Segment Crash Rates **Intersection Crash Rates**

TABLE 6-4: TYPICAL CRASHES FOUND IN THE PENN AVENUE CORRIDOR

Type of Crash	Potential Causal Factor	Possible Countermeasures
Rear end	It is typical of signalized intersections to have a higher incidence of rear-end collisions. This is sometimes caused by motorists not recognizing the back of the queues as they approach the signal or not identifying that vehicles are stopping in front of them at the traffic signal. Rear-end crashes can also occur where there is not a designated turn lane for vehicles to maneuver out of the main line to slow down and make a turn.	• Install/improve warning signage • Reduce speeds with enforcement • Reduce access to the mainline • Prohibit turns • Install left and/or right turn lanes • At signalized intersections: › Install visors › Install back plates › Relocate/add signal heads › Re-time signal › Adjust phase change interval › Increase red clearance interval
Sideswipe same direction	Side-swipe crashes frequently occur along corridors where cars commonly weave in and out of lanes, or switch lanes frequently, to avoid a vehicle slowing down to make a left or right turn. As stated previously, currently there are very few left- and right-turn lanes along the corridor. Field observations indicate that at intersections, motorists frequently treat the northbound and southbound approaches as shared left-thru/ shared right-thru turn lanes, which may be contributing to the sideswipe crashes.	• Install/improve warning signage • Reduce speeds with enforcement • Install left- and/or right-turn lanes • Remove on-street parking
Right angle	Right-angle crashes are common along corridors with high access density. Many of the crashes are likely caused by vehicles entering or exiting access points.	• Reduce access to mainline • Install/improve signage • Reduce speeds with enforcement • If poor visibility of traffic signal or restricted sight distance: › Install/improve warning sign › Install stop bar closer to cross road › Relocate/add signal heads • Enforce red-light running with confirmation lights • Improve lighting • Improve signal coordination along the corridor

TRAFFIC OPERATIONS ANALYSIS

A traffic operations analysis was conducted to determine how traffic in the Penn Avenue corridor currently operates, to identify the future traffic capacity issues, and to provide recommendations for potential roadway configurations that will be studied in the next phase of the project.

The traffic operations analysis focused on the following key intersections on Penn Avenue:

44th Avenue	Dowling Avenue
Lowry Avenue	West Broadway Avenue
Golden Valley Road	Plyouth Avenue
Glenwood Avenue	Cedar Lake Road

Traffic operations at these intersections were analyzed for both existing traffic volumes and year 2035 forecasted traffic volumes in the p.m. peak hour. Year 2035 traffic volume forecasts were based on historical traffic volumes and adjusted based on land use redevelopment opportunities within the corridor. Operations were analyzed in the p.m. peak hour because traffic levels are the highest in the corridor during this time period.

The study intersections were analyzed using VISSIM, a traffic modeling software. VISSIM software incorporates the multi-modal characteristics of the corridor by including pedestrian, bicycle, transit, and vehicle traffic, as well as on-street parking, into the model.

The traffic operations analysis used level of service (LOS) designations to quantify operations at each intersection. LOS designations indicate how much congestion occurs at an intersection. Intersections are given a ranking from LOS A through LOS F. The LOS results are based on average delay per vehicle. The delay threshold values by LOS designation are shown in Table 6-5. LOS A indicates the best traffic operation, with vehicles experiencing minimal delays. LOS F indicates an intersection where demand exceeds capacity, with vehicles experiencing high levels of delay. LOS A through D is generally considered acceptable for drivers in urban environments.

The analysis also modeled the average and max queue lengths at the study intersections for both the existing and year 2035 time periods.

For more detail on the data and methodology used for the traffic operations analysis please see Technical Memorandum - Transportation.

Key Terminology:

Queue: A line of vehicles waiting at an intersection

TABLE 6-5: LEVEL OF SERVICE CRITERIA FOR SIGNALIZED AND UNSIGNALIZED INTERSECTIONS

LOS Designation	Signalized Intersection	Possible Countermeasures
A	≤ 10	≤ 10
B	> 10 – 20	> 10 - 15
C	> 20 – 35	> 15 - 25
D	> 35 – 55	> 25 - 35
E	> 55 – 80	> 35 - 50
F	> 80	> 50

Existing Conditions Analysis

The existing geometrics, traffic volumes and traffic controls were used to model the LOS and queue lengths at each intersection. Existing transit service characteristics were also incorporated into the model. For more detailed information on existing transit conditions please see *Technical Memorandum - Transit*.

