MEMORANDUM

WALKSHED AND BIKESHED ANALYSIS

To: Andy Gitzlaff, Ramsey County

From: Brian Almdale, Jessica Schoner, John Dempsey, Ciara Schlichting and Fernando Oliveira, Toole Design

Date: April 8, 2020

Subject: Walkshed and Bikeshed Analysis

This memo provides a summary of the methodologies used for evaluating pedestrian and bicyclist access for the proposed Rush Line Bus Rapid Transit (BRT) Project stations, as well as an analysis example for each mode.

The walkshed analysis measures a half-mile walking distance to and from each station under three scenarios: (1) existing conditions, (2) proposed Rush Line BRT Project station area improvements and (3) a broader set of station area improvements including work planned by other agencies. The mapped results help the reader visualize how improvements to the pedestrian environment expand the utility of the BRT stations. Further, the analysis includes estimates of how many people live and work within the walksheds as an indicator of potential for walk-up station demand.

The bikeshed analysis measures a 3-mile bicycling distance to and from each station using both a low-stress network and the entire legal right-of-way (called the "high-stress network") under two scenarios: (1) existing conditions and (2) proposed Rush Line BRT Project station area improvements as well as work planned by other agencies, including an extension of the Bruce Vento Trail.

In this memo, the walkshed analysis methodology and results are presented first, followed by the bikeshed analysis. Each modal section includes a description of how the walksheds and bikesheds are built and mapped examples of the results for a single station area with an explanation of how to interpret the maps. The walkshed map example is for the proposed Buerkle Road station, and bikeshed map example depicts results for the proposed Maryland Avenue station. Mapped results for all stations are included in the attachments. Results of the walkshed population and employment analysis for all station areas are also included in this memo.

WALKSHED ANALYSIS

Building Station Area Walksheds

The Toole Design team built a set of half-mile[1] pedestrian walksheds surrounding the proposed BRT stations. The example shown in this memo is the Buerkle Road station. The walkshed methodology uses sidewalks and roadway crossings as the base network layer, rather than roadway centerlines.

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[1] The Federal Transit Administration (FTA) defines all pedestrian improvements within a half-mile of a transit station to have a *de facto functional* relationship with the transit station when assessing FTA funding eligibility. Additional improvements beyond one-half mile may also be included if they are within a distance people will travel to the station on foot. Source: *Final Policy Statement on Eligibility of Pedestrian and Bicycle Improvements under Federal Transit Law* (FTA, 2011). Available at https://www.federalregister.gov/documents/2011/08/19/2011-21273/final-policy-statement-onthe-eligibility-of-pedestrian-and-bicycle-improvements-under-federal. Accessed December 11, 2018.

This type of network layer allows the walkshed to be calculated based on pedestrian-specific facilities, such as sidewalk presence or gaps, and ease of intersection crossings.

The underlying pedestrian network was built using a set of sidewalk and crossing imputation procedures to transform an existing roadway centerline dataset within a half-mile Euclidean radius around the proposed BRT stations. Interstates and limited access roadways were removed from the initial roadway network before generating sidewalk and crossing features. Existing infrastructure was verified using aerial imagery. Due to time and budget constraints, this analysis assumes that the existing and proposed pedestrian network is compliant with the Americans with Disabilities Act, but this has not been verified.

The walksheds were calculated by accumulating the amount of time (seconds) it takes to walk one-half mile at 3.5 feet per second. The amount of time required to walk along each segment from start to finish is coded to each segment. The maximum walkshed limit is 755 seconds (about 13 minutes), which is the amount of time it would take a pedestrian to travel one-half mile at 3.5 feet per second (2.4 miles per hour). Intersection delays are added to roadway crossings in the network to approximate actual walking conditions in which a pedestrian may have to wait for a crossing signal or suitable gap. Delay duration was estimated using a proportion of the time required to cross the intersection, according to the following parameters:

- Arterial roadway crossings at a signalized intersection: 75 percent delay.
- Arterial roadway crossings at an unsignalized intersection: 90 percent delay.
- Collector street crossings: 25 percent delay.
- Local street crossings: no added delay.

These delays are only coded to segments that directly cross the arterial or collector street; segments crossing local streets *along* an arterial or collector do not have an added delay. For example, if one is walking *along* Buerkle Road and crossing a local street, no added delay was assumed; whereas if one is *crossing* Buerkle Road, an intersection delay was assumed since Buerkle Road is classified as a collector street. The same intersection assumptions were used in the analysis for both existing conditions and planned improvement conditions.

Three versions of the pedestrian network were developed for this analysis. The first network represents *existing* pedestrian conditions. Only existing sidewalks and shared use paths[2] are included in this network, along with the imputed intersection delay values. The second and third versions of the network, collectively referred to as “planned improvement” conditions, represent two scenarios: one based on the proposed Rush Line BRT Project station area improvements included in the 15 percent plans and another based on a broader collection of planned improvements by multiple agencies. These additional planned improvements included features in the approved concept plans from September 27, 2018 labeled as “future work by others” as well as other planned improvements provided by city and county staff.[3]

Both the existing conditions and planned improvement conditions networks are visualized on maps using a 75-foot buffer around all segments within the walkshed. Additionally, buildings that are both on a parcel that intersects the walkshed and are within 225 feet of the walkshed buffer (i.e., within 300

[2] Existing sidewalks and shared use paths were verified using aerial imagery.
[3] Additional improvements were provided by Ramsey County, city of White Bear Lake, city of Maplewood and city of Vadnais Heights.

feet from the segments in the walkshed) are highlighted on the maps. Highlighted buildings are more likely than non-highlighted buildings to have access to a BRT station within a 13-minute walk.

Mapping Station Area Walksheds

Maps 1 through 3 provide an example walkshed[4] analysis and output for the proposed Buerkle Road station using the methodology outlined in this memo. Similar output maps for all proposed stations are included in Attachment 1.

Map 1 displays the pedestrian walkshed under existing conditions. The existing walkshed uses only existing sidewalks and shared-use paths within a 13-minute walk (half-mile walking distance at 3.5 feet per second) from the proposed BRT station and includes the arterial and collector street crossing delays. The yellow polygon represents the existing walkshed catchment area that a pedestrian is able to reach within a 13-minute walk using only existing sidewalks and shared-use paths. The blue lines denote existing sidewalks. The green lines represent existing shared-use paths. The blue existing sidewalk segments that are not within the yellow walkshed polygon represent segments that are not accessible using the existing sidewalk network within 755 seconds, but that are within or near to the half-mile Euclidean distance station area.

Maps 2 and 3 show the pedestrian walkshed under two scenarios of planned improvement conditions. Map 2 contains the existing walkshed and the proposed Rush Line BRT Project station area improvements included in the 15 percent plans. Map 3 contains the existing walkshed, the proposed Rush Line BRT Project improvements and additional planned improvements from other agencies. Like Map 1, the thin blue lines denote existing sidewalks. The outlined dark purple lines represent planned new sidewalks or shared-use paths from the 15 percent plans. The outlined light blue lines represent additional planned improvements within the station area. The light purple “Project Improvement Walkshed” and light blue “Projects by Others Walkshed” depict areas that are accessible to the BRT station within a 755-second walk with the improvements in the 15 percent plans and all planned improvement conditions, respectively. Areas located outside these shaded “planned improvement” walksheds represent areas that take longer than 755 seconds to walk to. Areas where the purple or blue walksheds are visible represent areas that previously did not have access to the BRT station within a half-mile walk using sidewalks or shared-use paths but would have access after adding these planned improvements to the network. Versions of Map 3 for each station area are included in Attachment 1.

[4] Walksheds are built using a 75-foot buffer from the sidewalks and shared-use paths that are traversable to/from the proposed stations and are within 755 seconds of walk time.

PEDESTRIAN WALKSHED ANALYSIS

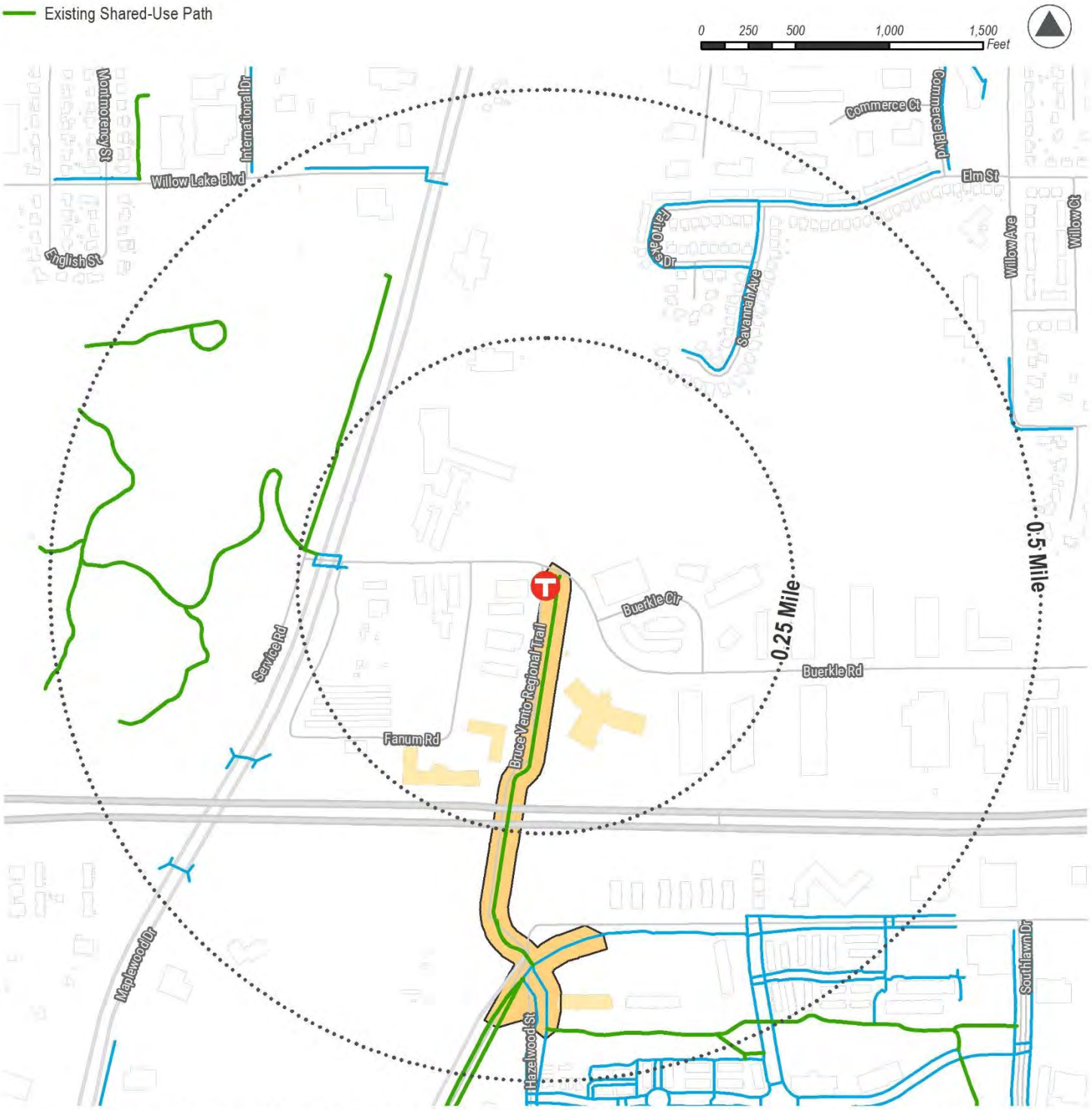
Map 1: Existing Conditions

Station Name: Buerkle Road

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Existing Conditions Walkshed*
- Buildings near the Existing Conditions Walkshed



*This is how far you can walk in 13 minutes using existing sidewalks, existing shared-use paths, Rush Line BRT project improvements, and improvements planned by others.

PEDESTRIAN WALKSHED ANALYSIS

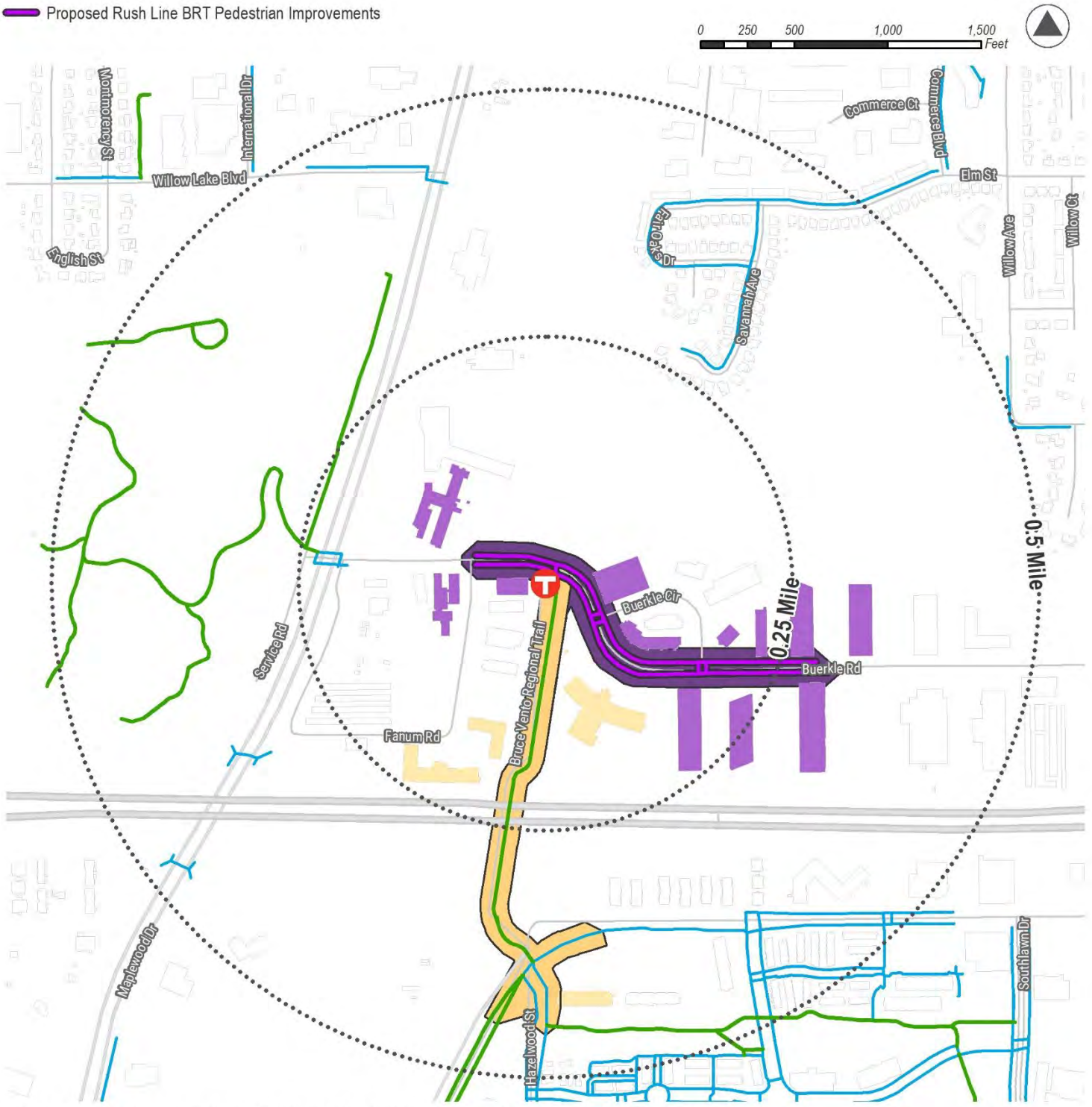
Map 2: Proposed Rush Line BRT Pedestrian Improvements

Station Name: Buerkle Road

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements Walkshed



*This is how far you can walk in 13 minutes using only the existing sidewalks and shared-use paths.
**This is how far you can walk in 13 minutes using existing sidewalks, existing shared-use paths, and Rush Line BRT project improvements.

PEDESTRIAN WALKSHED ANALYSIS

Map 3: Existing Conditions, Project Improvements, and Projects by Others

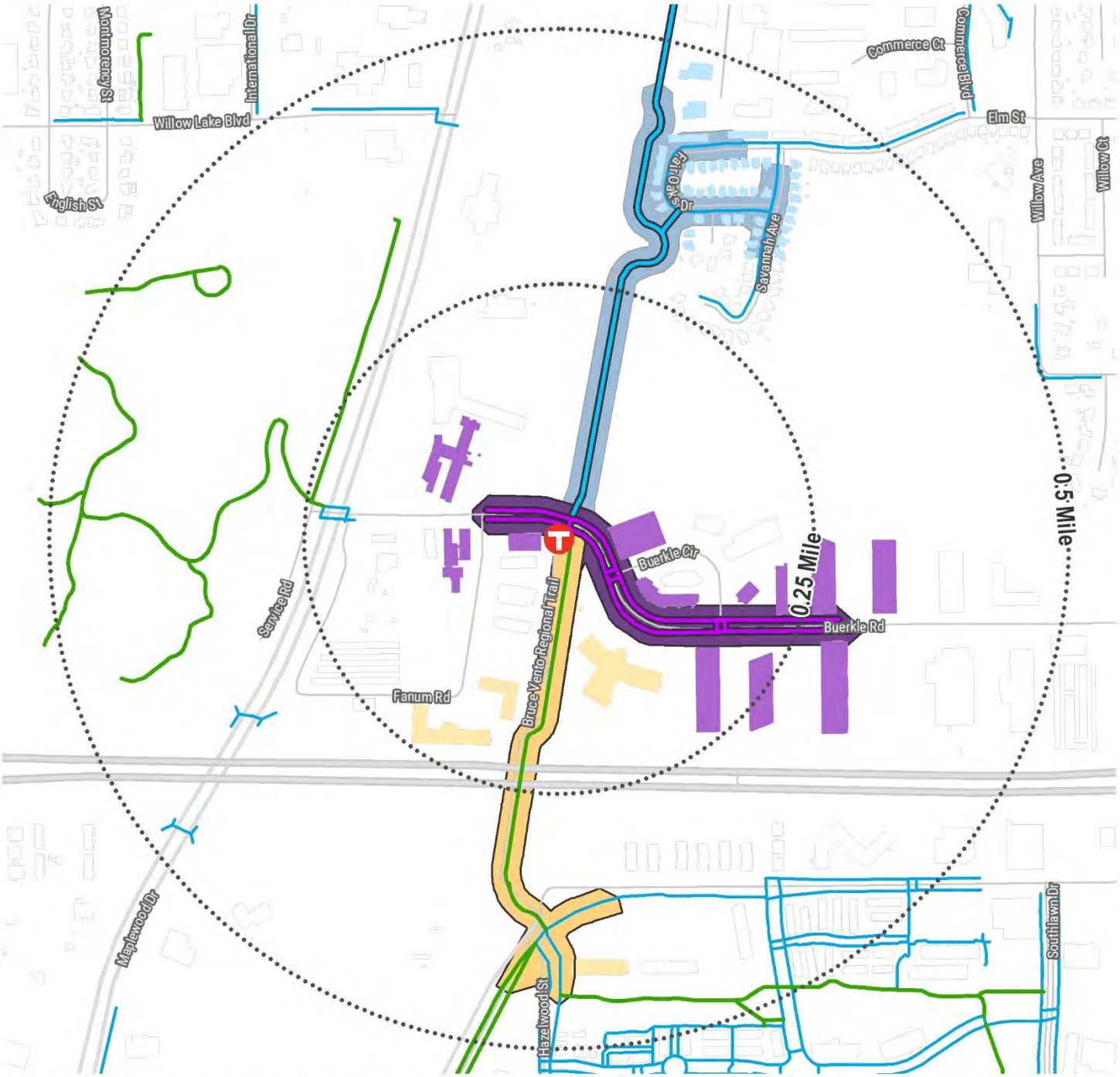
Station Name: Buerkle Road

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements Walkshed
- Buildings near the Projects by Others Walkshed

0 250 500 1,000 1,500 Feet



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**This is how far you can walk in 13 minutes using existing sidewalks, existing shared-use paths, and Rush Line BRT project improvements.
***This is how far you can walk in 13 minutes using existing sidewalks, existing shared-use paths, Rush Line BRT project improvements, and improvements planned by others.

4/3/2020

Pedestrian Network Gap Identification

For people to choose to walk to a proposed station, users ideally have a direct route that feels comfortable. A circuitous route, an uncomfortable road segment or a challenging intersection may discourage people from walking to the station. This section describes the framework for identifying pedestrian network gaps.

The completed walkshed analysis revealed gaps in the pedestrian network. The Toole Design team used the results of the walkshed analysis and Google Earth/Google Maps to identify network gaps and barriers near the proposed stations. Potential barriers such as highways, railroad tracks and topography were considered when identifying sidewalk gaps. The analysis did not include an Americans with Disabilities Act assessment of the existing sidewalk to identify gaps or sidewalks in disrepair. The analysis did not include an assessment of the pedestrian experience related to factors such as motor vehicle speed, motor vehicle traffic, criminal activity, police presence, shade, pedestrian scale lighting, etc.

The gap identification process started in the immediate proposed station area and then worked concentrically from the station area approximately one to four blocks to locate missing sidewalk segments and connections to the Bruce Vento Trail. Removing gaps would expand the immediate walkshed area by providing better connections to the existing sidewalk and trail network adjacent to the proposed station area. The improved walkshed perimeter was also reviewed for adjacent sidewalks or trails that could potentially expand the pedestrian connectivity to the station area if the missing gap was filled. Map 4 depicts the results of this sidewalk gap analysis for the Buerkle Road station area and Attachment 2 includes the results for all proposed stations north of downtown Saint Paul.