Existing Condition Analysis Results

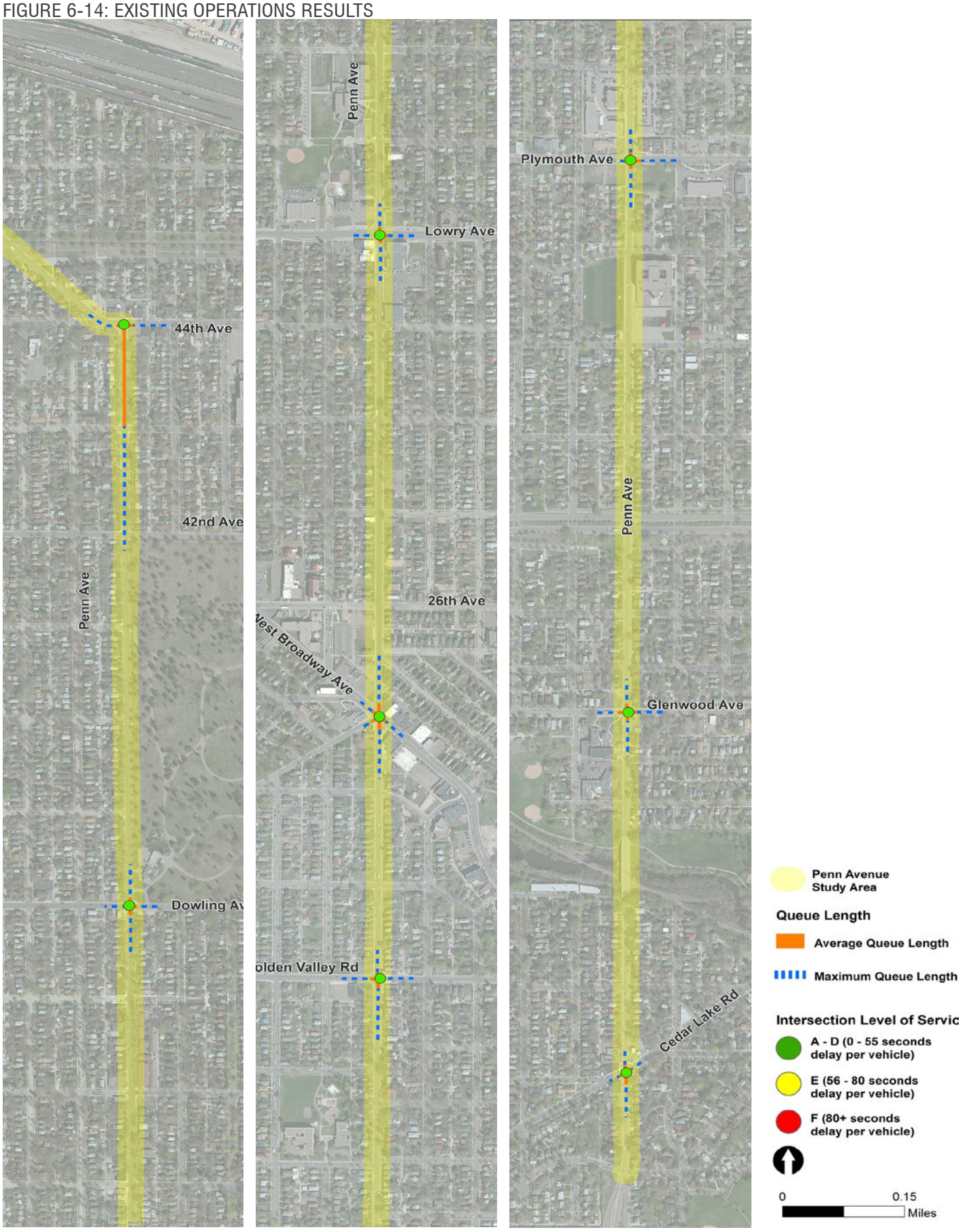
As shown in Table 6-6, results of the existing operations analysis indicate that the analyzed intersections currently operate at an acceptable overall LOS D or better during the p.m. peak hour.

While all of the study intersections operate with acceptable overall levels of service, there are some queuing issues along Penn Avenue. The average and max queue along each of the approaches at the study intersections are shown in Figure 6-14. Long queues at intersections block turning movements from other cross streets and diminish sight lines – making it more difficult for both pedestrians and motorists to cross the street. As shown in Figure 6-14, the longest queue lines in the existing condition occur at the Penn Avenue/44th Avenue intersection. It should be noted that the City of Minneapolis plans to update the signal timing at all of the intersections within the Penn Avenue study area this summer (2014), which should reduce the queues and improve overall traffic operations.

TABLE 6-6: EXISTING INTERSECTION CAPACITY ANALYSIS

	P.M. Peak Hour	
LOS Designation	Signalized Intersection	Possible Countermeasures
44th Avenue	D	38 sec.
Dowling Avenue	B	17 sec.
Lowry Avenue	B	19 sec.
West Broadway Avenue	C	31 sec.
Golden Valley Road	B	17 sec.
Plymouth Avenue	B	18 sec.
Glenwood Avenue	B	17 sec.
Cedar Lake Road (1)	C	15 sec.
(1) Indicates an unsignalized intersection with all-way stop control.		

FIGURE 6-14: EXISTING OPERATIONS RESULTS



Year 2035 No Build Conditions

The "Year 2035 no build condition" was analyzed to understand how the Penn Avenue corridor will operate when the existing roadway configuration is combined with future traffic growth and planned transit improvements.

Year 2035 traffic volume assumptions were based on historical ADT volumes, Hennepin County traffic forecasts, and expected growth in traffic based on planned land use redevelopment in the corridor. For more detailed information on the 2035 traffic assumptions please see *Technical Memorandum - Transportation*. The year 2035 transit assumptions were based on planned C Line station configurations and service plans. For more detailed information on future transit assumptions please see *Technical Memorandum - Transit*.

Year 2035 No Build Condition Analysis Results

Results of the Year 2035 no build condition intersection capacity analysis are shown in Figure 6-15 and summarized in Table 6-7. The results indicate that under this scenario all study intersections are expected to operate at an acceptable overall LOS D or better during the p.m. peak hour.

Queuing issues do become worse under the Year 2035 no build condition, as shown in Figure 12. As the project moves forward, strategies to reduce the queues in these locations (e.g. removing parking spaces, moving local bus stops, etc.) should be explored.

TABLE 6-7: YEAR 2035 NO BUILD INTERSECTION CAPACITY ANALYSIS

	P.M. Peak Hour	
Penn Avenue Intersection	LOS	Delay
44th Avenue	C	29 sec.
Dowling Avenue	C	21 sec.
Lowry Avenue	C	25 sec.
West Broadway Avenue	D	43 sec.
Golden Valley Road	B	19 sec.
Plymouth Avenue	C	24 sec.
Glenwood Avenue	B	19 sec.
Cedar Lake Road (1)	C	17 sec.
(1) Indicates an unsignalized intersection with all-way stop control.		

FIGURE 6-15: YEAR 2035 NO BUILD OPERATIONS

PARKING DEMAND

Public on street parking is allowed along the large majority of Penn Avenue, Queen Avenue and Oliver Avenue in the study corridor. Private off street parking is also provided by many of the businesses and institutions in the corridor. A parking analysis was performed to determine the demand for the supply of parking in the corridor. The analysis collected on-street parking counts on Wednesday, May 21, 2014 during the following times:

- Overnight/morning: 4:30 a.m. – 6:30 a.m.
- Midday: 11:30 a.m. – 1:30 p.m.
- Evening: 6:00 p.m. – 8:00 p.m.

Results of the parking utilization surveys are shown in Figure 6-16. To see more detailed information on the parking analysis methodology and results please see *Technical Memorandum - Transportation*.

Parking Analysis Key Findings

Results from the parking analysis indicate that there is not a parking shortage in the Penn Avenue corridor. However, parking demand was highest near the corridor's commercial nodes. Specifically, some of the highest demand in the corridor occurred during the midday time period at 44th Avenue, West Broadway Avenue, Plymouth Avenue, and Cedar Lake Road.

The analysis also demonstrated that on-street parking demand along Oliver Avenue and Queen Avenue was highest during the overnight/morning and evening time, suggesting that residents are using these streets for overnight parking.

FIGURE 6-16: PARKING UTILIZATION

Morning: 4:30 a.m.- 6:30 a.m. **Midday: 11:00 a.m. - 1:00 p.m.** **Evening: 6:00 p.m. - 8:00 p.m.**

TRANSIT

Multiple Metro Transit bus routes serve the Penn Avenue corridor, as shown in Figure 6-17. Route 19 is the corridor's main north-south transit route north of Highway 55; south of Highway 55, Route 9 runs along Penn between Glenwood Avenue and Cedar Lake Road. There are also eight other routes that intersect the study area. Route 19 and the other routes are all described in the next sections. The planned C Line arterial bus rapid transit (BRT) line is also discussed in this section.

ROUTE 19

Route 19 is the main route that serves Penn Avenue. Route 19 stops are located approximately every 1/8 of a mile along Penn Avenue north of Highway 55. Route 19 consists of three branches: B, the main branch, H and Y. All three branches of Route 19 are shown in Figure 6-18. For more information on each branch, please see *Technical Memorandum - Transit* (under separate cover).