Pedestrian Network Gap Analysis

The gap analysis identified existing pedestrian network barriers and opportunities for pedestrian improvements that may be considered as part of the Rush Line BRT Project. The gaps presented in Attachment 2 represent sidewalk segments and trail connections that can increase pedestrian connectivity to proposed station areas. Rush Line BRT Project staff will work with stakeholders to determine if the improvement should be included in the Rush Line BRT Project or if addressing the gap is more appropriate to include in the broader station area planning process.

Seven factors were used to analyze each connection. Each of the factors was assigned a level of priority. The Barriers and Opportunities for Pedestrian Improvements Summary Table presented in Attachment 2 represents the results for each potential improvement. The blue colored cells in the table represent a higher priority. The yellow colored cells in the table represent a lower priority. Factors considered include:

- **Adjacent land use:** Do adjacent land uses tend to generate pedestrian activity (residential, commercial/retail, community center, parks, schools, etc.)?
    - Blue indicates a higher level of potential pedestrian activity in the adjacent land use (residential, commercial/retail, parks, schools, etc.).
    - Yellow indicates a lower level of pedestrian activity in the adjacent land use (warehouse, industrial).

- **Barriers:** Does the segment help pedestrians cross/traverse a railroad, a highway or steep topography?
    - Blue indicates the connection removes significant barriers that pedestrians must cross or go around to reach the station.
    - Yellow indicates the lack of significant barriers on the pedestrian route.
- **Comfort:** Does the posted speed limit and/or average daily traffic volume on the adjacent roadway cause discomfort for pedestrians walking along the road?
    - Blue indicates local streets with a low posted speed limit and/or average daily traffic volume.
    - Yellow indicates an arterial or collector street with higher posted speed limit and/or average daily traffic volume.
- **Constructability:** Does the improvement location or existing conditions present significant issues that influence the potential cost of constructing the improvement?
    - Blue indicates no known extraordinary constraints that significantly influence the cost of construction.
    - Yellow indicates barriers that directly influence the construction process (steep slopes, noise walls, structures, potential easements or right-of-way).
- **Desire lines:** Is there evidence of more than occasional pedestrian activity along the segment (i.e., worn walking paths)?
    - Blue indicates evidence of pedestrian activity.
    - Yellow indicates no evidence of pedestrian activity.
- **Proximity to the proposed station:** Does the segment provide a direct connection to the station or is it within the immediate vicinity?
    - Blue indicates segments within a one-fourth mile buffer of the closest station.
    - Yellow indicates segments beyond a one-fourth mile buffer of the closest station.
- **Street pattern:** Does the street and trail network provide multiple pathways to access the station, or is the street network limited and the segment provides a more direct route to the station?
    - Blue indicates a disconnected grid network and/or curvilinear street pattern with limited connections to the station.
    - Yellow indicates a more gridded street network that provides multiple direct connections to the station.

It is noted that “safety” is also a factor to consider; however, a comprehensive safety analysis was not undertaken to determine if a new sidewalk connection would address a known safety issue. Also, the gap analysis did not include identifying all of the potential pedestrian crossings that could be improved with marked crosswalks and/or traffic control (i.e., rectangular rapid-flashing beacons, high-intensity activated crosswalks, etc.).

PEDESTRIAN WALKSHED ANALYSIS

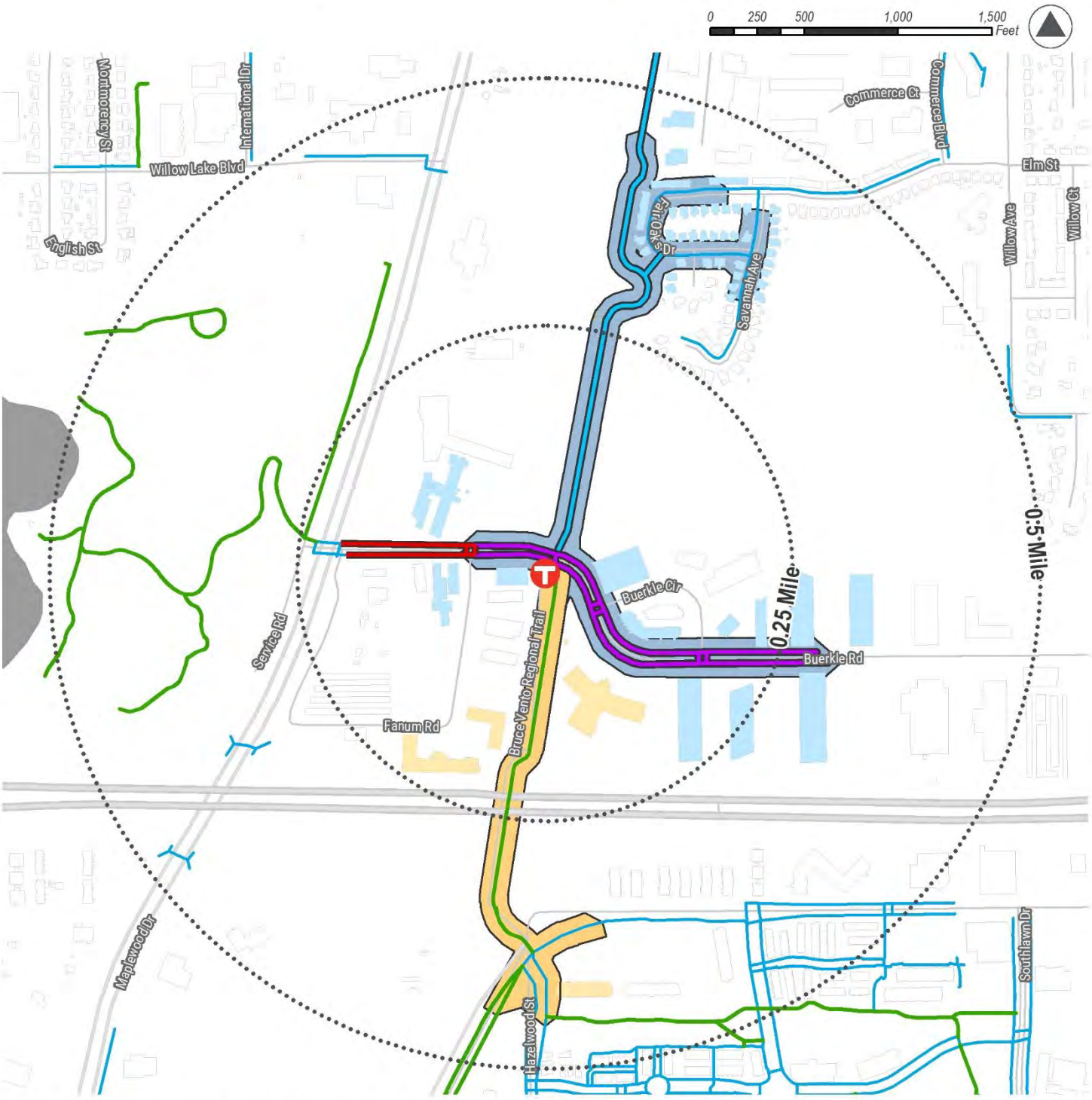
Map 4: Additional Sidewalk Projects to Consider

Station Name: Buerkle Road

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
- Project Improvements and Projects by Others Walkshed**
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements and Projects by Others Walkshed



*This is how far you can walk in 13 minutes using only the existing sidewalks and shared-use paths.

**This is how far you can walk in 13 minutes using existing sidewalks, existing shared-use paths, Rush Line BRT project improvements, and improvements planned by others.

4/3/2020

Estimating Population and Employment in Station Area Walksheds

WALKSHED POPULATION AND EMPLOYMENT METHODOLOGY

Toole Design used block group-level population totals from the US Census Bureau American Community Survey[5] and block-level employment totals from the US Census Bureau Longitudinal Employer-Household Dynamics survey.[6] For both population and employment data, these represent the finest scale data available that are updated regularly. Block groups are clusters of blocks for the purposes of Census data collection and reporting, and they typically are drawn to have about 600 to 3,000 people in them.[7] Spatially, block group size varies with population density; in areas with lower density, block groups must cover a larger area to reach the target population size. Blocks are smaller than block groups by definition (i.e., because several blocks comprise each block group) but are still smaller on average in areas with higher density. Conversely, the walksheds are calculated by closely buffering the street network to best approximate realistic pedestrian access using sidewalks and shared use paths.

Map 5 illustrates why this spatial mismatch complicates calculating population within the walksheds using the Buerkle Road station area as an example. The yellow area is the "existing conditions" walkshed around the Buerkle Road station. This walkshed overlaps with four block groups, outlined in red. Only a small portion of each of these block groups falls within the walkshed. For blocks (not pictured), the mismatch is not as striking, but there is still considerable spatial mismatch between the size and shape of Census blocks and the analysis walksheds.

To address this data challenge, Toole Design estimated population within the walkshed using proportional allocation based on area of overlap. In effect, if 10 percent of a block group's land area falls within the walkshed, then 10 percent of that block group's population was allocated to the walkshed. Likewise, if 25 percent of a block's total area falls within the walkshed, then 25 percent of that block's employment was allocated to the walkshed. This method is imperfect; it assumes a uniform distribution of jobs or residents throughout the block or block group's area, when population and employment alike actually tend to cluster along streets and block faces. However, the errors are expected to be modest, to average out across the aggregation of multiple block groups and – importantly – to be relatively stable and consistent across the rural-urban continuum present in station areas.

Toole Design applied the following procedure to calculate walksheds on both existing conditions and planned improvements:

- Calculate density per square mile.
    - Population: Calculate each block group's population density in people per square mile, using "land area" as the denominator.

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[5] US Census Bureau (2016). TIGER/Line Shapefiles. Retrieved from http://www2.census.gov/geo/tiger/TIGER2016/BG/tl_2016_27_bg.zip on December 7, 2018.
[6] US Census Bureau (2018). Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics (2002-2015). Washington, DC: US Census Bureau, Longitudinal-Employer Household Dynamics Program, accessed on December 1, 2018 at https://onthemap.ces.census.gov. LODES 7.3.
[7] https://www.census.gov/geo/reference/gtc/gtc_bg.html

    - Employment: Calculate each block's employment density in jobs per square mile, using "total area" as the denominator.
- Measure proportional area.
    - Map the intersection of all walksheds with all connected block groups and blocks.
    - Calculate the area of walkshed-block group intersections in square miles.
- Allocate employment and population.
    - Population: Multiply the walkshed-block group intersection by its corresponding block group's population density to produce an estimated number of people living in that polygon.
    - Employment: Multiply the walkshed-block intersection by its corresponding block's employment density to produce the estimated number of jobs in that polygon.
- Calculate results.
    - Sum the population and employment estimates for each walkshed to produce station area totals.
    - Calculate the percent difference between existing and planned improvement conditions for both population and employment.

PEDESTRIAN WALKSHED ANALYSIS

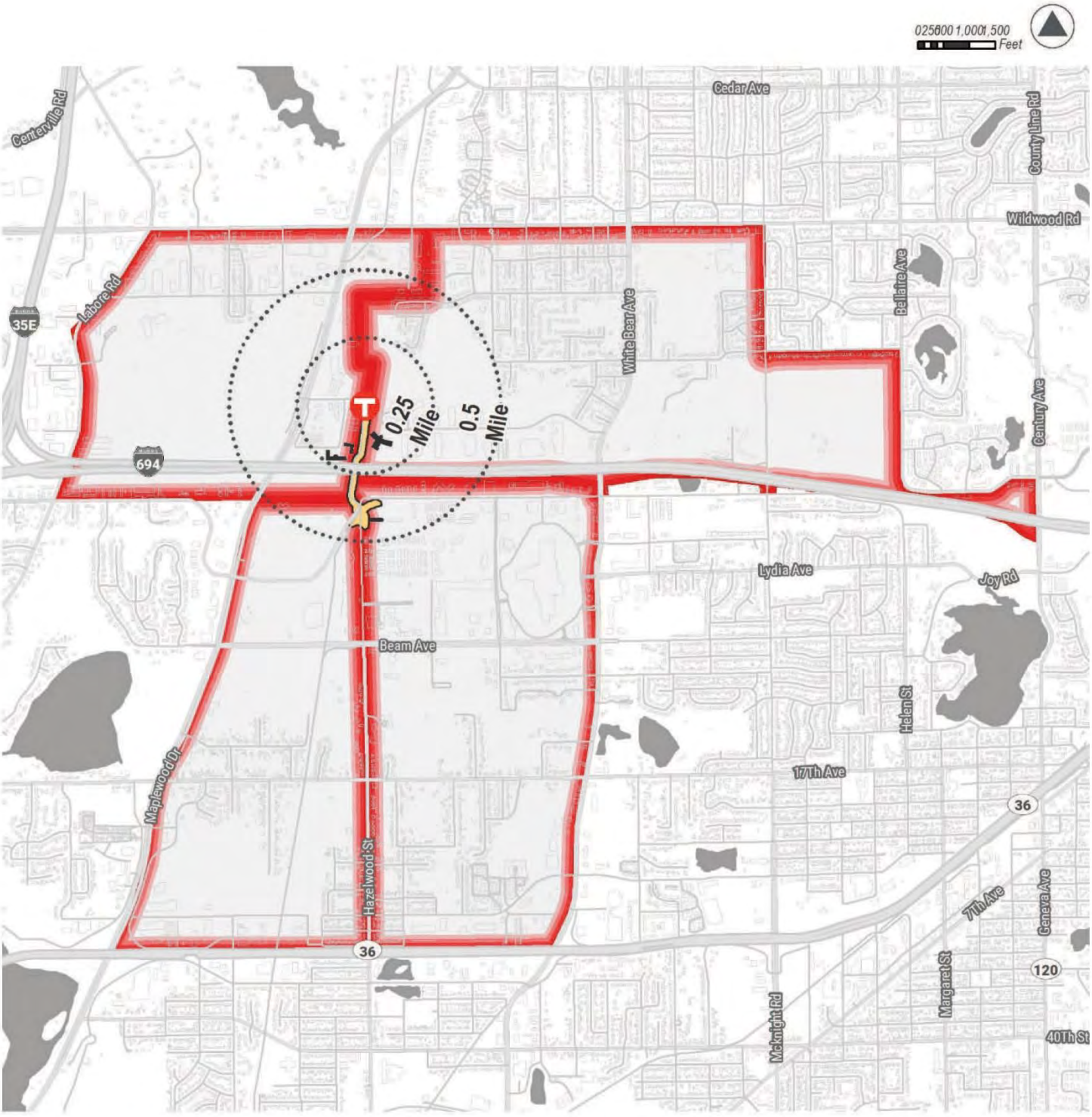
Map 5: Existing Conditions Walkshed and Block Groups Example

Station Name: Buerkle Road

Rush Line BRT

Key

- Planned Station
- Existing Conditions Walkshed*
- Buildings near the Existing Conditions Walkshed
- Block Groups



*This is how far you can walk in 13 minutes using only the existing sidewalks and shared-use paths.

As many of the walksheds overlap with one another, a separate procedure was used to remove duplicate overlapping areas before calculating the entire corridor-level population and employment estimates.

WALKSHED POPULATION AND EMPLOYMENT RESULTS

Table 1 displays the population estimates for each station area under existing conditions and after planned improvements have been built. Likewise, Table 2 summarizes employment estimates in walksheds. The final column for each table shows the percent difference between existing and planned conditions. Percent differences are only calculated for stations that have planned pedestrian improvements *that affect the extent of the walkshed*.

The corridor total for both existing and planned conditions is smaller than the sum of each station area's estimates due to overlapping walksheds as previously noted. Values are rounded to the nearest resident or employee or nearest percentage point.

LIMITATIONS OF THE POPULATION AND EMPLOYMENT ANALYSIS

As previously discussed, the proportional area method has some known limitations. It assumes that, on average, population and employment density within a block group or block is relatively even. In some cases, this assumption does not hold and the results can be unexpected. The Buerkle Road station provides a good illustration of this phenomenon. The population estimate for the Buerkle Road walkshed increases by 137 percent from all project improvements, due to planned sidewalk improvements near the BRT station. The walkshed increases in size considerably between the existing conditions and planned improvement conditions. However, the area that is added to the Buerkle Road walkshed due to these improvements is dominated by retail and unlikely to actually contribute *residents* to the walkshed. The literal interpretation (estimated 137 percent increase in population that can access the station within a half-mile walk) is flawed, but the underlying *meaning* is still true. Walking access to the station increased considerably, including the connection of several major retail destinations to the walkshed. This is confirmed by the employment estimate for the Buerkle Road station: under the planned improvement conditions, the number of jobs within a half-mile walk of the station is expected to increase by 240 percent from all planned improvements, which may perhaps be a slight *underestimate* due to the aforementioned limitations.

This analysis relies on population and employment data from 2016 and 2018, respectively, for all calculations. Changes in population or employment over time, between now and when the Rush Line BRT Project is completed and opened, cannot be accounted for. Research from the University of Minnesota has shown that fixed guideway transit, such as the Rush Line BRT Project, when paired with a well-connected street grid and other supportive built environment features, has the potential to promote job growth in station areas.[8]

[8] Guthrie, A. and Fan, Y. (2016). *Economic Development Impacts of Bus Rapid Transit*. Center for Transportation Studies, University of Minnesota: 16-02. Available from http://www.cts.umn.edu/Publications/ResearchReports/pdfdownload.pl?id=2698. Accessed March 19, 2019.

Table 1: Estimates of Total Population in Station Area Walksheds Under Existing Conditions and After Planned Improvements Have Been Built

Station Name	Existing Conditions	Project Improvements	All Planned Improvements	Percent Difference vs. Project	Percent Difference vs. All
14th Street	4,373	4,373	4,373	0%	0%
Mt. Airy Street	2,592	2,592	2,592	0%	0%
Olive Street	1,407	1,407	1,407	0%	0%
Cayuga Street	1,803	1,803	1,803	0%	0%
Payne Avenue	4,021	4,021	4,021	0%	0%
Arcade Street	4,686	4,686	4,686	0%	0%
Cook Avenue	4,508	4,649	4,649	3%	3%
Maryland Avenue	4,563	5,120	5,120	12%	12%
Larpenteur Avenue	760	1,526	1,560	101%	105%
Frost Avenue	934	929	1,164	0%	25%
Highway 36	691	827	827	20%	20%
Maplewood Mall Transit Center	880	880	880	0%	0%
St. John's Boulevard	698	758	758	9%	9%
Buerkle Road	127	196	302	54%	137%
County Road E	321	330	438	3%	37%
Cedar Avenue	413	430	727	4%	76%
Whitaker Street	635	751	812	18%	28%
Downtown White Bear Lake	1,064	1,064	1,064	0%	0%
Entire Corridor	26,735	28,033	28,812	5%	8%

Table 2: Estimates of Total Employment in Station Area Walksheds Under Existing Conditions and After Planned Improvements Have Been Built

Station Name	Existing Conditions	Project Improvements	All Planned Improvements	Percent Difference vs. Project	Percent Difference vs. All
14th Street	15,494	15,494	15,494	0%	0%
Mt. Airy Street	8,511	8,511	8,511	0%	0%
Olive Street	2,685	2,685	2,685	0%	0%
Cayuga Street	1,744	1,744	1,744	0%	0%
Payne Avenue	1,814	1,814	1,814	0%	0%
Arcade Street	1,753	1,753	1,753	0%	0%

Station Name	Existing Conditions	Project Improvements	All Planned Improvements	Percent Difference vs. Project	Percent Difference vs. All
Cook Avenue	594	596	596	0%	0%
Maryland Avenue	570	596	596	5%	5%
Larpenteur Avenue	54	131	133	145%	149%
Frost Avenue	222	221	270	0%	22%
Highway 36	437	481	481	10%	10%
Maplewood Mall Transit Center	2,402	2,402	2,402	0%	0%
St. John's Boulevard	1,729	2,210	2,210	28%	28%
Buerkle Road	169	312	575	84%	240%
County Road E	455	472	665	4%	46%
Cedar Avenue	66	78	300	18%	352%
Whitaker Street	277	348	383	26%	39%
Downtown White Bear Lake	1,825	1,825	1,825	0%	0%
Entire Corridor	29,245	30,039	30,709	3%	5%

BIKE NETWORK ANALYSIS

Building Station Area Bikesheds

The Toole Design team conducted a bicycle level of traffic stress (LTS) analysis and built a set of 3-mile[9] bikesheds surrounding the proposed Maryland Avenue station. The bikeshed methodology uses the existing off-street bicycle facilities as well as the existing roadway network, classified by LTS score.

BICYCLE LEVEL OF TRAFFIC STRESS ANALYSIS METHODOLOGY

The LTS methodology uses characteristics of the roadway such as speed limits, the amount of motor vehicle traffic, number of travel lanes, bikeway design elements and other roadway characteristics to classify segments of the network into one of four levels. Trails are typically classified as low stress (level 1) and major arterials are often high stress (level 4). This classification is important because people have different levels of comfort interacting with motor vehicle traffic when they are biking or considering biking. The LTS analysis can later be augmented by a demand analysis to highlight

[9] The FTA defines all bicycle improvements within 3 miles of a transit station to have a *de facto functional* relationship with the transit station when assessing FTA funding eligibility. Additional improvements beyond 3 miles may also be included if they are within a distance people will travel to the station by bicycle. Source: *Final Policy Statement on Eligibility of Pedestrian and Bicycle Improvements under Federal Transit Law* (FTA, 2011). Available from https://www.federalregister.gov/documents/2011/08/19/2011-21273/final-policy-statement-onthe-eligibility-of-pedestrian-and-bicycle-improvements-under-federal. Accessed December 11, 2018.

roadway segments in areas where demand for bicycling trips is high, but traffic stress is also high, to visualize areas where existing facilities may be inadequate to meet the demand.