FIGURE 6-17: EXISTING TRANSIT SERVICE IN THE PENN AVENUE CORRIDOR

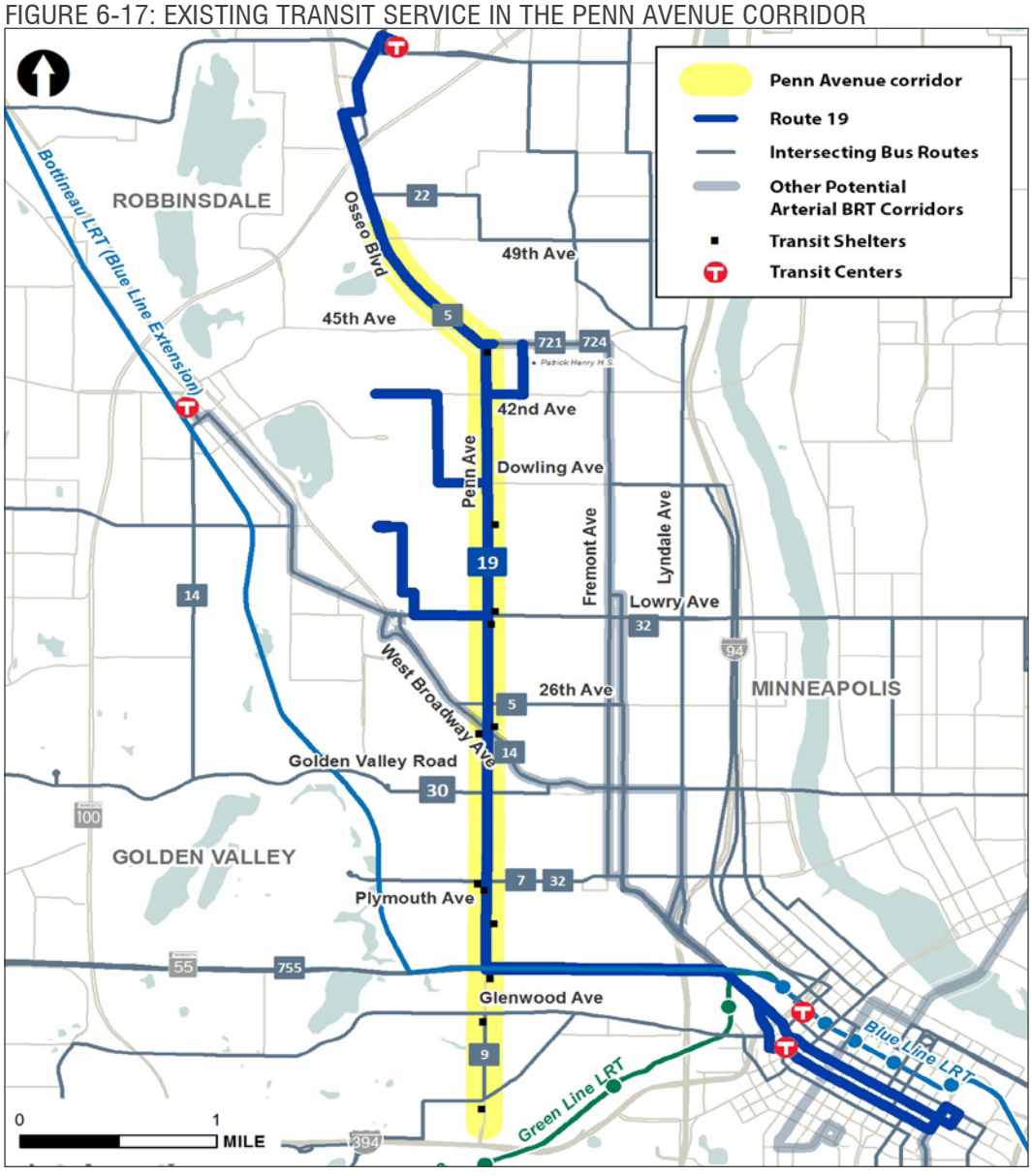
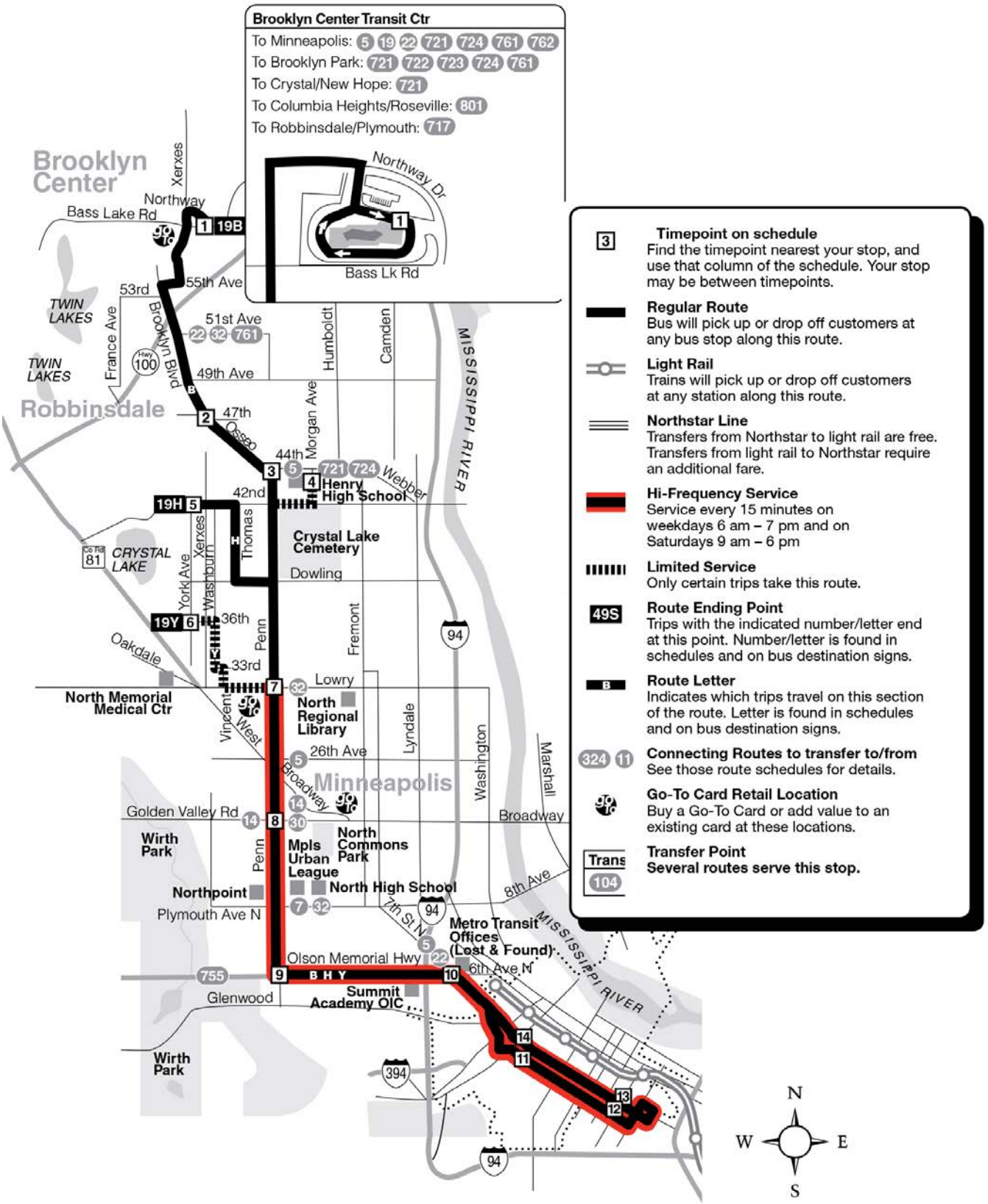


FIGURE 6-18: ROUTE 19



Key Terminology:

Bus Frequency: The number of bus trips that occur during a certain time period.

Span of Service: The number of hours that a bus route operates

Go-To cards: Metro Transit's automated fare payment cards.