Research by Roger Geller,[10] Jennifer Dill[11] and others[12] indicates that while avid bicyclists are accustomed to interacting with motor vehicle traffic, most people have little tolerance for interacting with traffic while riding a bike and are very worried about being struck by a motor vehicle. In fact, these concerns discourage many people from trying biking in the first place. The share of people that are interested in biking but concerned about traffic comprise 51 to 56 percent of the population (avid or confident bicyclists comprise 12 to 13 percent, and the remainder have no interest in riding a bike).[11] They prefer quiet streets, trails and other "low stress" places to bike that have limited motor vehicle traffic or are separated from traffic.

The Mineta Transportation Institute, a California-based research institution, developed the LTS framework to classify *streets* from low-stress to high-stress using four levels that mirror the four types of bicyclists:

- **LTS 1** streets are comfortable for people of all ages and abilities, including children.
- **LTS 2** streets are comfortable for most adults, including people who are interested but concerned about bicycling.
- **LTS 3** streets are comfortable for those who are confident bicyclists.
- **LTS 4** streets are the most stressful classification and are uncomfortable for most people except for those who are very confident bicyclists.

As opposed to other methods to determine the suitability of streets for bicycling (e.g., bicycle level of service), the LTS method provides a greater weight to parameters that affect bicyclist comfort level: traffic separation, motor vehicle traffic speeds and volumes. While most people are comfortable bicycling on quiet streets, the LTS method requires physical separation between bicycles and cars when traffic levels and speeds exceed certain thresholds. This is important because separation from motor vehicle traffic may be the most important factor to consider when encouraging more people to bicycle to the stations.

This method uses several base criteria for determining traffic stress (street width, posted speed limit and presence of on-street parking) as well as additional criteria depending on facility type (bike lane width, traffic volume when streets do not have bike lanes and number of driveway/street crossings for paths).

For this analysis, traffic stress was calculated using a simplified version of the LTS methodology, as described in Table 3 through Table 5 (adapted from Mineta Institute research).[13]

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[10] Geller, R (2006). Four Types of Cyclists, Portland Bureau of Transportation, Portland, OR. http://www.portlandoregon.gov/transportation/article/264746. Accessed December 4, 2018.
[11] Dill, J., and N. McNeil (2013). Four Types of Cyclists? Examination of Typology for Better Understanding of Bicycling Behavior and Potential. Transportation Research Record: Journal of the Transportation Research Board, No. 2387, pp. 129–138. DOI: 10.3141/2387-15.
[12] Maaza C. Mekuria, Peter G. Furth, and Hilary Nixon. "Low-Stress Bicycling and Network Connectivity." Mineta Transportation Institute Publications (2012). Available from https://scholarworks.sjsu.edu/mti_publications/74/. Accessed December 4, 2018.
[13] http://www.northeastern.edu/peter.furth/wp-content/uploads/2014/05/LTS-Tables-v2-June-1.pdf

Table 3: Mixed Traffic Criteria[14]

Number of Lanes	Effective Average Daily Traffic Volume[16]	Speed Limit[15] (miles per hour) ≤ 20	25	30	35	40	45	50+
Unlaned two-way street (no centerline)	0-750	LTS 1	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3
	751-1,500	LTS 1	LTS 1	LTS 2	LTS 3	LTS 3	LTS 4	LTS 4
	1,501-3,000	LTS 2	LTS 2	LTS 2	LTS 3	LTS 4	LTS 4	LTS 4
	3,000+	LTS 2	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4
One thru lane per direction (one-way, one-lane street or two-way street with centerline)	0-750	LTS 1	LTS 1	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3
	751-1,500	LTS 2	LTS 2	LTS 2	LTS 3	LTS 3	LTS 4	LTS 4
	1,501+	LTS 2	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4
Two thru lanes per direction	0-8,000	LTS 3	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4
	8,001+	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4
Three+ thru lanes per direction	Any volume	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4	LTS 4	LTS 4

Table 4: Bike Lanes and Shoulders Not Adjacent to a Parking Lane[17]

Number of Lanes	Bike Lane Width	Speed Limit[18] (miles per hour) ≤ 25	30	35	40	45	50+
One thru lane per direction, or unlaned	6+ feet	LTS 1	LTS 1	LTS 2	LTS 3	LTS 3	LTS 3
	4 or 5 feet	LTS 2	LTS 2	LTS 2	LTS 3	LTS 3	LTS 4
Two thru lanes per direction	6+ feet	LTS 2	LTS 2	LTS 2	LTS 3	LTS 3	LTS 3
	4 or 5 feet	LTS 2	LTS 2	LTS 2	LTS 3	LTS 4	LTS 4
Three+ lanes per direction	Any width	LTS 3	LTS 3	LTS 3	LTS 4	LTS 4	LTS 4

Notes
1. If bike lane/shoulder is frequently blocked, use mixed traffic criteria.
2. Qualifying bike lane/shoulder should extend at least 4 feet from a curb and at least 3.5 feet from a pavement edge or discontinuous gutter pan seam.
3. Bike lane width includes any marked buffer next to the bike lane.

[14] Reproduced from http://www.northeastern.edu/peter.furth/wp-content/uploads/2014/05/LTS-Tables-v2-June-1.pdf
[15] Standard methodology uses prevailing speed. Speed limits are used where prevailing speed data are not readily available, as in this case.
[16] Effective average daily traffic is the average daily traffic for two-way roads; effective average daily traffic = 1.67*average daily traffic for one-way roads.
[17] Reproduced from: http://www.northeastern.edu/peter.furth/wp-content/uploads/2014/05/LTS-Tables-v2-June-1.pdf
[18] Standard methodology uses prevailing speed. Speed limits are used where prevailing speed data are not readily available, as in this case.

Table 5: Bike Lanes Alongside a Parking Lane[19]

Number of Lanes	Bike Lane Reach = Bike + Parking Lane Width	Speed Limit[20] (miles per hour)		
		≤ 25	30	35
One lane per direction	15+ feet	LTS 1	LTS 2	LTS 3
	12-14 feet	LTS 2	LTS 2	LTS 3
Two lanes per direction (two-way)	15+ feet	LTS 2	LTS 3	LTS 3
Two to three lanes per direction (one-way)		LTS 2	LTS 3	LTS 3
Other multilane		LTS 3	LTS 3	LTS 3

Notes
1. If bike lane is frequently blocked, use mixed traffic criteria.
2. Qualifying bike lane must have reach (bike lane width + parking lane width) ≥ 12 feet.
3. Bike lane width includes any marked buffer next to the bike lane.

BIKESHED ANALYSIS METHODOLOGY

Toole Design conducted a bikeshed analysis using the results from the LTS analysis. A set of 3-mile bike networks were developed using shared-use paths and roadways that do not restrict bicycle traffic (i.e., limited access highways). These networks were used to produce two bikesheds: one bikeshed for a low-stress network and another for a high-stress network.

A **low-stress** bikeshed was produced using only the **low-stress network segments** (LTS 1 and LTS 2). The low-stress network represents a network that is suitable for those who are less confident bicyclists. Bicyclists in this category are assumed to be unwilling to ride on high-stress facilities; therefore, LTS 3 and LTS 4 facilities have been removed.

A **high-stress** bikeshed was produced using **all network segments** (LTS 1 through LTS 4). The high-stress network includes all facilities on which bicyclists are permitted because confident bicyclists are more willing to ride a bicycle along streets with higher speeds, higher traffic volumes and less separation from motor vehicles.

Proposed Rush Line BRT station area improvements and the following improvements planned by other agencies were then added to the network as low stress segments (LTS 1 or 2):

- Frost Avenue Corridor Trail Improvements (from English Street to White Bear Avenue).
- Bruce Vento Trail Extension Project (from Buerkle Road to Highway 96 E).
- Jackson Street Trail Improvements (from University Avenue to Pennsylvania Avenue).
- Highway 61 Trail Improvements (from County Road F to Cedar Avenue).

The low-stress and high-stress bikesheds were recalculated under planned improvement conditions and overlaid with the existing conditions bikesheds to see where the planned improvements are expanding the area accessible from the station via bicycle.

[19] Reproduced from: http://www.northeastern.edu/peter.furth/wp-content/uploads/2014/05/LTS-Tables-v2-June-1.pdf

[20] Standard methodology uses prevailing speed. Speed limits are used where prevailing speed data are not readily available, as in this case.

Mapping Station Area Bikesheds

Maps 6 through 8 provide example outputs from the bikeshed[21] analysis for the proposed Maryland Avenue station using the methodology outlined in this memo. Similar maps for all station areas are included in Attachment 3.

Map 6 illustrates the LTS results from planned conditions that reflect improvements by the Rush Line BRT Project and additional improvments by others. LTS 1 and LTS 2 have been combined to define low stress, and LTS 3 and LTS 4 are combined to define high stress. Major roadways and collectors make up most of the high-stress network. Local streets, neighborhood collectors and shared-use paths make up the low-stress network. Based on existing conditions, there is no low-stress bicycle access to the Maryland Avenue station. The only low-stress access is provided by new trail that provides a direct connection between the Maryland Avenue station and the Bruce Vento Trail.

Map 7 displays the 3-mile low-stress and high-stress bikesheds surrounding Maryland Avenue. The low-stress bikeshed is drawn using a blue polygon and represents areas that have access to the proposed BRT station using only the low-stress network. The high-stress bikeshed is drawn using a red polygon and represents areas that have access to the proposed station using the high-stress network that is comprised of LTS 1 through LTS 4. The area within the 3-mile circular buffer but not in either the red or blue polygon represents areas that theoretically could be part of a bikeshed if network connectivity were increased. Bold blue lines represent project improvements, and dashed blue and black lines represent improvements planned by others. Areas shaded darker blue or darker red indicate where the planned improvements are expanding the low- or high-stress bikeshed.

The planned trail improvement that connects the Maryland Avenue station directly to the Bruce Vento Trail provides a low-stress connection that creates a large low-stress bikeshed. The visible high-stress bikeshed that extends beyond to the east and south of the station can be thought of as opportunitiy areas to improve access to the proposed BRT station.

Map 8 shows the same output as Map 7 but at a different scale to help identifity the high-stress streets and poor trail connectivity that prevent the low-stress bikeshed from expanding to the east and south. Improving bicycle access to the station along Maryland Avenue and improving connections to the Bruce Vento Trail from the south can expand the low-stress bikeshed.

[21] Bikesheds are built using a 75-foot buffer from the street centerline and shared-use paths that are traversable to/from the proposed stations within a 3-mile bicycling distance for the low-stress and high-stress networks separately.

BIKESHED ANALYSIS

Map 6: Bicycle Level of Traffic Stress

Station Name: Maryland Avenue

Rush Line BRT

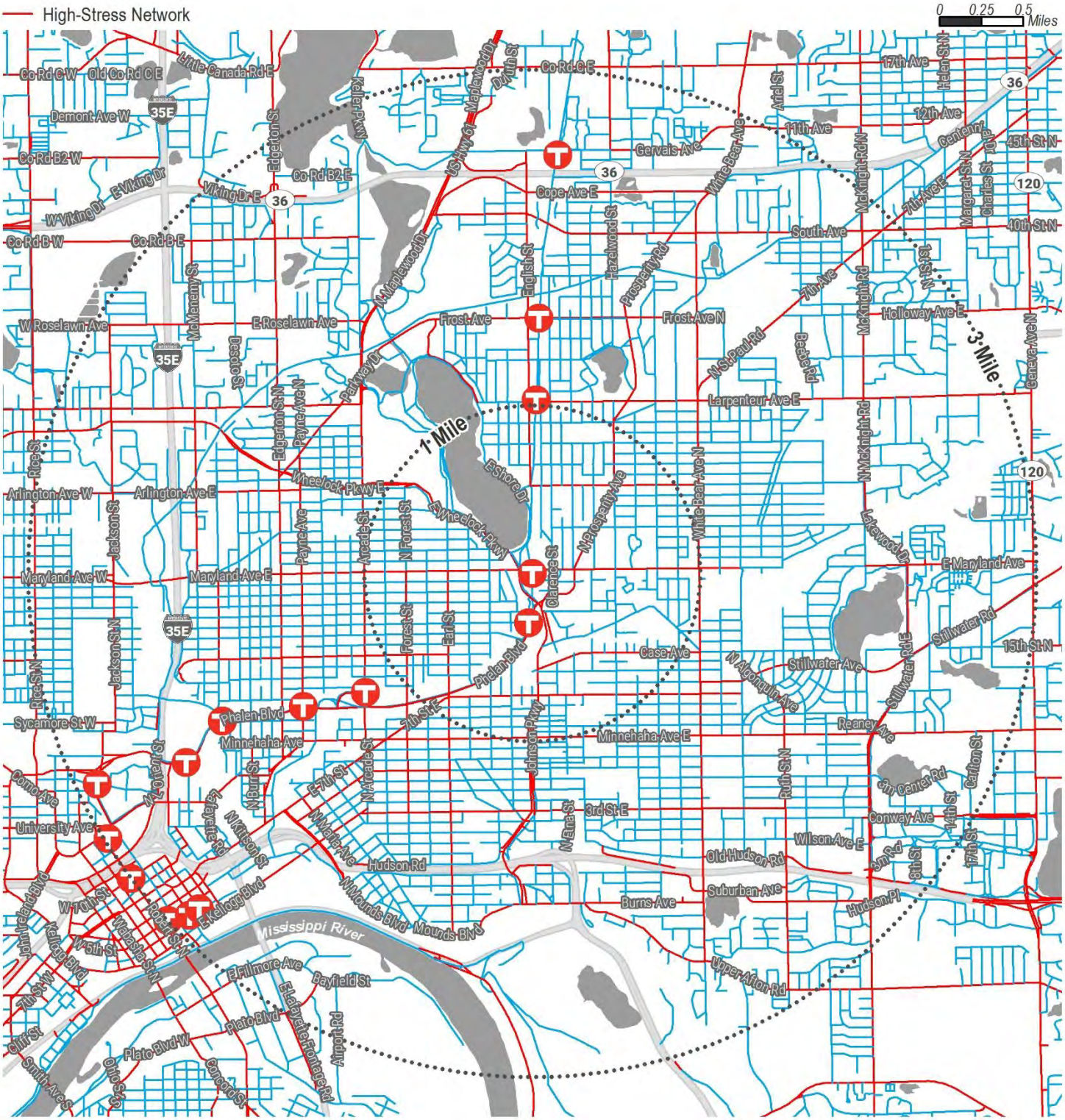
Key

Planned Station

Bicycle Level of Traffic Stress

Low-Stress Network

High-Stress Network



BIKESHED ANALYSIS

Map 7: Bikeshed Analysis

Station Name: Maryland Avenue

Rush Line BRT

Key

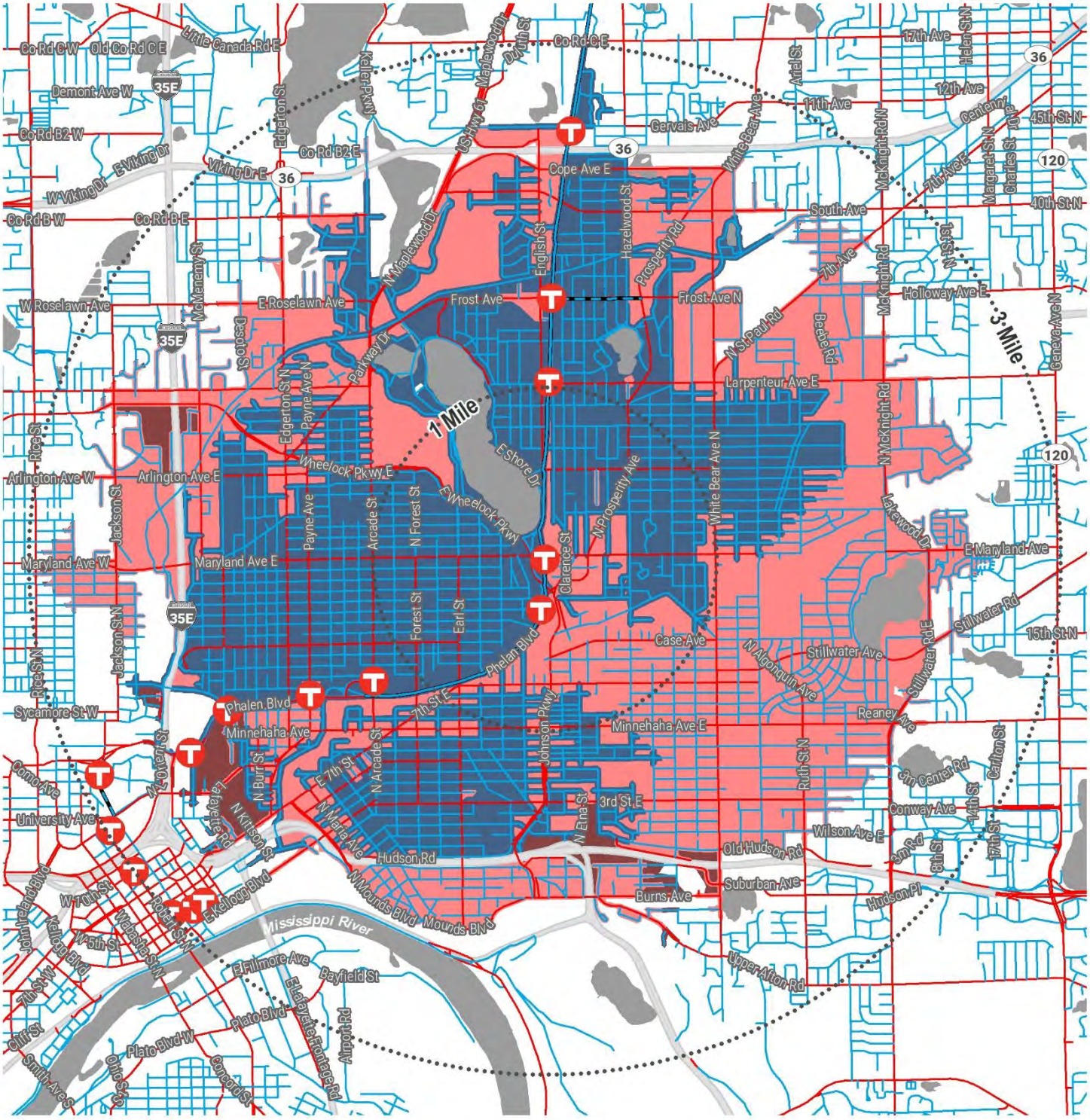
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



BIKESHED ANALYSIS

Map 8: Bikeshed Analysis, Focus Map

Station Name: Maryland Avenue

Rush Line BRT

Key

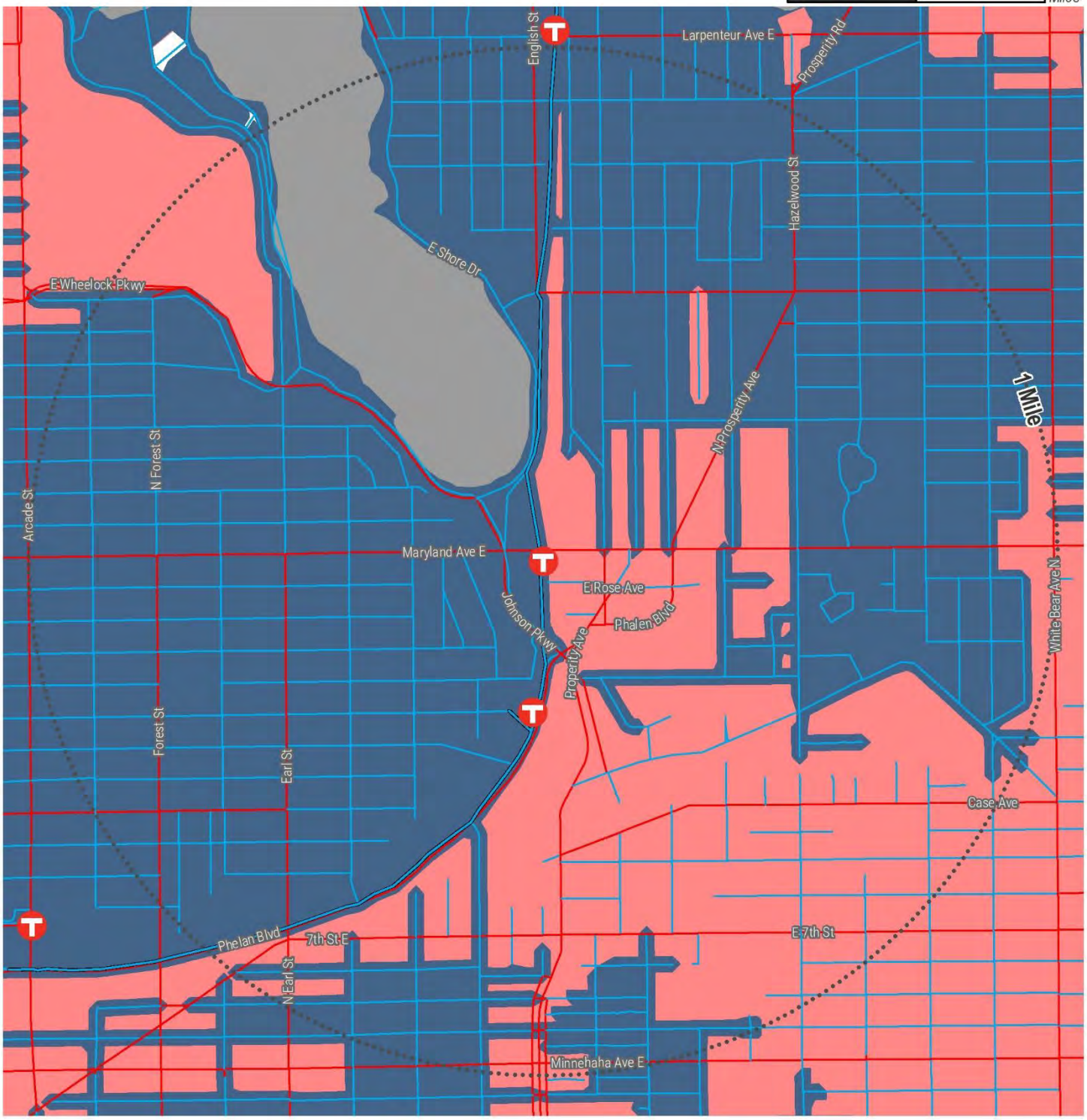
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



NEXT STEPS

Pedestrian Network Analysis

The gap analysis identified existing pedestrian network barriers and opportunities for pedestrian improvements that may be considered as part of the Rush Line BRT Project. The gaps presented in Attachment 2 represent sidewalk segments and trail connections that can increase pedestrian connectivity to planned station areas. The next step is for Rush Line BRT Project staff to review the identified gaps and determine if the improvement should be included in the Rush Line BRT Project as it progresses through the design process or if addressing the gap is more appropriate to include in the broader station area planning process.

Bike Network Analysis

Like the walkshed analysis, the bikeshed analysis highlights areas of opportunity for improving low-stress bicycle access to the Rush Line BRT stations. Bicycling can become more appealing to a broader segment of the population as the level of traffic stress decreases. Additional low-stress bicycle facility connections to the Bruce Vento Trail from adjacent neighborhoods and along high-stress arterials can expand the low-stress bikeshed. The high-stress routes present gaps and barriers in the bicycle network. These gaps and barriers can be addressed through station area planning with local communities as well as future community planning endeavors related to transit, trails and non-motorized transportation.

ATTACHMENTS

Attachment 1: Rush Line BRT Planned Station Existing and Improved Walksheds

Attachment 2: Rush Line BRT Walkshed Gap Recommendations, and Barriers and Opportunities for Pedestrian Improvements Summary Table

Attachment 3: Rush Line BRT Planned Station Existing and Improved Bikesheds and Bicycle Level of Traffic Stress

ATTACHMENT 1

RUSH LINE BRT PLANNED STATION EXISTING AND IMPROVED WALKSHEDS

PEDESTRIAN WALKSHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: 14th Street

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements Walkshed
- Buildings near the Projects by Others Walkshed

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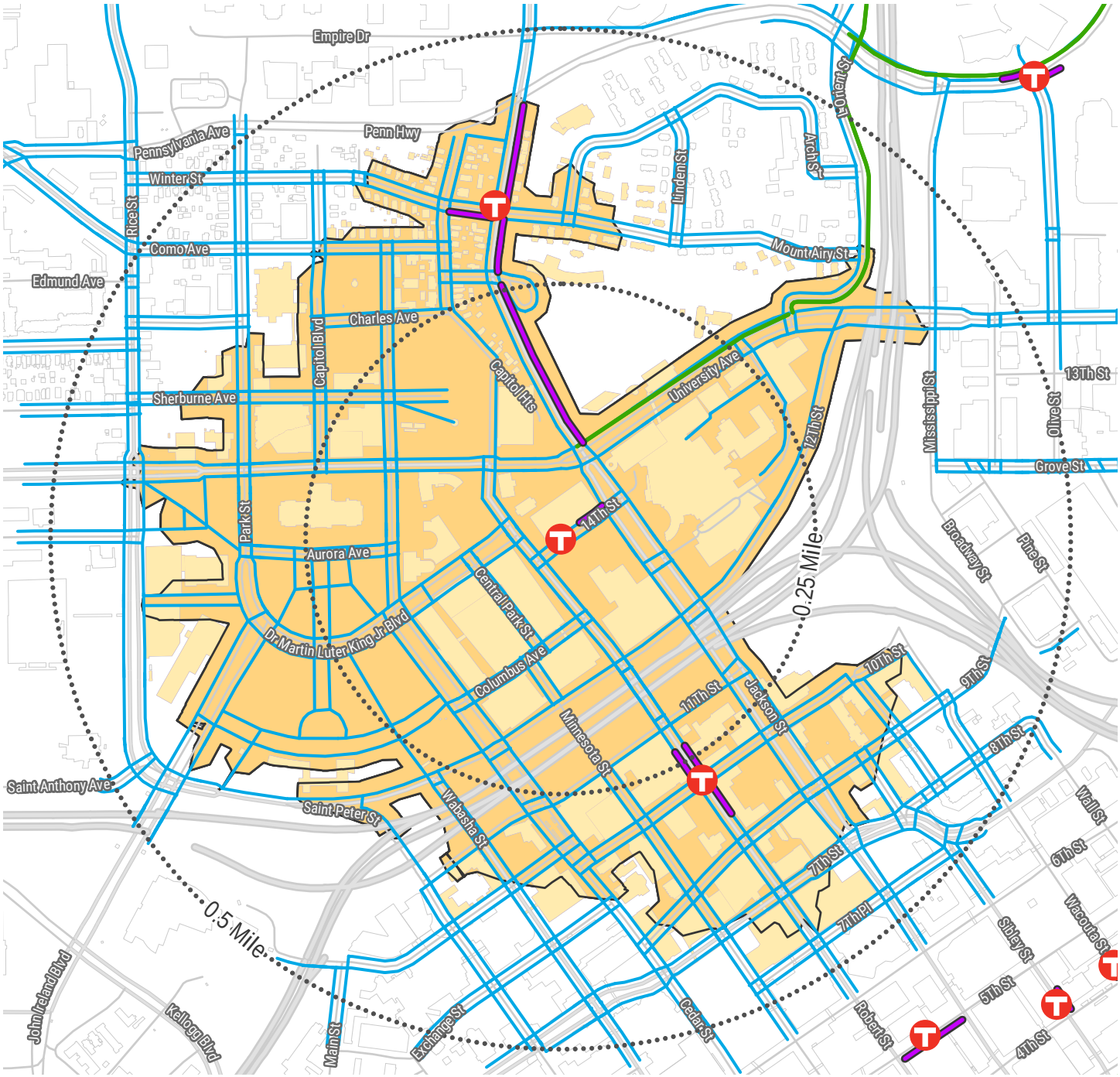

*This is how far you can walk in 13 minutes using only the existing sidewalks and shared-use paths.

**This is how far you can walk in 13 minutes using existing sidewalks, existing shared-use paths, and Rush Line BRT project improvements.

***This is how far you can walk in 13 minutes using existing sidewalks, existing shared-use paths, Rush Line BRT project improvements, and improvements planned by others.

3/31/2020

PEDESTRIAN WALKSHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Mt. Airy

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements Walkshed
- Buildings near the Projects by Others Walkshed

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PEDESTRIAN WALKSHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Olive Street

Rush Line

B R T

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
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PEDESTRIAN WALKSHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Cayuga Street

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
- Buildings near the Existing Conditions Walkshed
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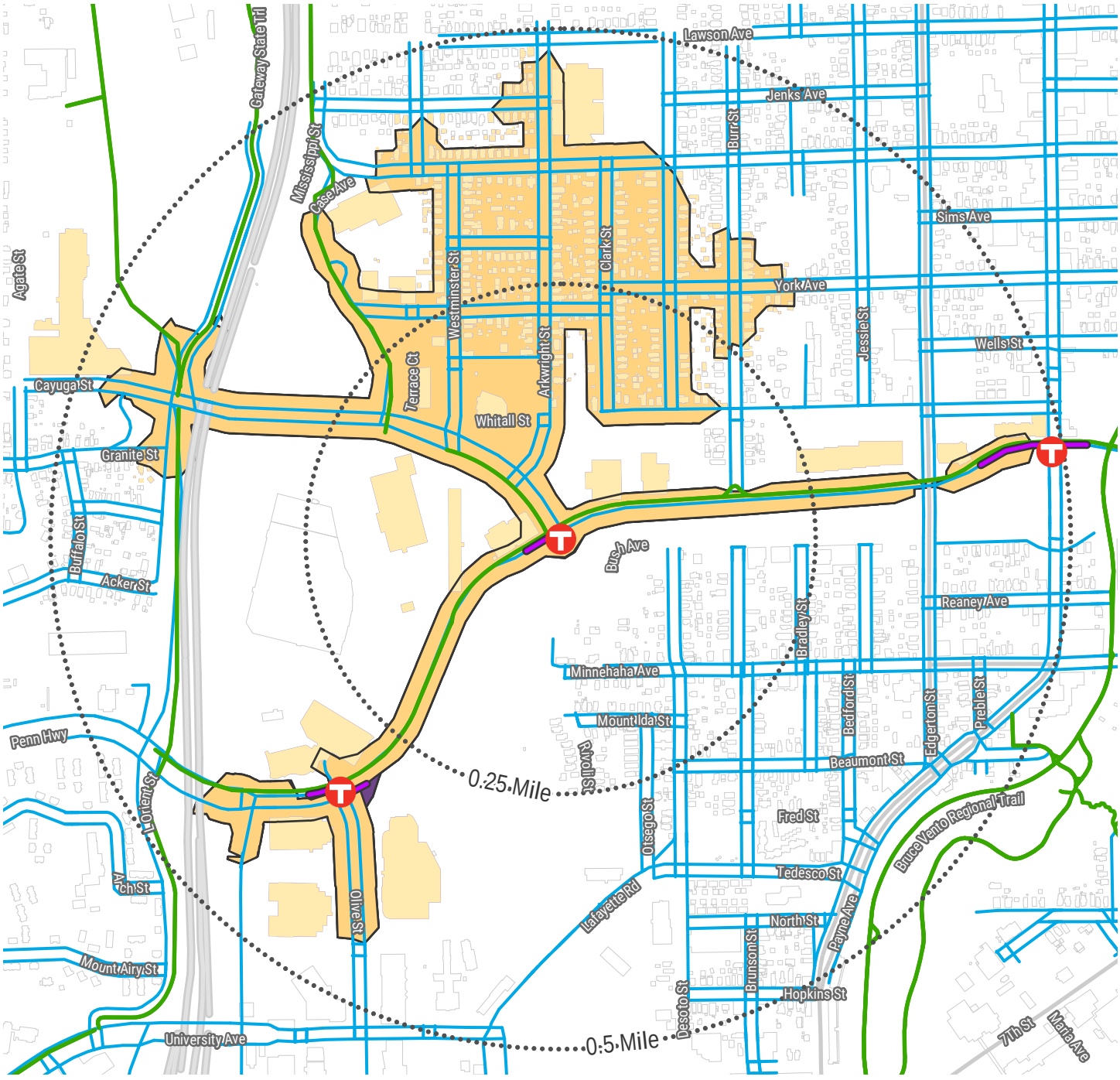

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PEDESTRIAN WALKSHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Payne Avenue

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements Walkshed
- Buildings near the Projects by Others Walkshed

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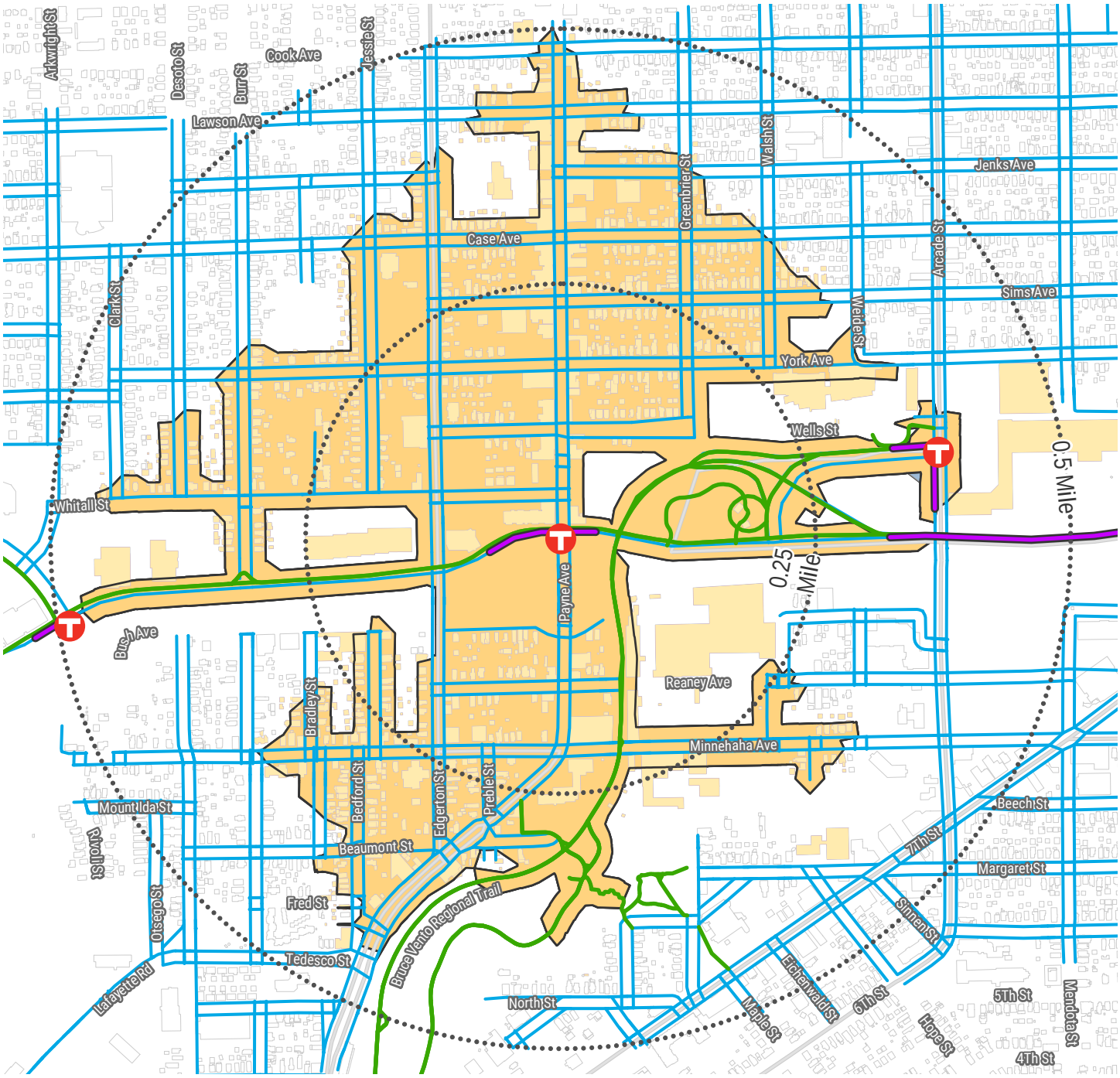

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PEDESTRIAN WALKSHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Arcade Street

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
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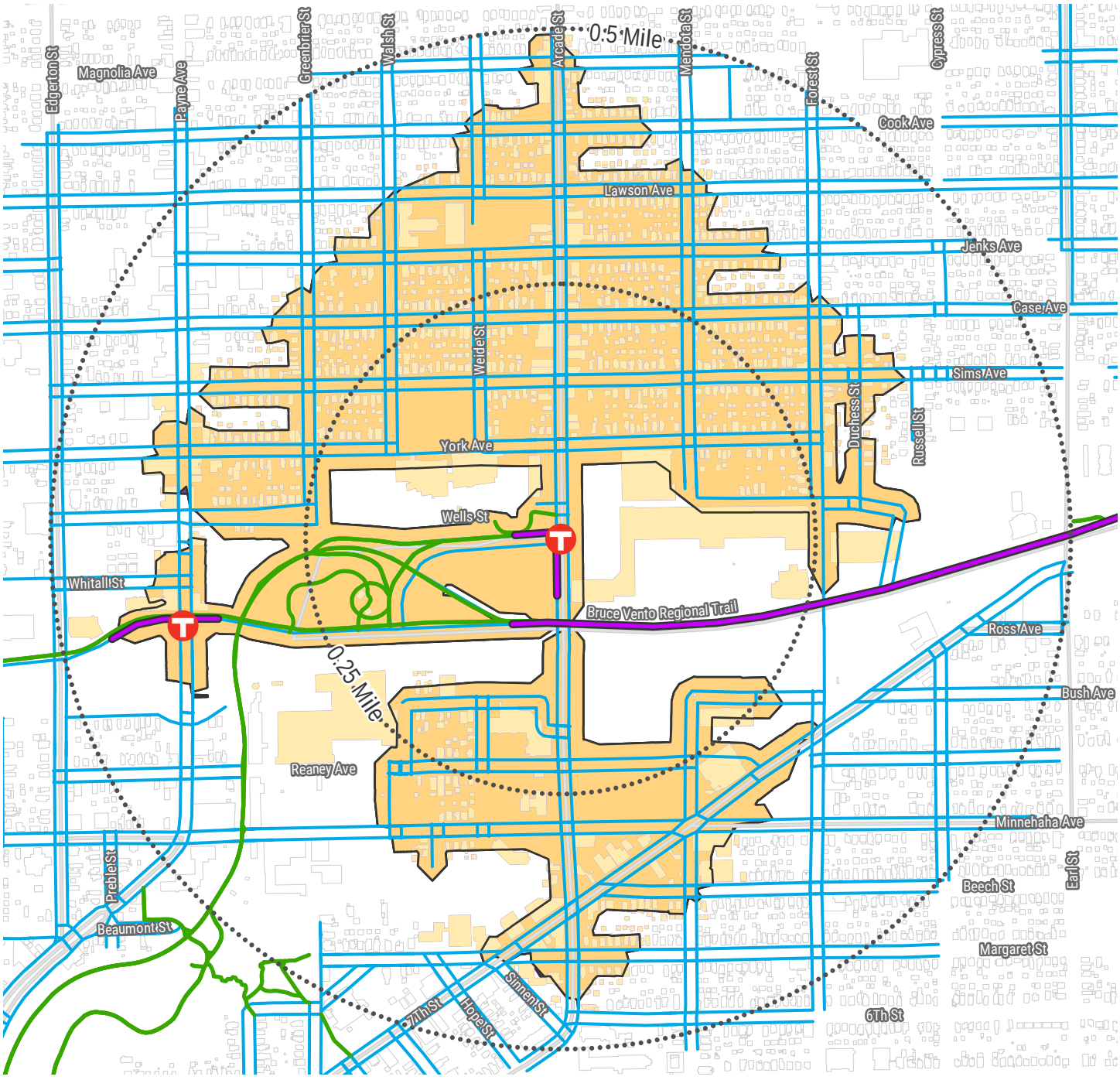

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3/31/2020

PEDESTRIAN WALKSHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Cook Avenue

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements Walkshed
- Buildings near the Projects by Others Walkshed

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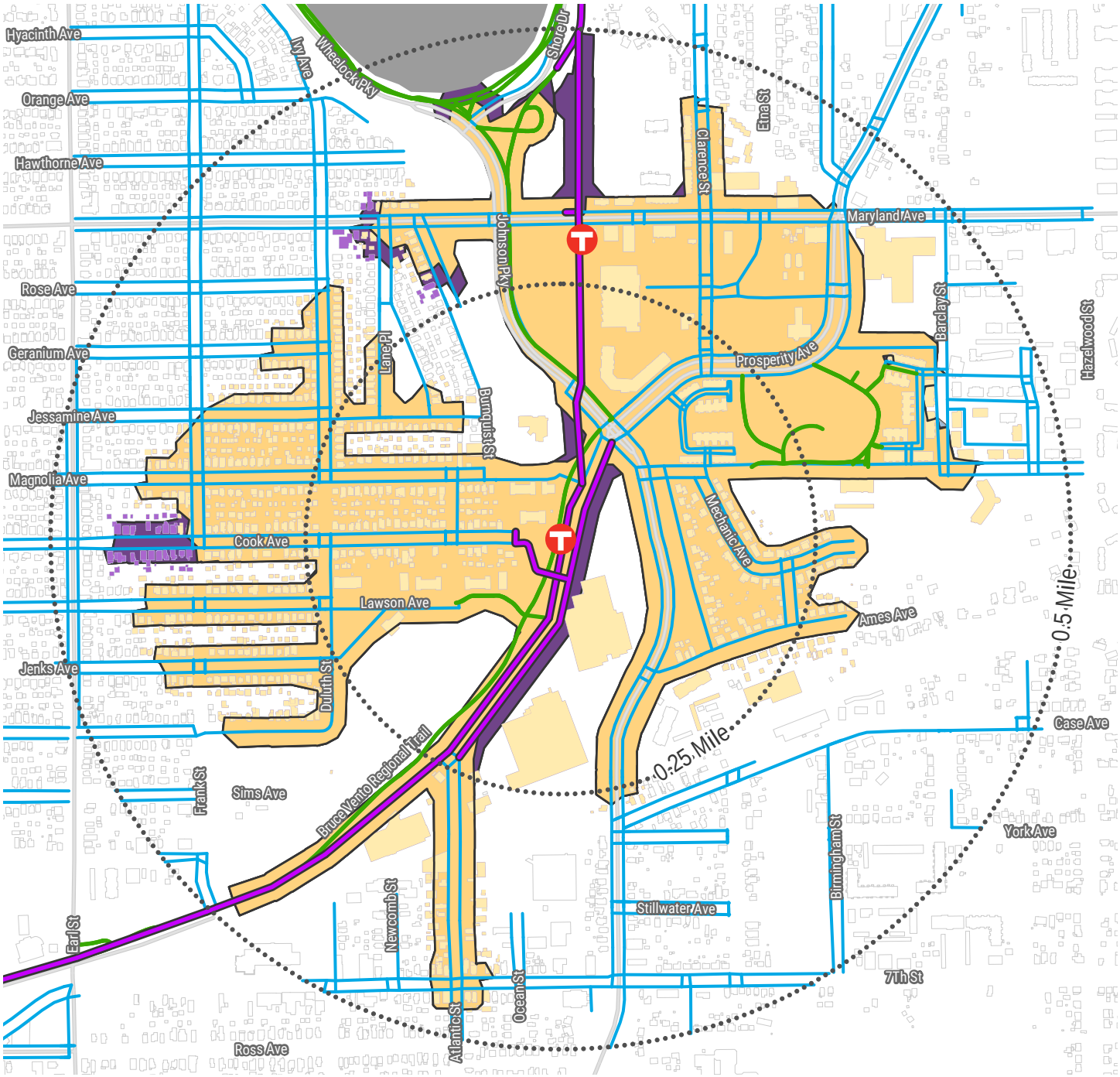