Existing Span of Service and Frequency

Route 19 operates for varying periods of time (i.e. span of service) and at varying frequencies in different portions of the study area. The portion of Route 19 that operates south of Lowry Avenue is part of the Metro Transit Hi-Frequency Network. The Hi-Frequency network provides service every 15 minutes (or better) throughout most of the day on weekdays and Saturdays. The Hi-Frequency Network portion of Route 19 is shown in red in Figure 6-18.

The span of service and frequency for all portions of the Route 19 is shown in Table 6-8. Since 2007, Metro Transit has steadily been improving Route 19 service by adding more bus frequency. For more information on these service upgrades please see *Technical Memorandum - Transit*.

Fare Payment

According to Metro Transit automated passenger count data, 52 percent of Route 19 passengers pay their fares using Go-To cards and 48 percent of riders pay in cash. Compared to the Go-To card usage rate across the entire Metro Transit system (approximately 67 percent) use of the automatic payment system on the Route 19 is relatively low. Cash payments take significantly longer to process per passenger. The higher rates of cash payments on Route 19 means it likely takes longer for passengers to board at each stop than on other comparable routes in the Metro Transit system.

Ridership

In total, on an average weekday, Route 19 provides approximately 7,800 trips in the Penn Avenue corridor between 49th Avenue and Highway 55.[1] This represents approximately 46 percent of the 17,000 total trips taken along the entire route (i.e. from Brooklyn Center Transit Center to downtown Minneapolis). Ridership on Route 19 is strong throughout the day. Approximately 60 percent of weekly boardings on Route 19 occur off-peak, that is, outside of the traditional hours of commuter travel during the morning and afternoon. The level of ridership at each Route 19 stop within the study area is shown in Figure 6-19. As shown in this figure, there is strong ridership throughout the study area; however, six nodes stand out for having the highest levels of ridership. The six highest ridership nodes in the study area are listed in Table 6-9. The ridership at these six nodes represents approximately 37 percent of the study area's total Route 19 ridership.

On Time Performance

The large majority of the Route 19 bus trips run on time. Metro Transit considers a bus on-time if it reaches a scheduled time point no more than one minute early and no more than five minutes late, and on average approximately 88 percent of the route's trips are on time. This is in line with Metro Transit's system-wide average on time average (87 percent on time). For more detailed information on stop-by-stop Route 19 on time performance and the factors affecting on-time performance, please see *Technical Memorandum - Transit*.

TABLE 6-8: ROUTE 19 SPAN OF SERVICE AND FREQUENCY

Portion of Route 19	Span of Service	Frequency
Trunk Line (i.e. on Penn Avenue, south of Dowling)	5AM – 1AM, weekdays and weekends	10 – 20 min
B Branch	5AM – 1AM, weekdays and weekends	10 – 30 min
H Branch	5AM – 1AM, weekdays and weekends	60 min
Y Branch	Peak period, peak direction (i.e. southbound in the morning, northbound in the afternoon), weekdays	3 trips in the morning peak, 3 trips in the afternoon peak
Service to Patrick Henry High School	Beginning and end of school days only	3 - 4 trips in the morning and in the afternoon

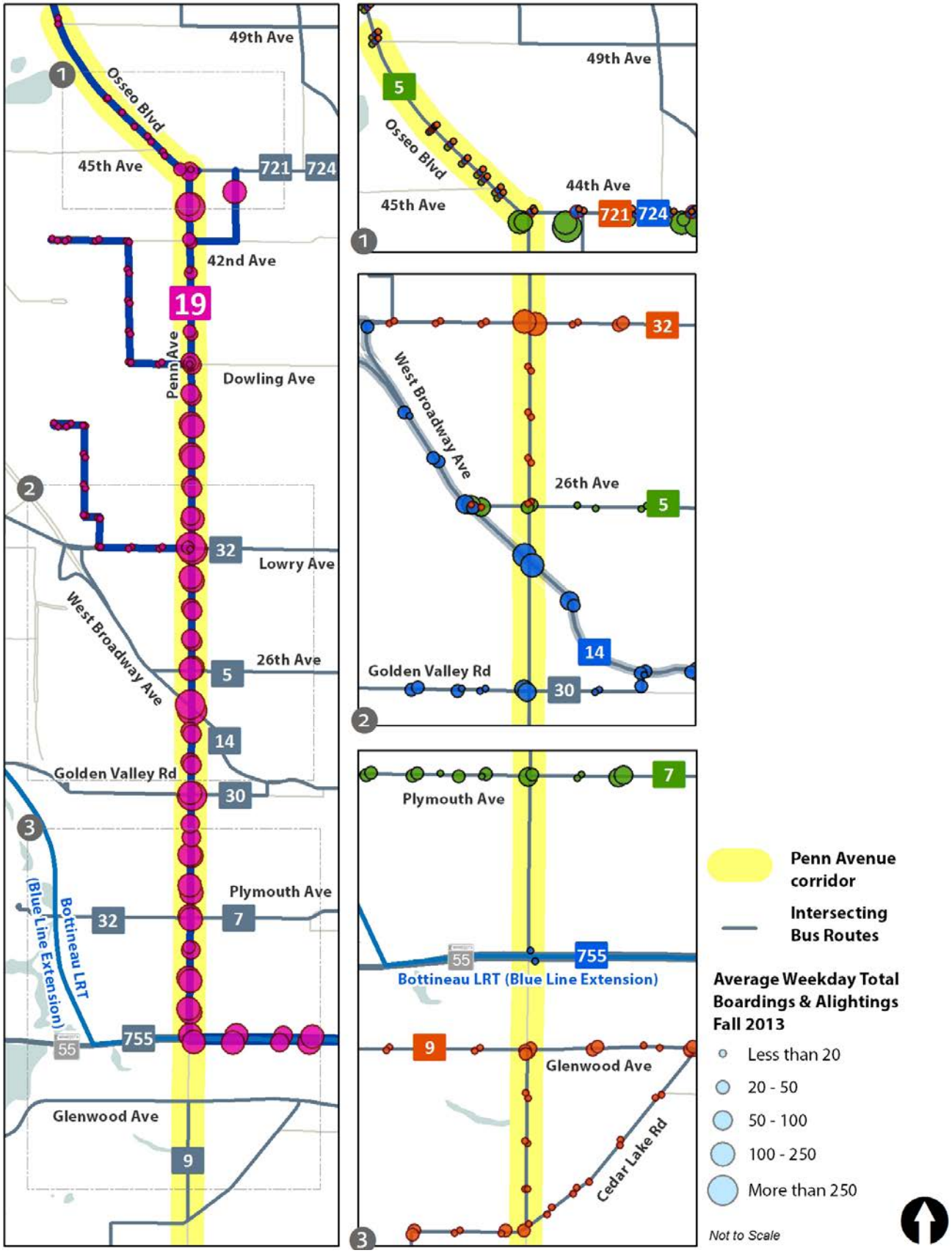
TABLE 6-9: ROUTE 19 HIGHEST RIDERSHIP NODES (WITHIN THE PENN AVENUE STUDY AREA)