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3/31/2020

PEDESTRIAN WALKSHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Maryland Avenue

Rush Line

B R T

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
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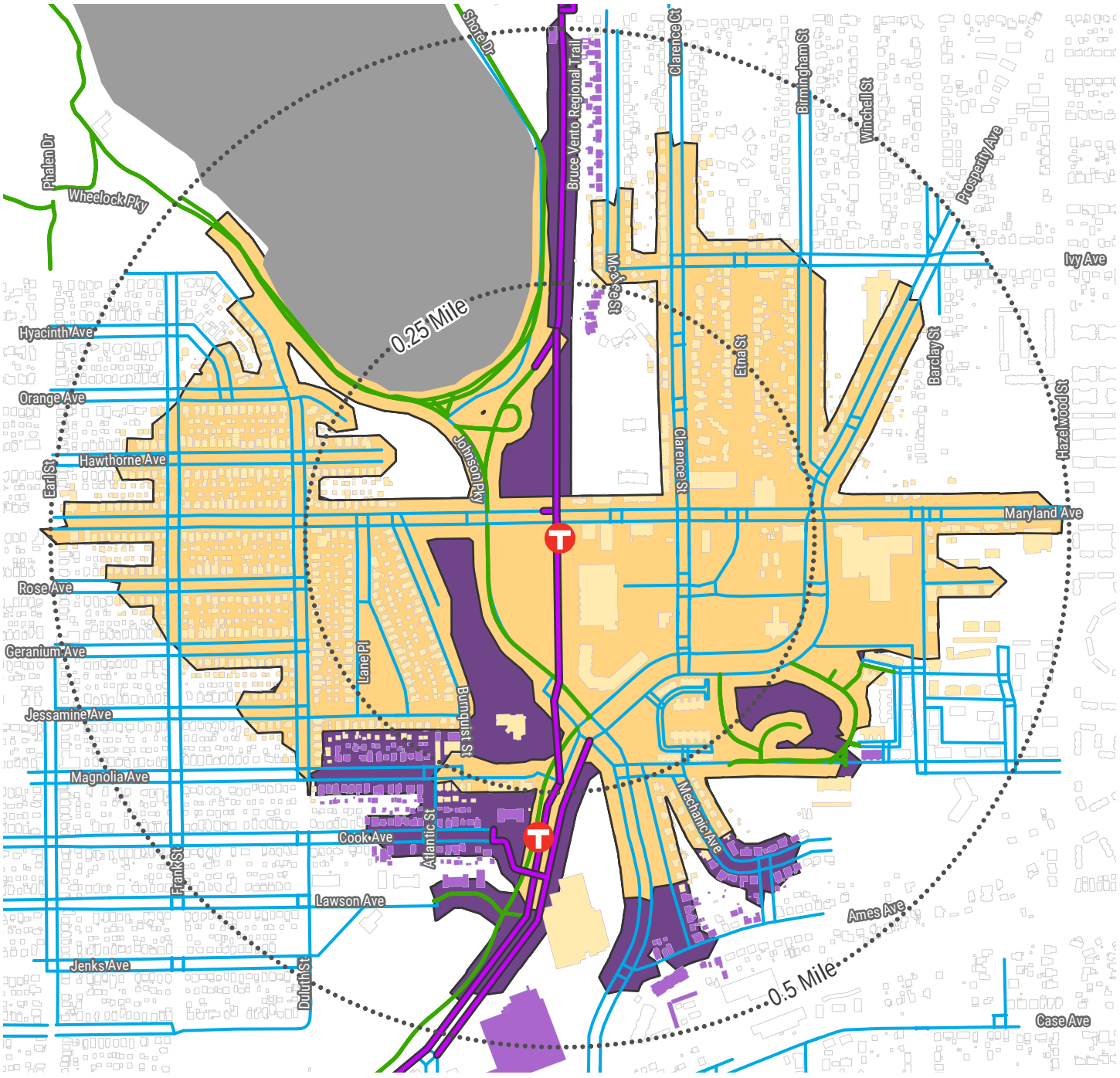

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3/31/2020

PEDESTRIAN WALKSHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Larpenteur Avenue

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements Walkshed
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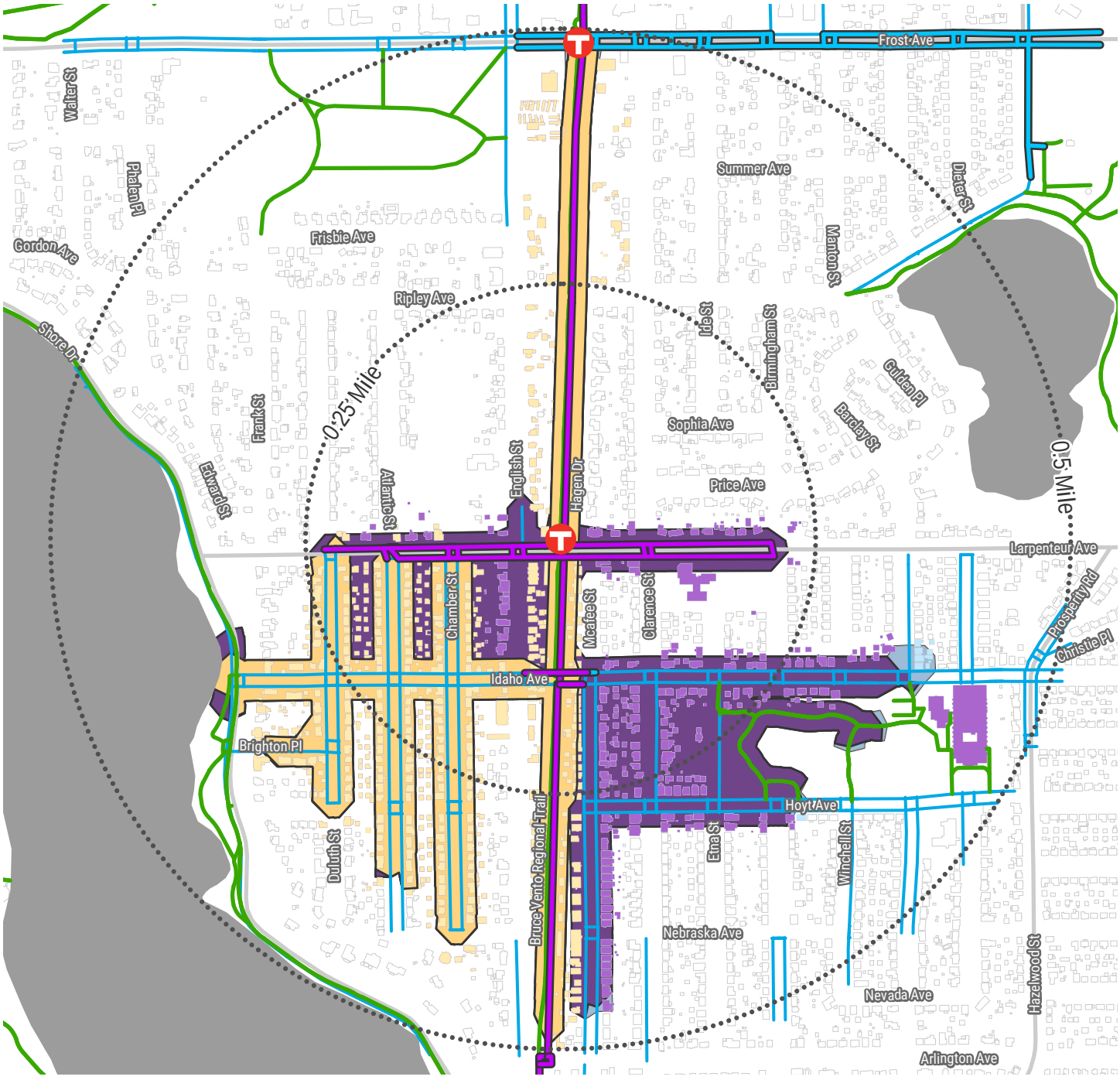

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3/31/2020

PEDESTRIAN WALKSHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Frost Avenue

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
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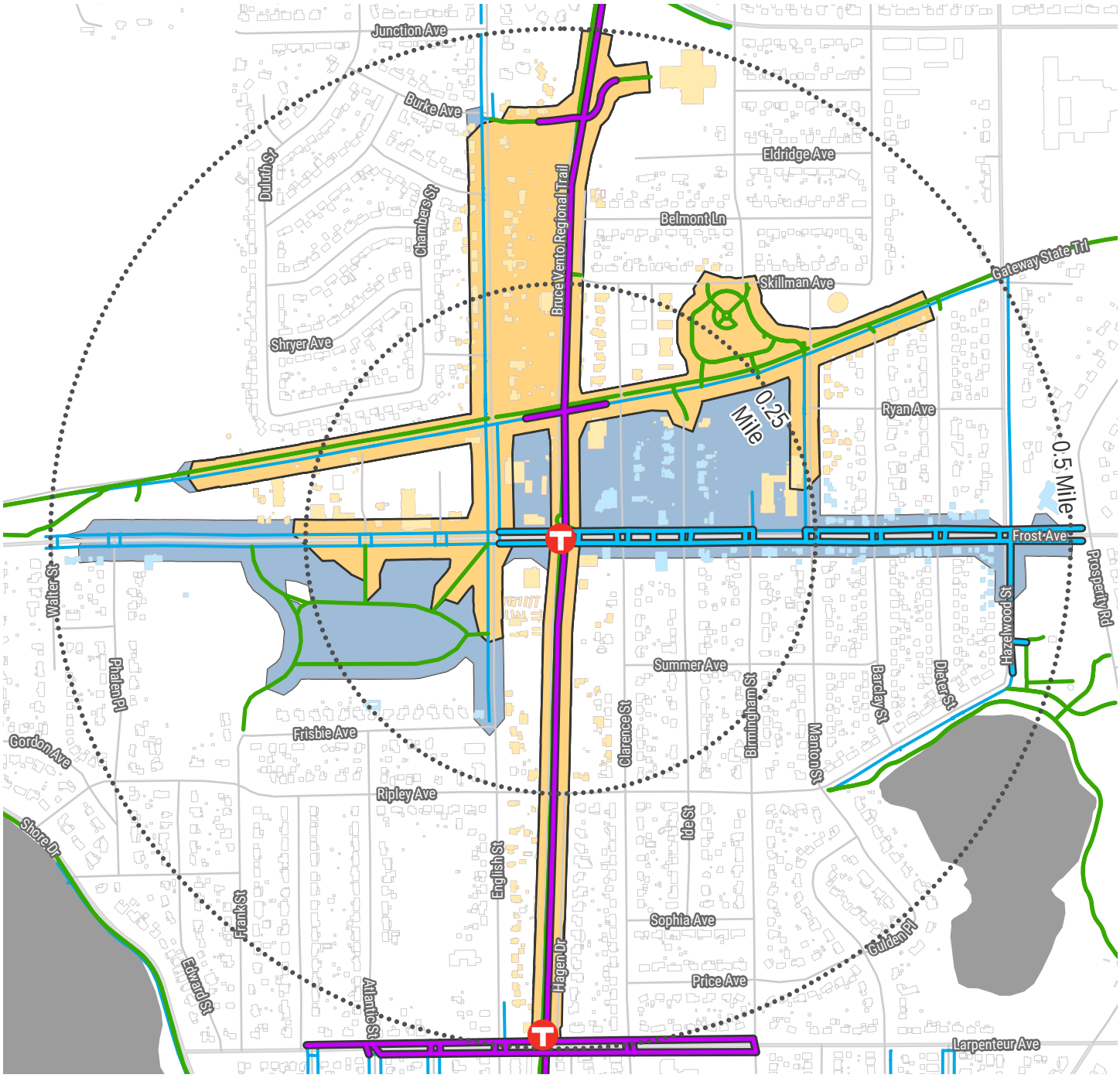

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3/31/2020

PEDESTRIAN WALKSHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Highway 36

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements Walkshed
- Buildings near the Projects by Others Walkshed

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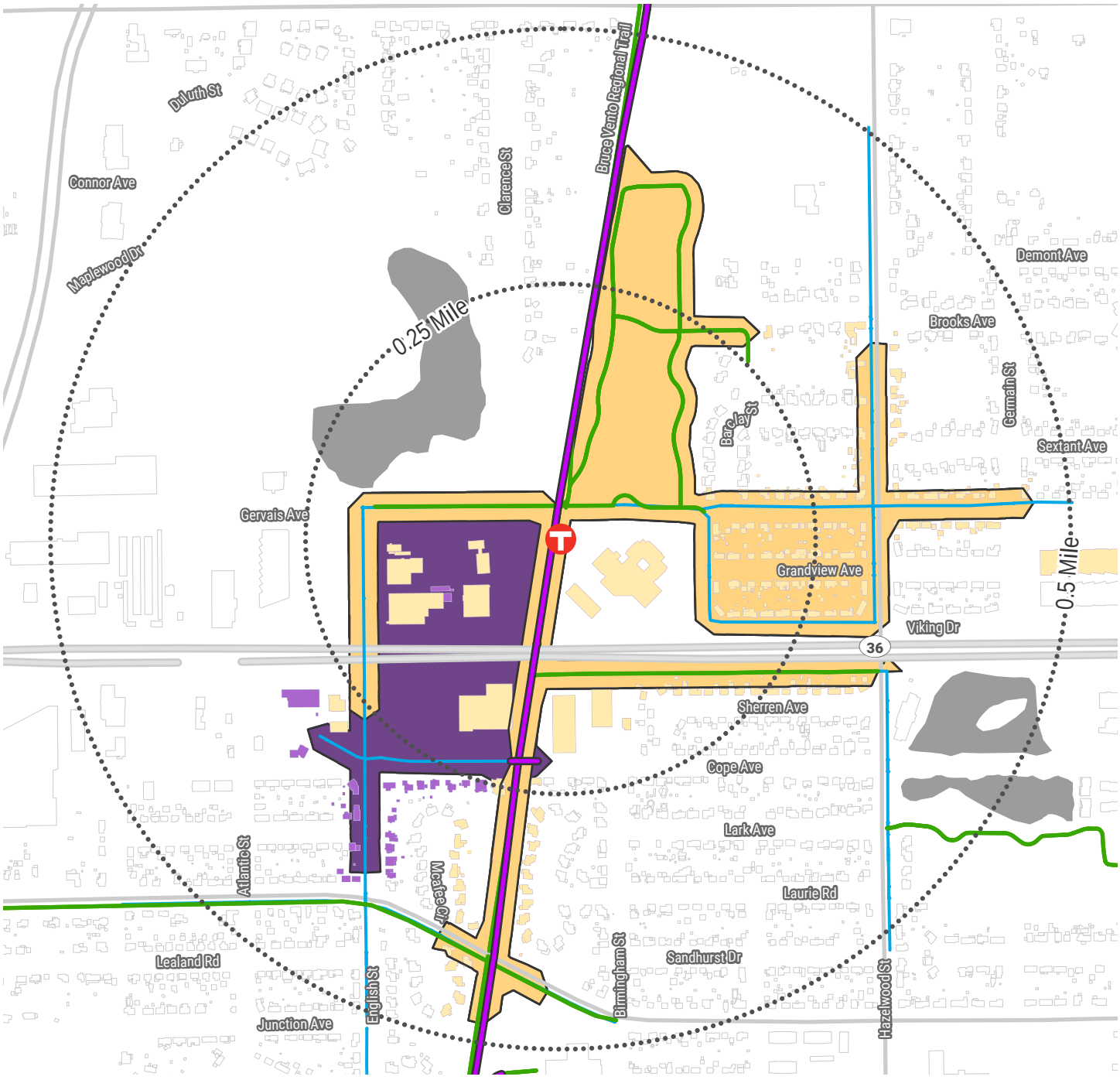

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3/31/2020

PEDESTRIAN WALKSHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Maplewood Mall Transit Center

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements Walkshed
- Buildings near the Projects by Others Walkshed

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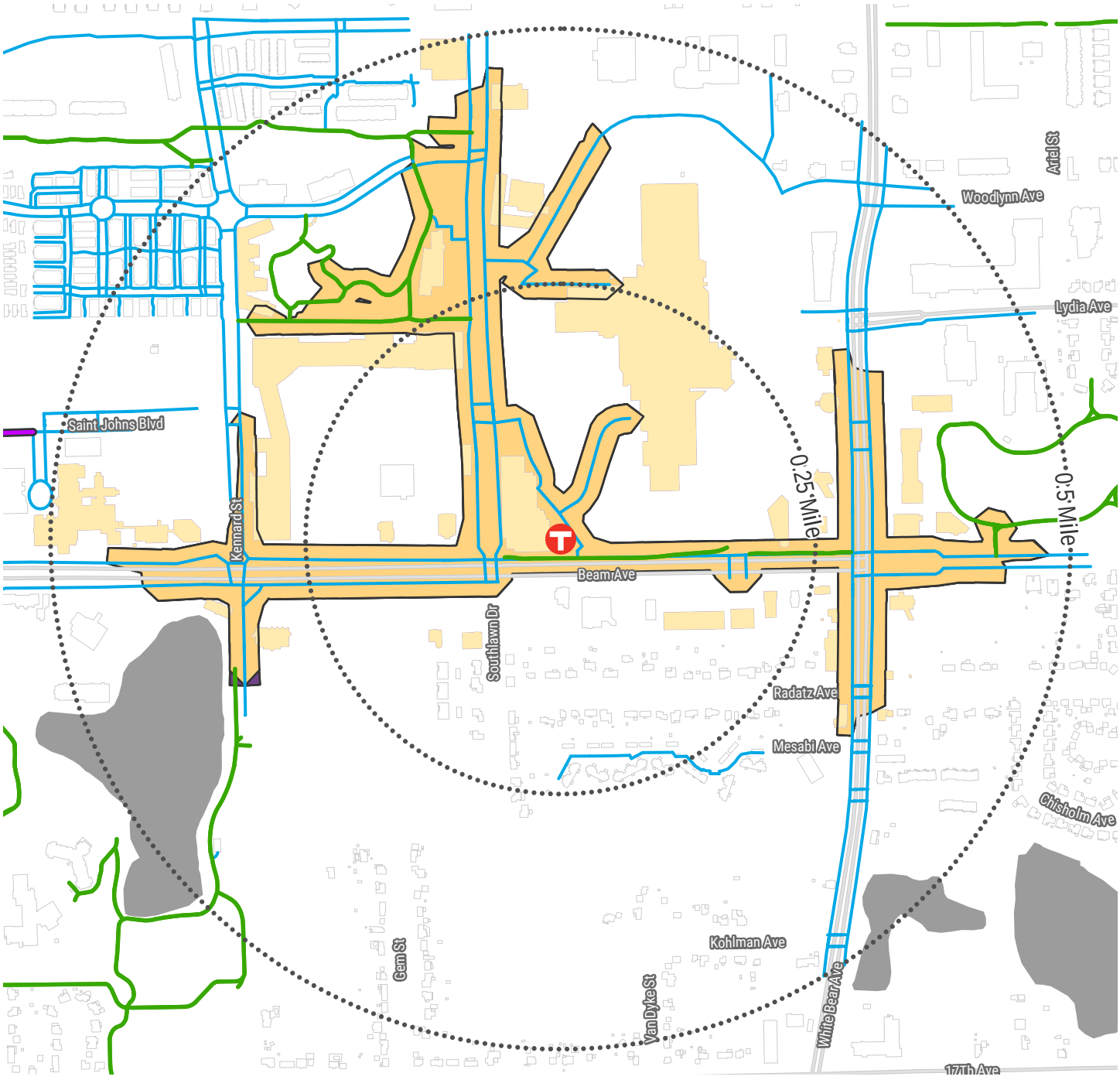

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3/31/2020

PEDESTRIAN WALKSHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: St. John's Boulevard

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements Walkshed
- Buildings near the Projects by Others Walkshed