Stop Location	Southbound Boardings and Alightings	Northbound Boardings and Alightings	Node Total Boardings and Alightings1
Lowry Avenue	438	446	884
West Broadway Avenue	286	270	556
Golden Valley Road	215	258	473
Plymouth Avenue	239	217	456
43rd Avenue	126	292	418
36th Avenue	208	197	405

Source: Metro Transit Fall Weekday 2013 automated passenger count (APC) data

1 Boardings are the total number of people getting on the bus. Alightings are the total number of people getting off the bus.

FIGURE 6-19: STOP LEVEL RIDERSHIP IN THE PENN AVENUE CORRIDOR



Intersecting Bus Routes

The characteristics of the bus routes that intersect with Penn Avenue and Route 19 are described in Table 6-10 and shown in Figure 6-17. The listed span of service and frequencies reflect the level of service provided in the Penn Avenue study area and not necessarily the span and frequency of the overall route (i.e. Route 5 is considered a Hi-Frequency Network Route, however the 5F pattern only serves the study area every 30 minutes).

Stop level ridership for the intersecting routes is shown in Figure 6-19. Routes 5, 14, and 32 have the highest ridership in the study area, as shown in as shown in Table 6-10. The highest ridership stop locations for these three routes are at 44th Avenue, Lowry Avenue, and West Broadway Avenue. These locations are the same, or one block off of, three of Route 19's highest ridership nodes.

TABLE 6-10: INTERSECTING BUS ROUTES WEEKDAY SERVICE CHARACTERISTICS

Route No.	Type of Route	Intersecting Street	Weekday Span of Service	Weekday Frequency	Average Weekday boardings/alightings in the Penn Avenue study area2
14 N/R	Local	West Broadway Avenue	5AM – 1AM	20 – 30 min	390
14 D/G/L	Local	Golden Valley Road	5AM – 1AM	30 – 60 min	
5K/M	Local	44th Avenue	4:30 AM – 2:30 AM	10-15 min, 30 late night	366
5F	Local	26th Avenue	6AM – 7PM	30 min	
32	Local	Lowry Avenue	6:30AM – 8PM	30 min	378
9	Local	Glenwood Avenue and Cedar Lake Road	5AM – 1AM	20-30 min	161
7	Local	Plymouth Avenue	5AM – 12PM	30 min day / 60 min evening	126
721	Limited Stop	44th Avenue	Peak only	3 AM trips, 2 PM trips	41
724	Limited Stop	44th Avenue	8AM – 4PM	30 min	40
755	Limited Stop	Highway 55	Peak only	6 AM trips, 6 PM trips	30
30	Local	Golden Valley Road	5:30AM – 11PM	30 min	N/A1

Source: Metro Transit April 2014 Automated Passenger Count Data

1 No ridership data is available for Route 30, because it is a new route, introduced in March 2014.

2 Boardings and alightings of intersecting routes at Penn Avenue

Corridor Transit Shelters

Currently, there are very few bus shelters in the Penn Avenue Corridor. Of the 65 stops on Penn Avenue only six stops have shelters. Similarly, of the 28 stops in the study area serving the intersecting transit routes only six stops have shelters. This means only 13 percent of the stops in the Penn Avenue study area are have shelters.

The locations of the shelters are shown in Figure 6-17 and listed in Table 6-11. Metro Transit owns all but two shelters in the study area. The shelter located on Penn Avenue at West Broadway Avenue is a custom shelter owned by Catalyst Community Partners. The shelter located on Penn Avenue at Plymouth Avenue is owned by CBS Outdoor, a private entity that operates shelters for advertising revenue through a franchise agreement with the City of Minneapolis.