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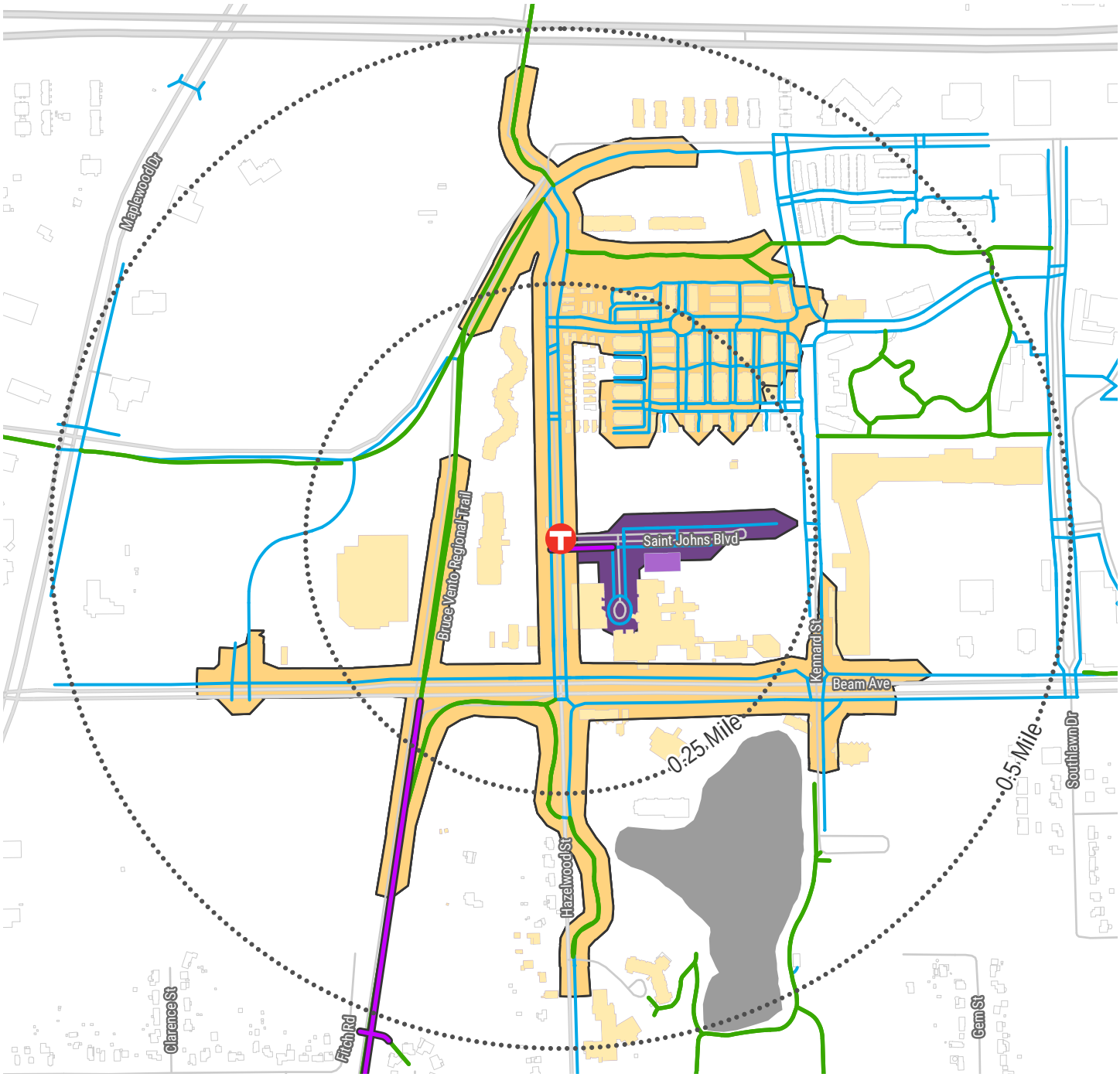

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3/31/2020

PEDESTRIAN WALKSHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Buerkle Road

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements Walkshed
- Buildings near the Projects by Others Walkshed

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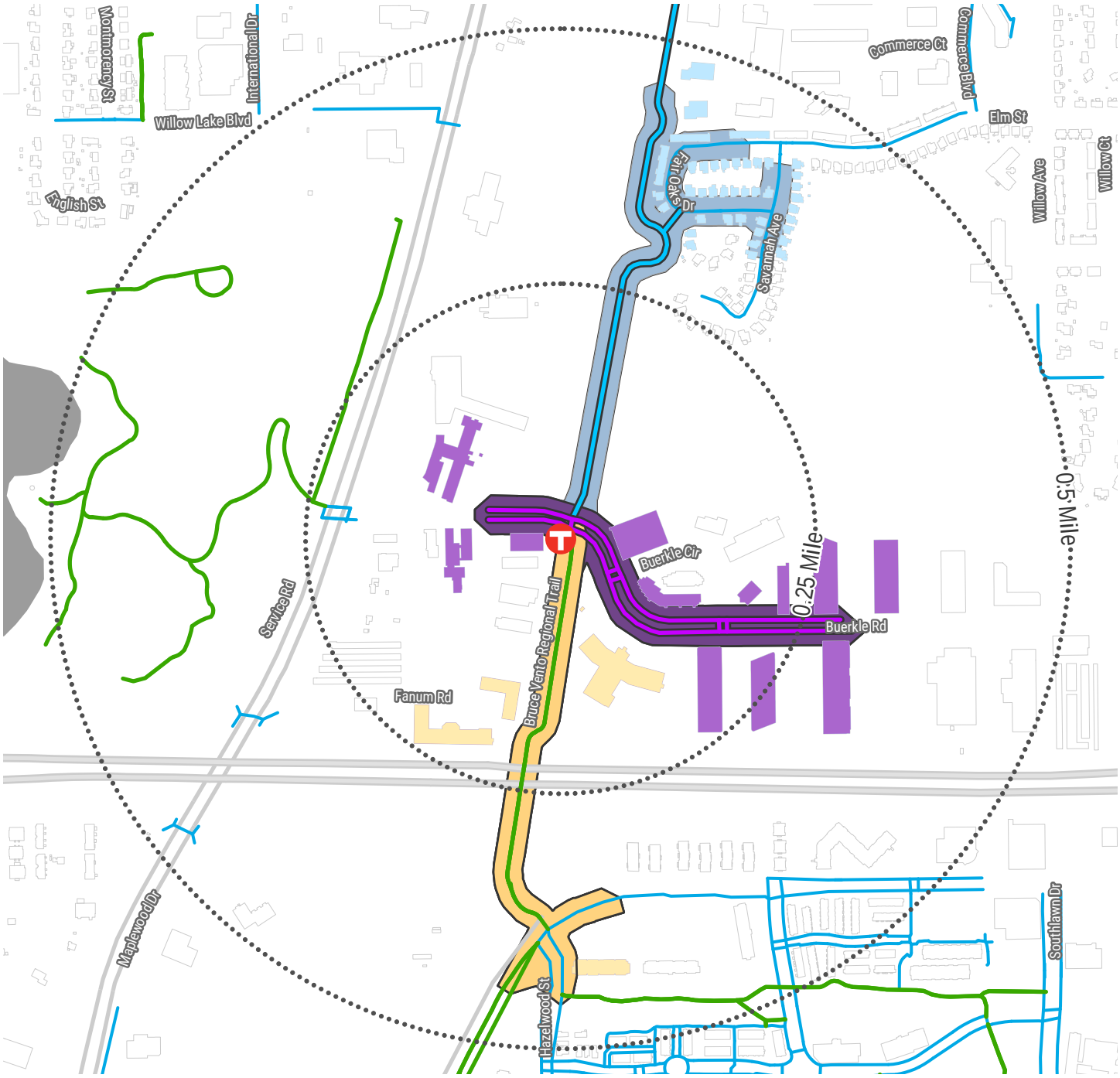

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3/31/2020

PEDESTRIAN WALKSHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: County Road E

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements Walkshed
- Buildings near the Projects by Others Walkshed

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3/31/2020

PEDESTRIAN WALKSHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Cedar Avenue

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements Walkshed
- Buildings near the Projects by Others Walkshed

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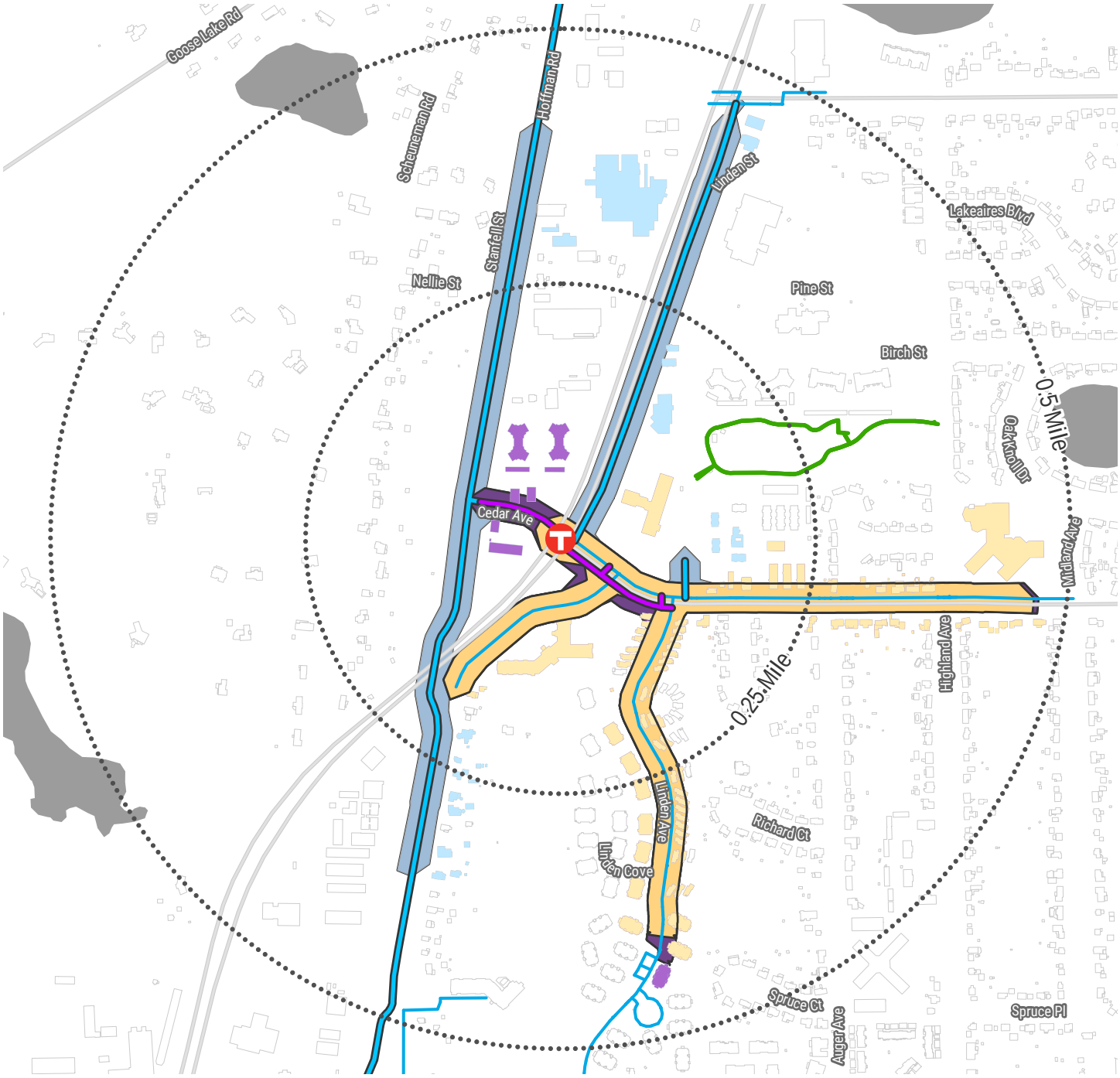

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3/31/2020

PEDESTRIAN WALKSHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Whitaker Street

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements Walkshed
- Buildings near the Projects by Others Walkshed

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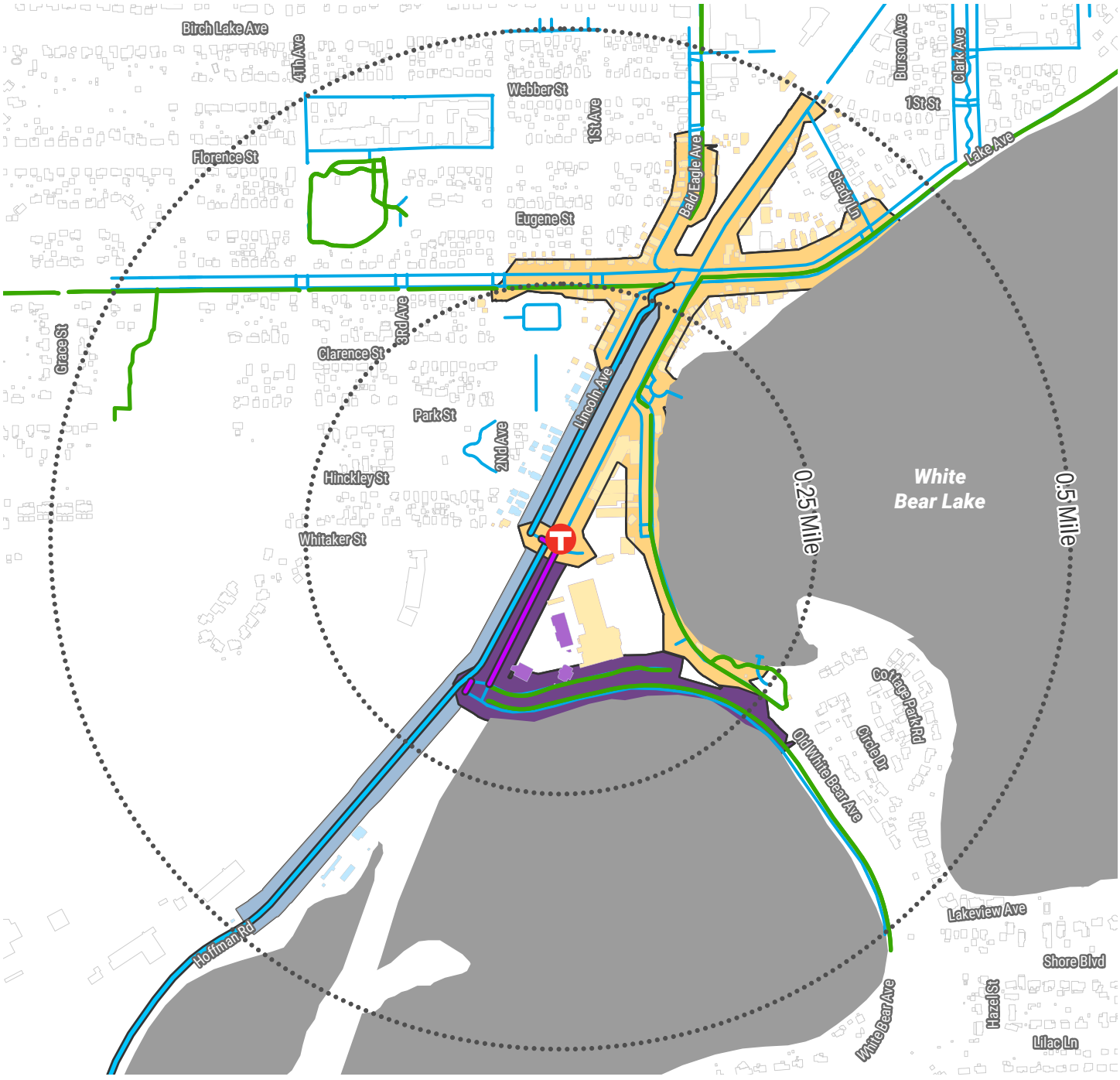

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3/31/2020

PEDESTRIAN WALKSHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Downtown White Bear Lake

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Existing Conditions Walkshed*
- Project Improvements Walkshed**
- Projects by Others Walkshed***
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements Walkshed
- Buildings near the Projects by Others Walkshed

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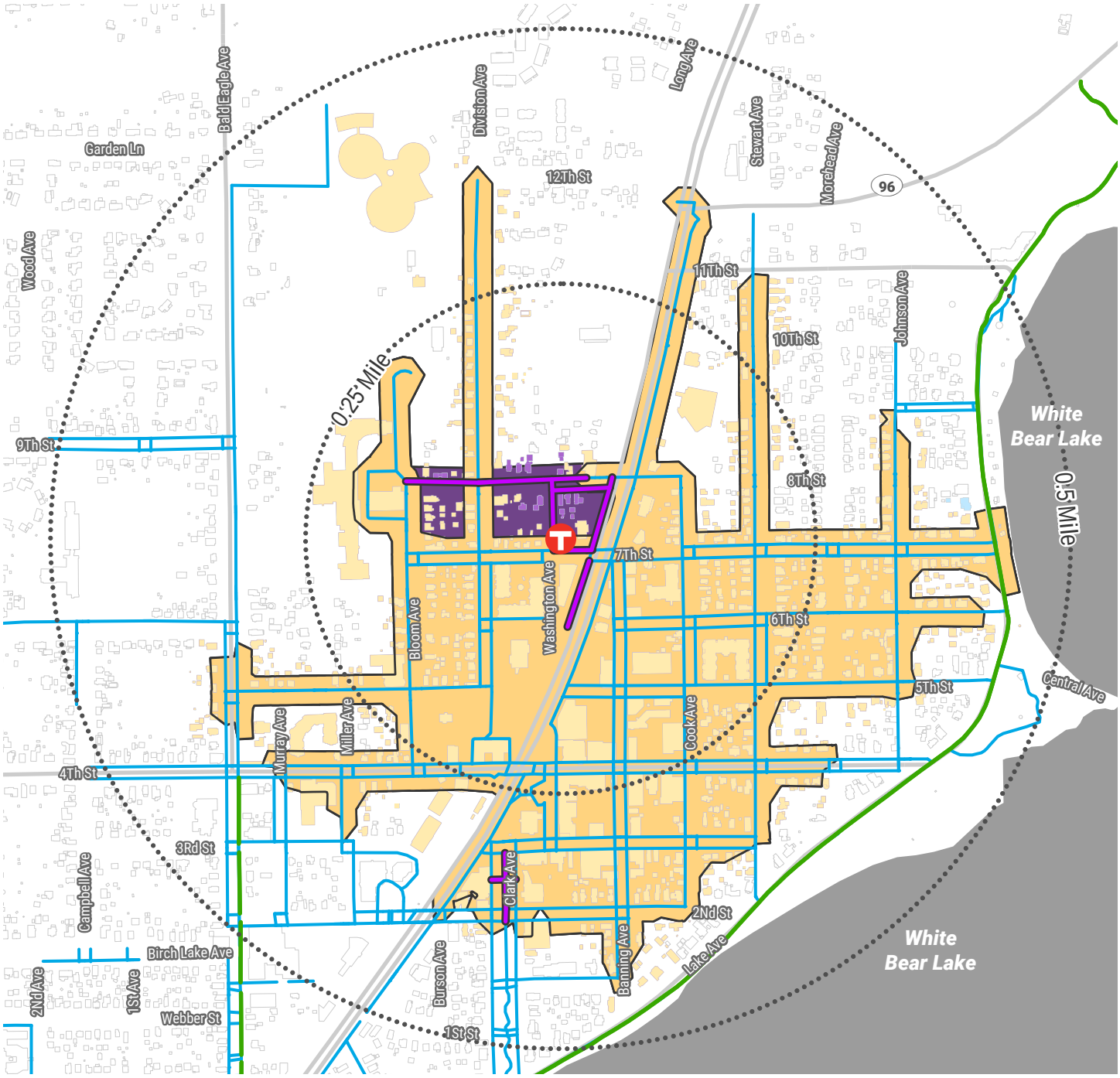

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3/31/2020

ATTACHMENT 2

RUSH LINE BRT WALKSHED GAP RECOMMENDATIONS, AND BARRIERS AND OPPORTUNITIES FOR PEDESTRIAN IMPROVEMENTS SUMMARY TABLE

PEDESTRIAN WALKSHED ANALYSIS

Additional Sidewalk Projects to Consider

Station Name: 14th Street

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
- Project Improvements and Projects by Others Walkshed**
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements and Projects by Others Walkshed

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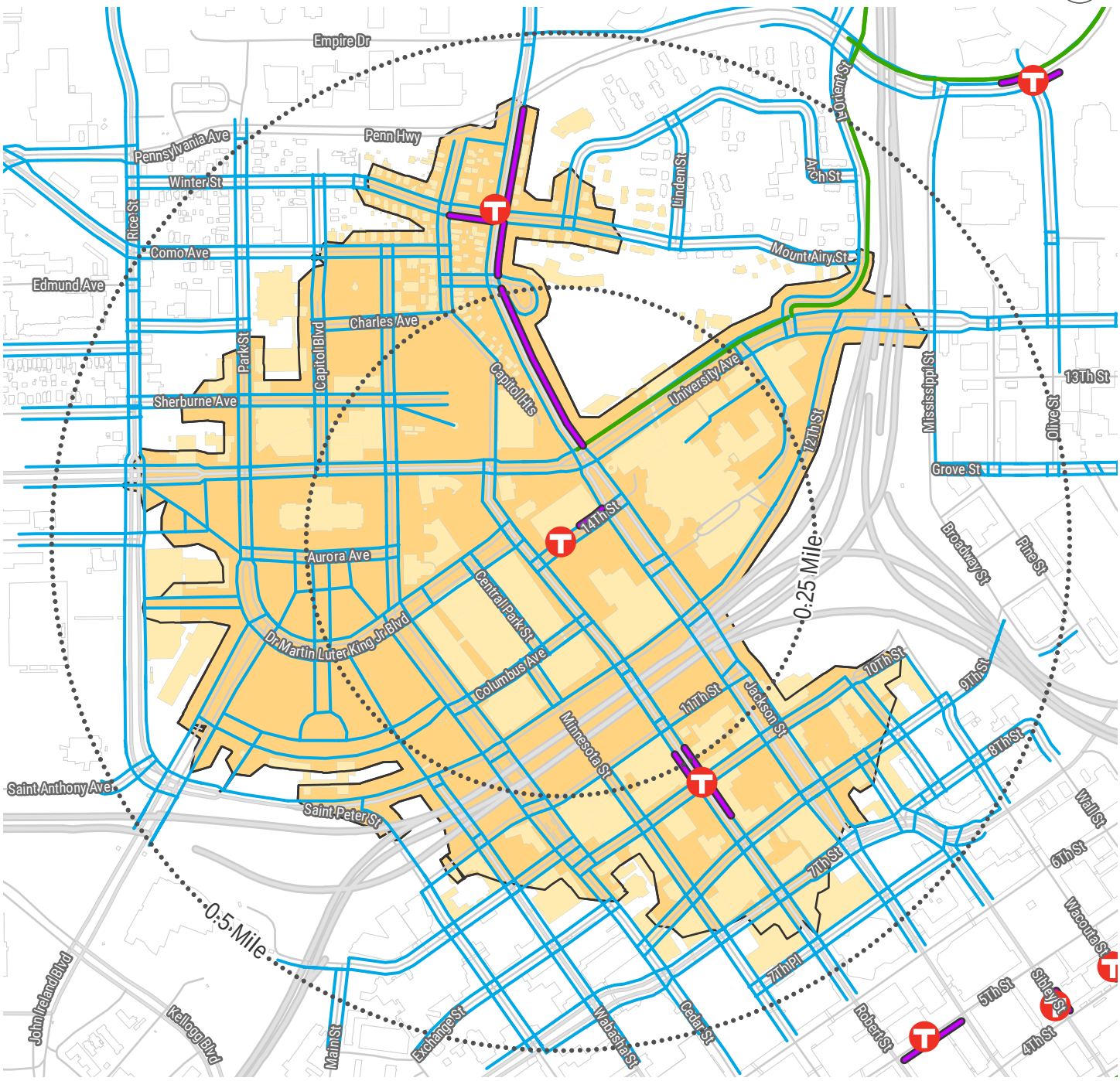