TABLE 6-11: TRANSIT SHELTERS IN THE CORRIDOR

Metro Transit Site ID	Sited On	Sited At	Corner Description	Owner	Notes
Shelters located on Penn Avenue					
11110	Penn Avenue	36th Avenue	Near side south	Metro Transit	
11102	Penn Avenue	Lowry Avenue	Near side south	Metro Transit	Custom shelter design through Lowry Avenue Community Works Project
52664	Penn Avenue	West Broadway Avenue	Near side south	Metro Transit	
52671	Penn Avenue	West Broadway Avenue	Near side north	Catalyst Community Partners	Custom shelter; Blossoms of Hope
17832	Penn Avenue	Plymouth Avenue	Near Side north	CBS	Missing glass panels
17835	Penn Avenue	Oak Park Avenue	Near side south	Metro Transit	
Shelters located on Penn Avenue					
9589	44th Avenue	Penn Avenue	Far side east	Metro Transit	
53154	Lowry Avenue	Penn Avenue	Far side east	Metro Transit	
17688	Plymouth Avenue	Penn Avenue	Near side east	Metro Transit	
17839	Highway 55	Penn Avenue	Far side east	Metro Transit	
3038	Glenwood Avenue	Penn Avenue	Near side east	Metro Transit	
7422	Cedar Lake Road	Penn Avenue	Near side east	Metro Transit	

Metro Transit Shelter Placement

Metro Transit recently analyzed the conditions at the agency's nearly 15,000 active bus stops to determine which stops warrant a bus shelter. This analysis ranked three locations in the Penn Avenue study within the top 32 sites system-wide that warranted a shelter. The location and description of the sites are shown in Table 6-12. For more detailed information on Metro Transit's shelter analysis please see *Technical Memorandum - Transit*.

It should be noted that all three of the locations listed in Table 6-12 are planned C Line station locations, as discussed in the next section. These locations will be studied further through the Penn Avenue Community Works process and other C Line planning.

TABLE 6-12: BUS STOP LOCATIONS THAT MADE METRO TRANSIT'S TOP 32 SITES THAT WARRANT A SHELTER

Site ID	Site On	Site At	Corner/ Direction	Final Score	Priority Rank
17831	Penn Avenue	Plymouth Avenue	Nearside Southbound	5.4	2- Medium-High
52667	Penn Avenue	Golden Valley Road	Nearside Southbound	5.3	2- Medium-High
11103	Penn Avenue	Lowry Avenue	Nearside Northbound	5.1	2- Medium-High

C LINE: ARTERIAL BRT ON PENN AVENUE

Key Concept:

The primary objective of arterial BRT is to provide faster and more frequent service as well as an improved customer experience.

Metro Transit is in the planning stages of implementing arterial bus rapid transit (BRT) on Penn Avenue. The new service, called the C Line, includes a package of improvements to make transit more reliable, faster and more attractive to users. The C Line alignment connects the Penn Avenue corridor to downtown Minneapolis and the Brooklyn Center Transit Center, as shown in Figure 6-21. The transit line will run in mixed-traffic similar to a local bus, but incorporates limited-stop service, high-quality stations, technology improvements, and branding to differentiate the service from regular bus routes. The primary objective of arterial BRT is to provide faster and more frequent service as well as an improved customer experience. Faster service is accomplished by reducing the time buses spend waiting at traffic signals and for passengers to board, and by stopping at fewer locations. An improved passenger experience is achieved through more comfortable vehicles, stations, information technology, and improved service reliability.

C Line Stations

There are 11 planned C Line stations within the Penn Avenue study area, as shown in Figure 6-21. Ideally, arterial BRT stations are placed on the farside of an intersection and are designed with a bump-out. Farside stations maximize the effectiveness of traffic signal priority (TSP) given to transit operations. Bump-outs convert existing roadway space, typically a turn lane or parking lane, into a wider sidewalk to accommodate a station, as shown in Figure 6-20 nelow. Bump-outs also allow buses to stop at stations without weaving in and out of traffic.

At locations where bump-out platforms are not feasible due to existing site constraints, curbside platforms must be used. Curbside platforms are located adjacent to the roadway curb of a street and are typically integrated into the surrounding sidewalk. Curbside stations are much narrower than bump-outs, and as a result, cannot always accommodate passenger shelters or other amenities. The exact location and configuration of each station within the study area will be informed by the Penn Avenue Community Works project process.

Key Terminology:

Farside station: A farside stop is located just after an intersection with another street.