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3/31/2020

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PEDESTRIAN WALKSHED ANALYSIS

Additional Sidewalk Projects to Consider

Station Name: Mt. Airy

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
- Project Improvements and Projects by Others Walkshed**
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements and Projects by Others Walkshed

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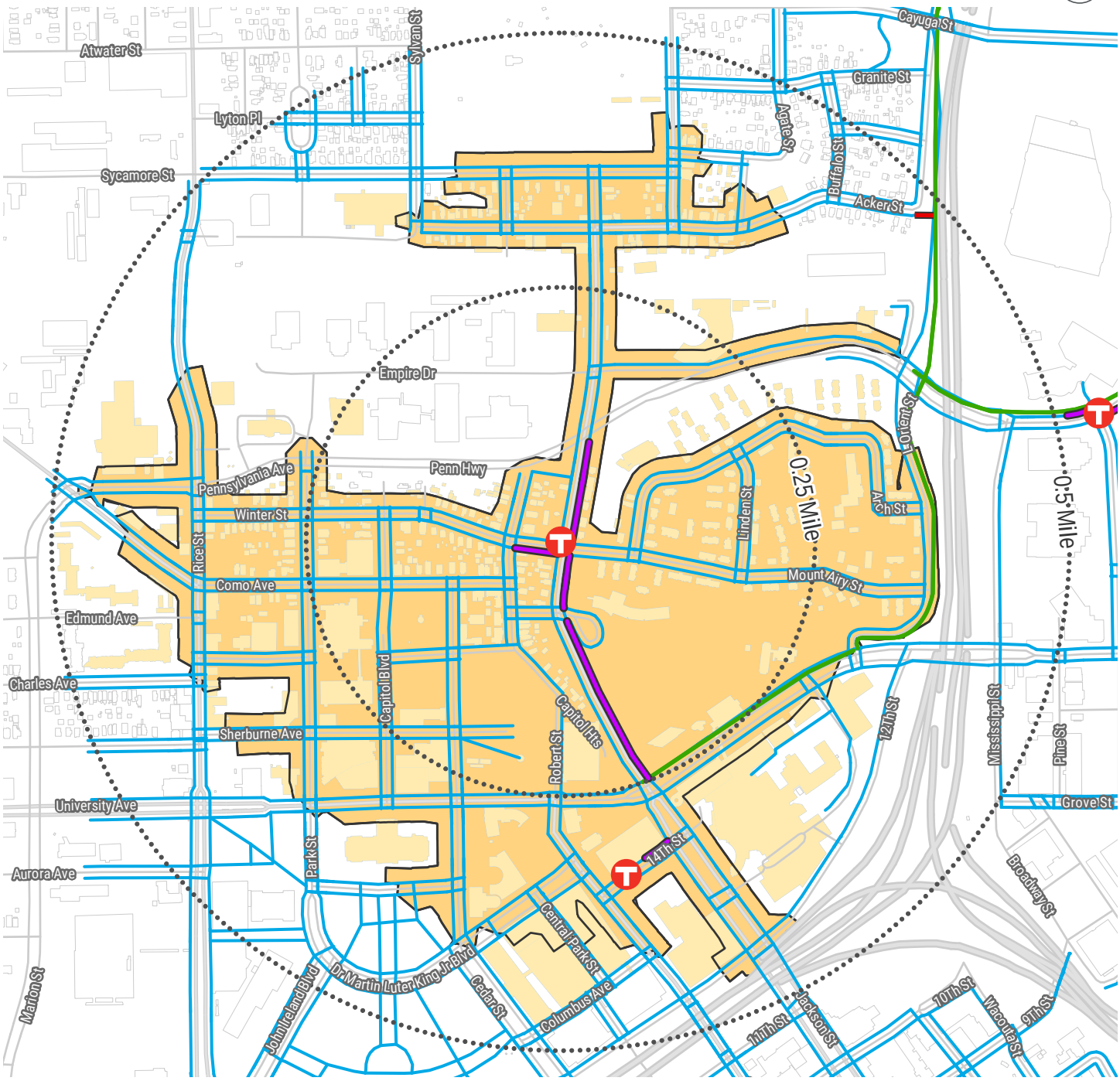

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3/31/2020

Station Name: Mt. Airy

Improvement Location	From	To	Directional (Side of Roadway)	Distance to Station (mile buffer)	Proximity to the adjacent stations (mile buffer)	City Improvement Location
Acker Street	Acker Street	Gateway State Trail	South	0.5 mile	Olive Street (0.25) Cayuga Street (0.5)	Saint Paul

PEDESTRIAN WALKSHED ANALYSIS

Additional Sidewalk Projects to Consider

Station Name: Olive Street

Rush Line B R T

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
- Project Improvements and Projects by Others Walkshed**
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements and Projects by Others Walkshed

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3/31/2020

Station Name: Olive Street

Improvement Location	From	To	Directional (Side of Roadway)	Distance to Station (mile buffer)	Proximity to the adjacent stations (mile buffer)	City Improvement Location
Acker Street	Acker Street	Gateway State Trail	South	0.25 mile	Cayuga Street (0.5) Mt. Airy (0.5)	Saint Paul
East Cayuga Street	Westminster Street	Arkwright Street	South	0.5 mile	Cayuga Street (0.25)	Saint Paul
Arkwright Street	East Cayuga Street	Whitall Street	West	0.5 mile	Cayuga Street (0.25)	Saint Paul
Whitall Street	Arkwright Street	Clark Street	North	0.5 mile	Cayuga Street (0.25) Payne Avenue (0.5)	Saint Paul
Trail Connection (no ROW)	Bruce Vento Regional Trail	Burr Street	Diagonal (West of Burr Street)	0.5 mile	Cayuga Street (0.25) Payne Avenue (0.5)	Saint Paul
Bush Avenue	Desoto Street	Edgerton Street	South	0.5 mile	Cayuga Street (0.25) Payne Avenue (0.25)	Saint Paul
Burr Street Bridge	Burr Street (North of Phalen Boulevard)	Burr Street (South of Phalen Boulevard)	West and East	0.5 mile	Cayuga Street (0.25)	Saint Paul

PEDESTRIAN WALKSHED ANALYSIS

Additional Sidewalk Projects to Consider

Station Name: Cayuga Street

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
- Project Improvements and Projects by Others Walkshed**
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements and Projects by Others Walkshed

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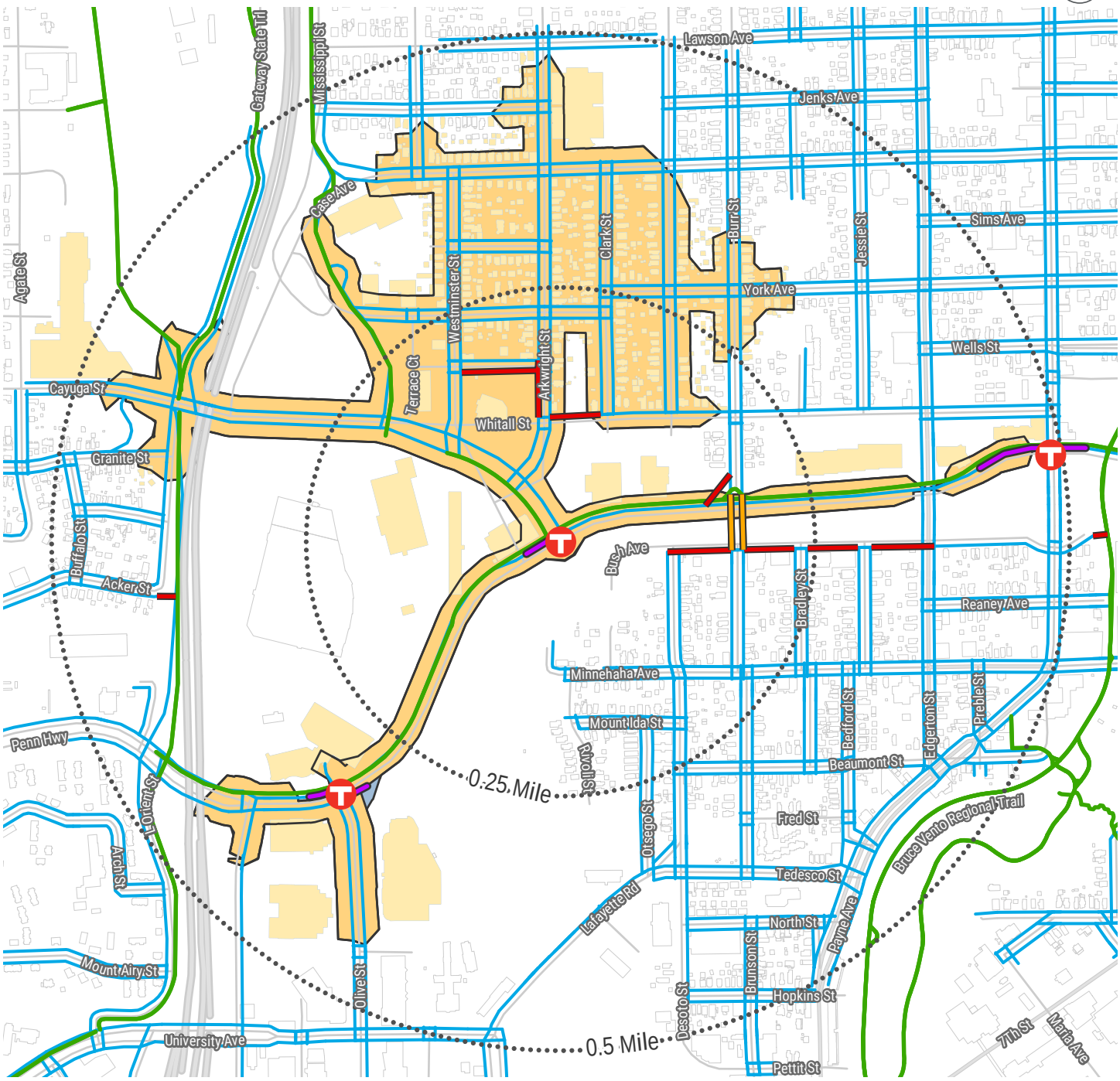

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3/31/2020

Station Name: Cayuga Street

Improvement Location	From	To	Directional (Side of Roadway)	Distance to Station (mile buffer)	Proximity to the adjacent stations (mile buffer)	City Improvement Location
Acker Street	Acker Street	Gateway State Trail	South	0.25 mile	Olive Street (0.25) Mt. Airy (0.5)	Saint Paul
East Cayuga Street	Westminster Street	Arkwright Street	South	0.25 mile	Olive Street (0.5)	Saint Paul
Arkwright Street	East Cayuga Street	Whitall Street	West	0.25 mile	Olive Street (0.5)	Saint Paul
Whitall Street	Arkwright Street	Clark Street	North	0.25 mile	Olive Street (0.5) Payne Avenue (0.5)	Saint Paul
Trail Connection (No ROW)	Bruce Vento Regional Trail	Burr Street	Diagonal (West of Burr Street)	0.25 mile	Olive Street (0.5) Payne Avenue (0.5)	Saint Paul
Burr Street Bridge	Burr Street (North of Phalen Boulevard)	Burr Street (South of Phalen Boulevard)	West and East	0.25 mile	Olive Street (0.5) Payne Avenue (0.5)	Saint Paul
Bush Avenue	Desoto Street	Edgerton Street	South	0.25 mile	Olive Street (0.5) Payne Avenue (0.5) Arcade Street (>0.5)	Saint Paul
Trail Connection (No ROW)	Bush Avenue	Bruce Vento Regional Trail	Trail Connection	0.5 mile	Payne Avenue (0.25) Arcade Street (0.5)	Saint Paul

PEDESTRIAN WALKSHED ANALYSIS

Additional Sidewalk Projects to Consider

Station Name: Payne Avenue

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
- Project Improvements and Projects by Others Walkshed**
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- Buildings near the Project Improvements and Projects by Others Walkshed

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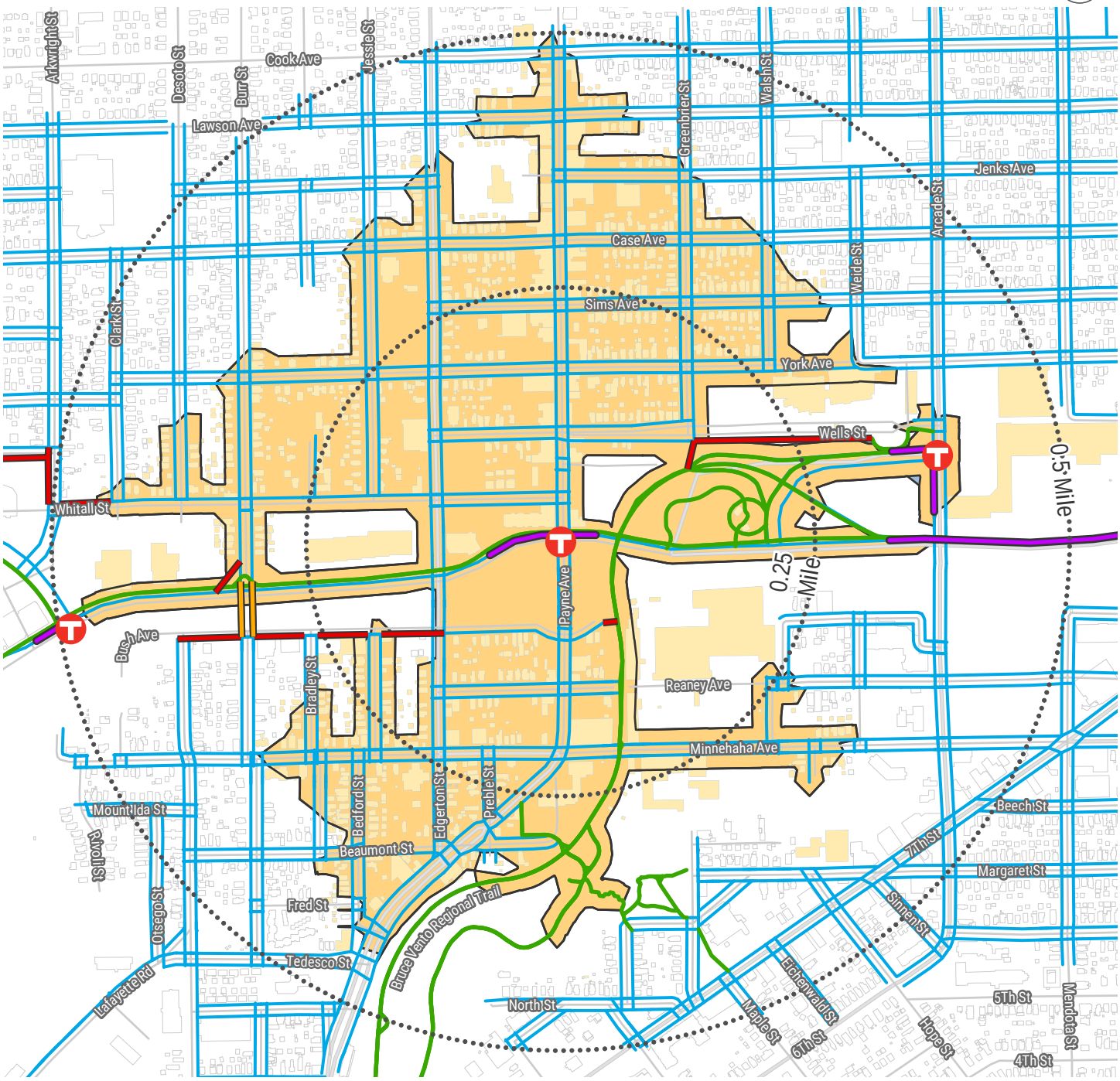

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3/31/2020

Station Name: Payne Avenue

Improvement Location	From	To	Directional (Side of Roadway)	Distance to Station (mile buffer)	Proximity to the adjacent stations (mile buffer)	City Improvement Location
East Cayuga Street	Westminster Street	Arkwright Street	South	>0.5 mile	Cayuga Street (0.25) Olive Street (0.5)	Saint Paul
Arkwright Street	East Cayuga Street	Whitall Street	West	>0.5 mile	Cayuga Street (0.25) Olive Street (0.5)	Saint Paul
Whitall Street	Arkwright Street	Clark Street	North	0.5 mile	Cayuga Street (0.25) Olive Street (0.5)	Saint Paul
Trail Connection (No ROW)	Bruce Vento Regional Trail	Burr Street	Diagonal (West of Burr Street)	0.5 mile	Cayuga Street (0.25) Olive Street (0.5)	Saint Paul
Burr Street Bridge	Burr Street (North of Phalen Boulevard)	Burr Street (South of Phalen Boulevard)	West and East	0.5 mile	Cayuga Street (0.25) Olive Street (0.5)	Saint Paul
Bush Avenue	Desoto Street	Edgerton Street	South	0.25 mile	Cayuga Street (0.25) Olive Street (0.5)	Saint Paul
Trail Connection (No ROW)	Bush Avenue	Bruce Vento Regional Trail	Trail Connection	0.25 mile	Arcade Street (0.5) Cayuga Street (>0.5)	Saint Paul
Wells Street Trail Connection	Eastside Heritage Park	YMCA	South	0.25 mile	Arcade Street (0.25)	Saint Paul

PEDESTRIAN WALKSHED ANALYSIS

Additional Sidewalk Projects to Consider

Station Name: Arcade Street

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
- Project Improvements and Projects by Others Walkshed**
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements and Projects by Others Walkshed

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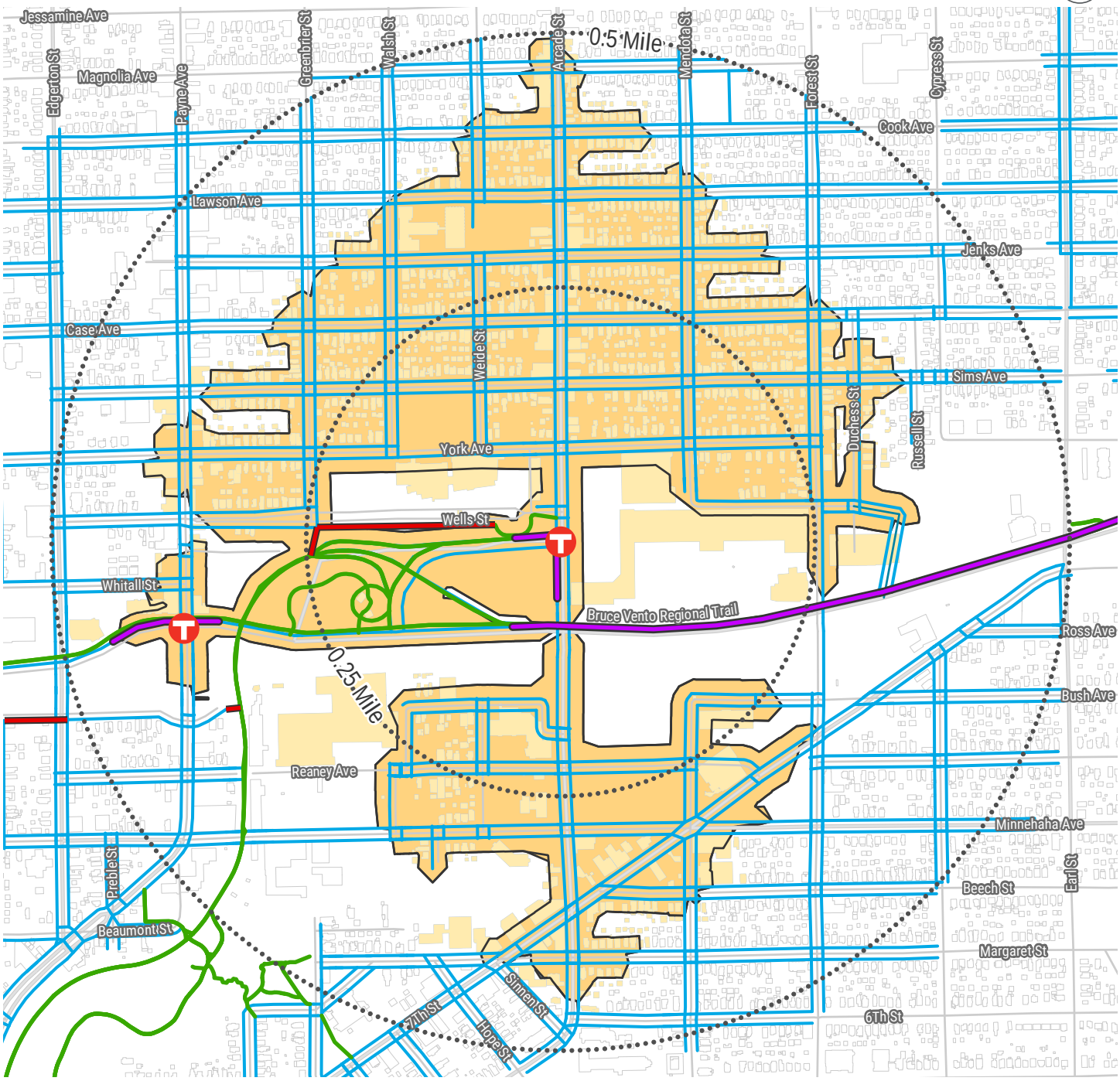