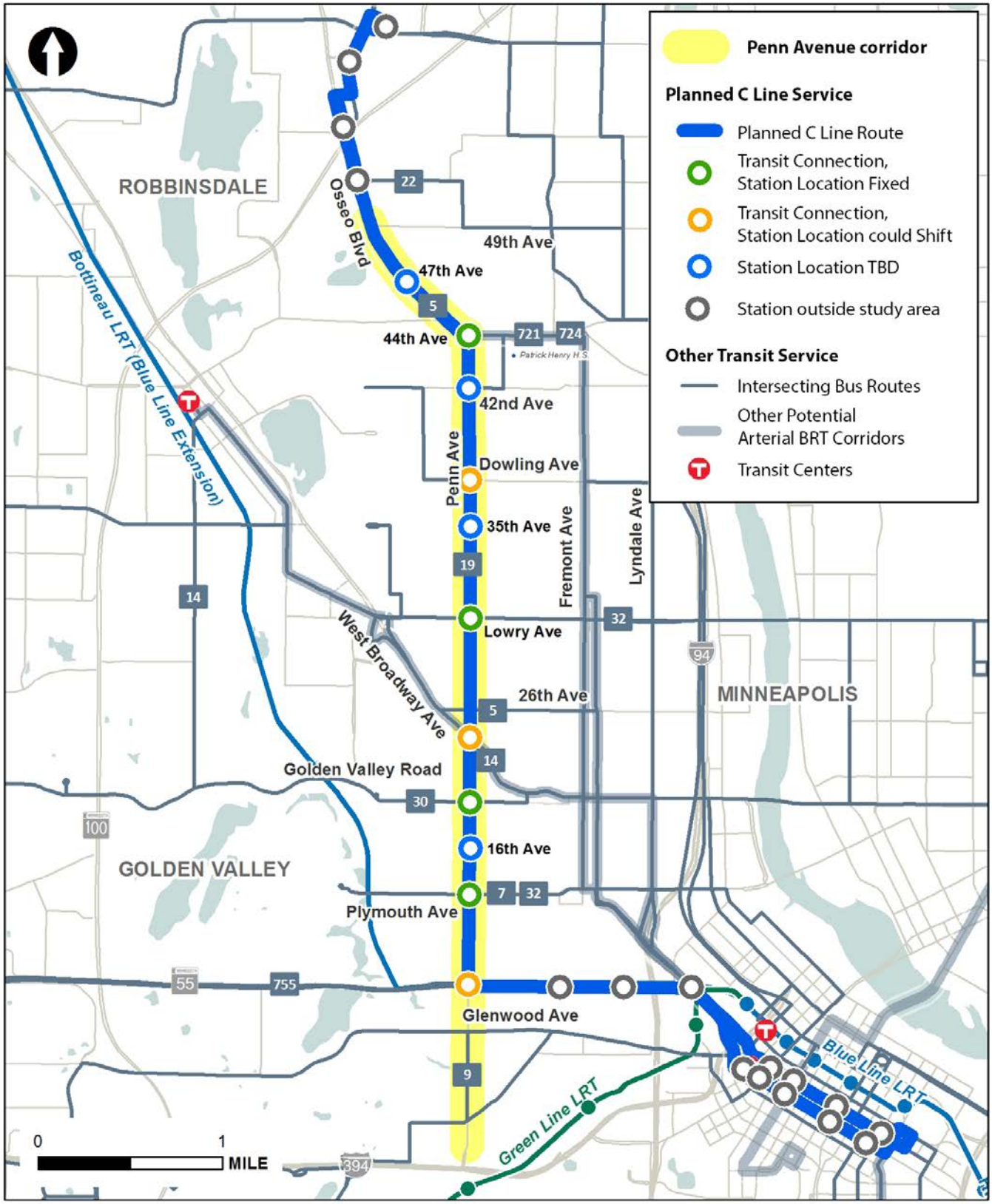
Traffic Signal Priority (TSP): Technology used to extend green light phases at signalized intersections for a few moments, allowing buses to move through an intersection without stopping.

Bumpout: A bump-out is a section of the sidewalk that is extended from the existing roadway curb to the edge of the through lane for the length of the station.

FIGURE 6-20: BUS BUMPOUT

Arterial BRT Shelter (Large)

FIGURE 6-21: PROPOSED C LINE ROUTE



C Line Service Plan

The C Line will increase the span of transit service and frequency of transit service in the Penn Avenue study area. The proposed C Line service plan is illustrated in Table 6-13. C Line service will run every ten minutes throughout the majority of the day, every 30 minutes in the early morning and every 20 minutes late at night.

Route 19 will continue to provide local service along the study area at a reduced frequency, generally every 30 minutes. Branches will continue to be served.

TABLE 6-13: PROPOSED C LINE SERVICE PLAN

Route	Early AM	AM	Midday	PM	Evening	Late Night
C Line	30 min	10 min	10 min	10 min	12 min	20 min
Route 19	60 min	30 min	30 min	30 min	30 min	60 min

For more detailed information about the C Line please see Transportation Technical Memo 4.

FUTURE TRANSIT OPPORTUNITIES

Ongoing transit initiatives and projects underway in the region will impact the Penn Avenue corridor, including the following:

- Metro Transit Service Improvement Plan
- Bottineau Light Rail Transit (LRT) – Blue Line extension
- Southwest LRT – Green Line extension

This section summarizes each project and how it relates to the corridor.

Metro Transit Service Improvement Plan

Metro Transit is in the process of developing a 10-15 year service improvement plan for expanding the local and express route bus network. This plan will help prioritize where and how to improve service throughout the transit network as well as in the study area.

Workshops with elected officials and community groups were held in November 2013 to discuss the service improvement plan. In addition, nearly 4,000 people completed an on-line survey for the plan. Metro Transit staff is currently reviewing this feedback, identifying common themes, patterns and the most-requested improvements. A summary of the results will be posted on Metro Transit's website later this spring. Based on this input, Metro Transit will create a draft Service Improvement Plan using the transit planning principles outlined below. The draft plan will be distributed for public review and comment later this year.

Bottineau Light Rail Transit (LRT) – Blue Line extension

The Bottineau LRT line is a planned extension of the existing Blue Line LRT. The line will run from Target Field station in downtown Minneapolis to Brooklyn Park. The southern portion of the line will run along Highway 55, allowing for transfers to the C Line. Specifically, the C Line and the Bottineau LRT are expected to both have a station near Penn Avenue and Highway 55. This planned transit connection will offer Penn Avenue corridor residents and employees an important connection to the regional transit system. For more information on the Bottineau LRT please see the project's website at: http://www.bottineautransitway.org

Southwest LRT – Green Line extension

The Southwest LRT is a planned extension of the existing Green Line LRT. The line will run from Target Field station in downtown Minneapolis to Eden Prairie. The Southwest LRT does not have any stops within the Penn Avenue corridor; however there is a planned LRT stop just south of I-394 at Kenwood Parkway, just south of Penn Avenue. Regional agencies are currently considering the most effective way to connect the Penn Avenue corridor to the Southwest LRT line. For more information on the Southwest LRT please see the project's website at http://metrocouncil.org/Transportation/Projects/Current-Projects/Southwest-LRT.aspx