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3/31/2020

Station Name: Arcade Street

Improvement Location	From	To	Directional (Side of Roadway)	Distance to Station (mile buffer)	Proximity to the adjacent stations (mile buffer)	City Improvement Location
Bush Avenue	Desoto Street	Edgerton Street	South	0.25 mile	Payne Avenue (0.25) Cayuga Street (0.5)	Saint Paul
Trail Connection (no ROW)	Bush Avenue	Bruce Vento Regional Trail	Trail Connection	0.25 mile	Payne Avenue (0.25) Cayuga Street (>0.5)	Saint Paul
Wells Street Trail Connection	Eastside Heritage Park	YMCA	South	0.25 mile	Payne Avenue (0.25)	Saint Paul

PEDESTRIAN WALKSHED ANALYSIS

Additional Sidewalk Projects to Consider

Station Name: Cook Avenue

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
- Project Improvements and Projects by Others Walkshed**
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements and Projects by Others Walkshed

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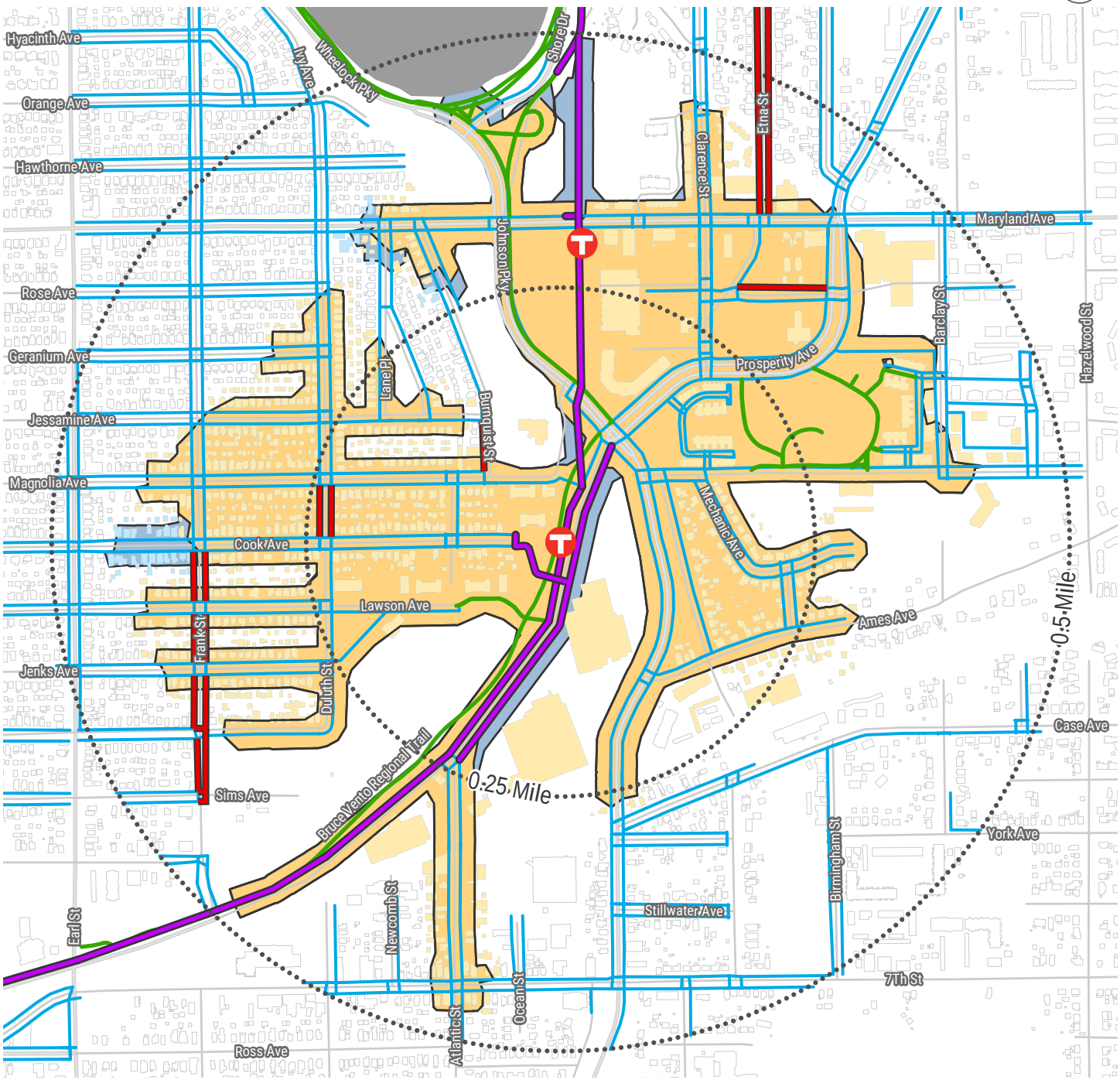

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3/31/2020

Station Name: Cook Avenue

Improvement Location	From	To	Directional (Side of Roadway)	Distance to Station (mile buffer)	Proximity to the adjacent stations (mile buffer)	City Improvement Location
Duluth Street	Cook Avenue	Magnolia Avenue	West and East	0.25 mile	Maryland Avenue (0.5)	Saint Paul
Burnquist Street	Magnolia Avenue	Jessamine Avenue	West	0.25 mile	Maryland Avenue (0.25)	Saint Paul
Rose Avenue East	Etna Street	Prosperity Avenue	North	0.5 mile	Maryland Avenue (0.25)	Saint Paul
Etna Street	Maryland Avenue	Ivy Avenue	West and East	0.5 mile	Maryland Avenue (0.25)	Saint Paul

PEDESTRIAN WALKSHED ANALYSIS

Additional Sidewalk Projects to Consider

Station Name: Maryland Avenue

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
- Project Improvements and Projects by Others Walkshed**
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements and Projects by Others Walkshed

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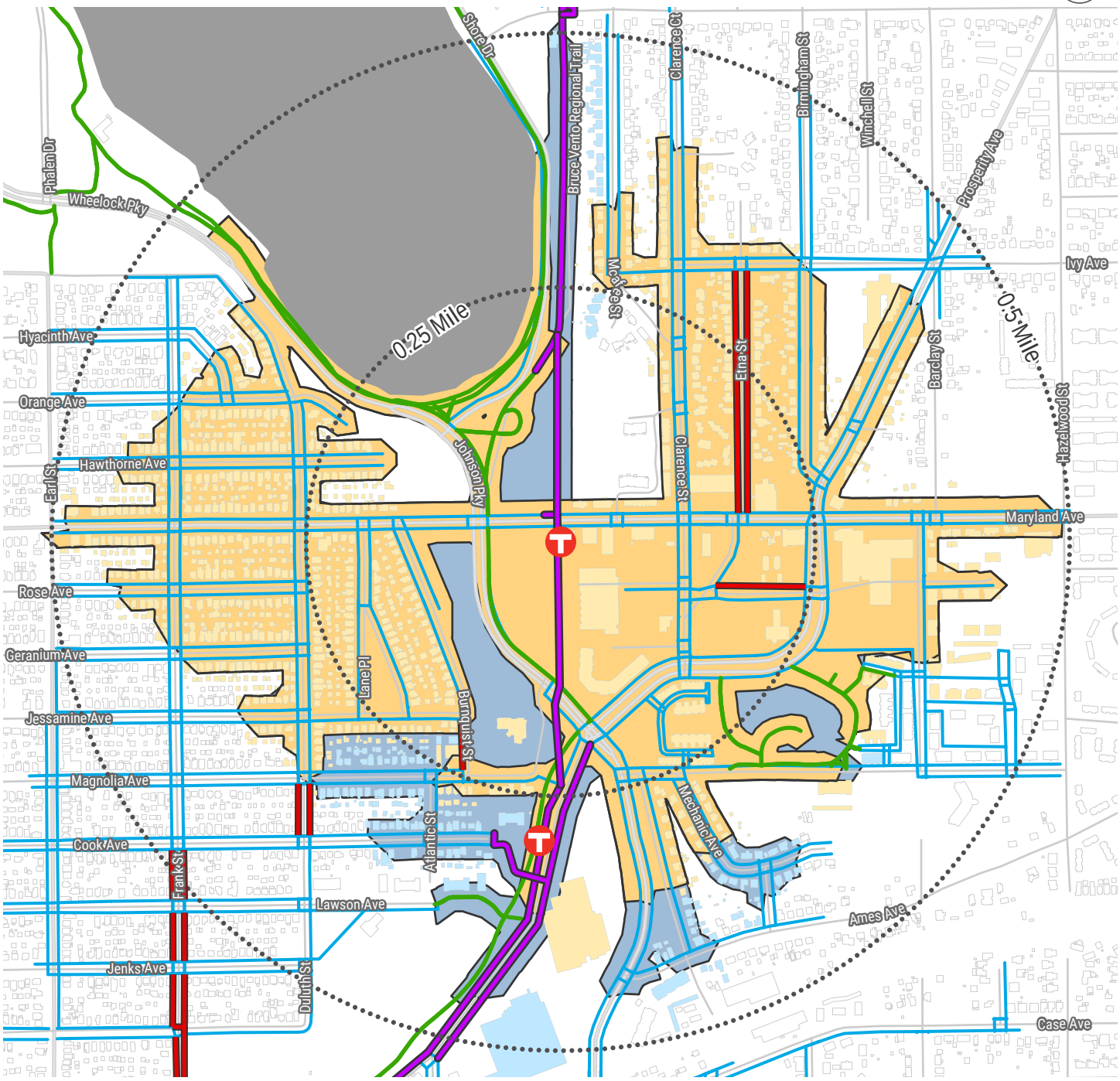

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3/31/2020

Station Name: Maryland Avenue

Improvement Location	From	To	Directional (Side of Roadway)	Distance to Station (mile buffer)	Proximity to the adjacent stations (mile buffer)	City Improvement Location
Duluth Street	Cook Avenue	Magnolia Avenue	West and East	0.5 mile	Cook Avenue (0.25)	Saint Paul
Burnquist Street	Magnolia Avenue	Jessamine Avenue	West	0.25 mile	Cook Avenue (0.25)	Saint Paul
Rose Avenue East	Etna Street	Prosperity Avenue	North	0.25 mile	Cook Avenue (0.5)	Saint Paul
Etna Street	Maryland Avenue	Ivy Avenue	West and East	0.25 mile	Cook Avenue (0.5)	Saint Paul

PEDESTRIAN WALKSHED ANALYSIS

Additional Sidewalk Projects to Consider

Station Name: Larpenteur Avenue

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
- Project Improvements and Projects by Others Walkshed**
- Buildings near the Existing Conditions Walkshed
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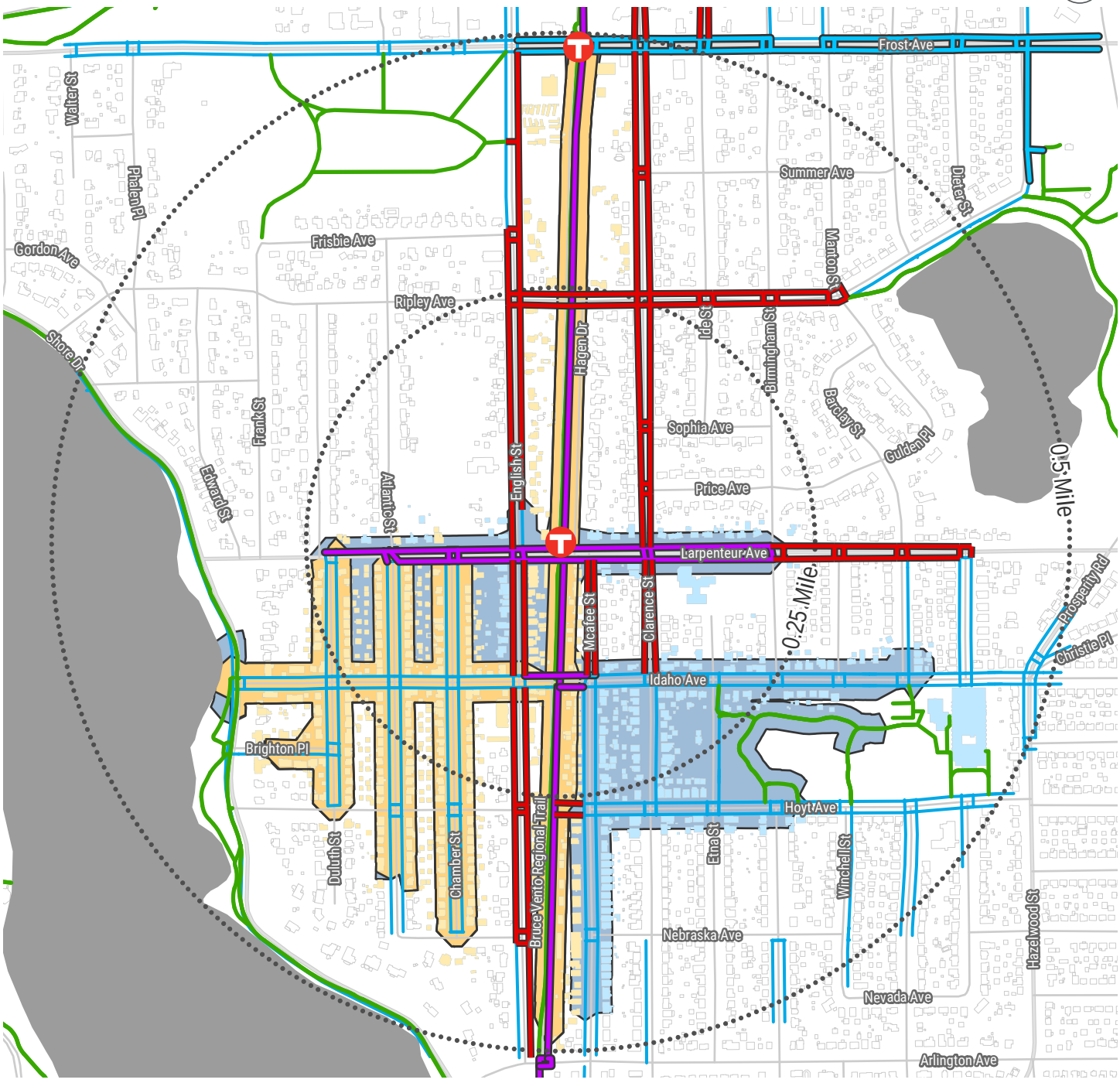

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3/31/2020

Station Name: Larpenteur Avenue

Improvement Location	From	To	Directional (Side of Roadway)	Distance to Station (mile buffer)	Proximity to the adjacent stations (mile buffer)	City Improvement Location
English Street	Nebraska Avenue	Frisbie Avenue	West	0.25 mile	Frost Avenue (0.25)	Maplewood Saint Paul
English Street	Arlington Avenue	Frost Avenue	East	0.25 mile	Frost Avenue (0.25)	Maplewood Saint Paul
Mcafee Street	Idaho Avenue	Larpenteur Avenue	West and East	0.25 mile	Frost Avenue (>0.5)	Saint Paul
Clarence Street	Idaho Avenue	Skillman Avenue East	West and East	0.25 mile	Frost Avenue (0.25)	Maplewood Saint Paul
Hoyt Avenue	Bruce Vento Regional Trail	Mcafee Street	Trail Connection	0.5 mile	Frost Avenue (>0.5)	Saint Paul
Larpenteur Avenue	Birmingham Street	Dieter Street	North and South	0.25 mile	Frost Avenue (>0.5)	Saint Paul
Ripley Avenue	English Street	Clarence Street	North and South	0.25 mile	Frost Avenue (0.25)	Maplewood

PEDESTRIAN WALKSHED ANALYSIS

Additional Sidewalk Projects to Consider

Station Name: Frost Avenue

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
- Project Improvements and Projects by Others Walkshed**
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements and Projects by Others Walkshed

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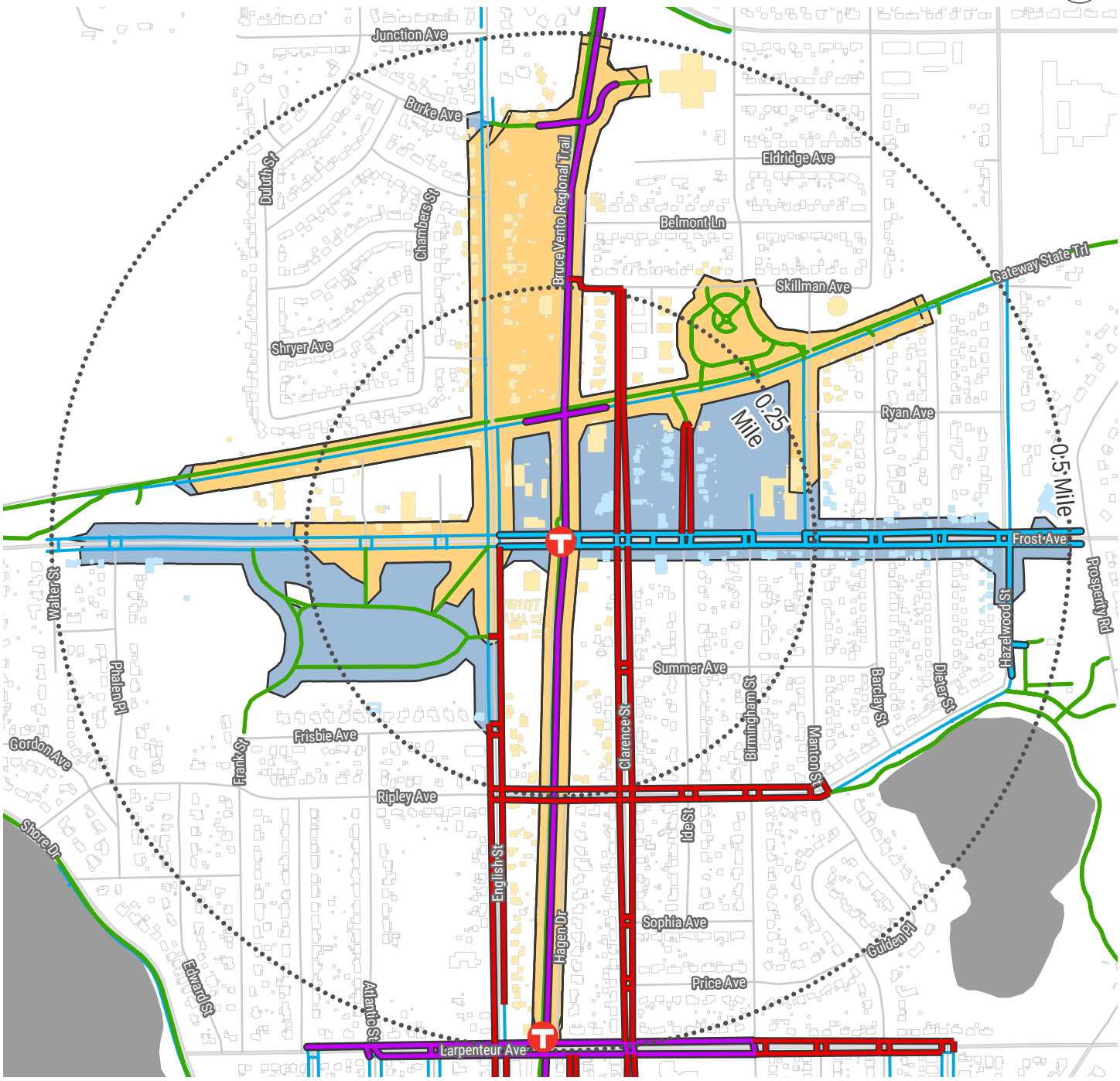

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3/31/2020

Station Name: Frost Avenue

Improvement Location	From	To	Directional (Side of Roadway)	Distance to Station (mile buffer)	Proximity to the adjacent stations (mile buffer)	City Improvement Location
English Street	Nebraska Avenue	Frisbie Street	West	0.25 mile	Larpenteur Avenue (0.25)	Maplewood Saint Paul
English Street	Arlington Avenue	Frost Avenue	East	0.25 mile	Larpenteur Avenue (0.25)	Maplewood
Mcafee Street	Idaho Avenue	Larpenteur Avenue	West and East	>0.5 mile	Larpenteur Avenue (>0.5)	Saint Paul
Clarence Street	Idaho Avenue	Skillman Avenue East	West and East	0.25 mile	Larpenteur Avenue (0.25)	Maplewood Saint Paul
Larpenteur Avenue	Birmingham Street	Dieter Street	North and South	>0.5 mile	Larpenteur Avenue (0.25)	Maplewood Saint Paul
Ripley Avenue	English Street	Clarence Street	North and South	0.25 mile	Larpenteur Avenue (0.25)	Maplewood
Skillman Avenue East	Bruce Vento Regional Trail	Clarence Street	South	0.25 mile	N/A	Maplewood

PEDESTRIAN WALKSHED ANALYSIS

Additional Sidewalk Projects to Consider

Station Name: Highway 36

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
- Project Improvements and Projects by Others Walkshed**
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements and Projects by Others Walkshed

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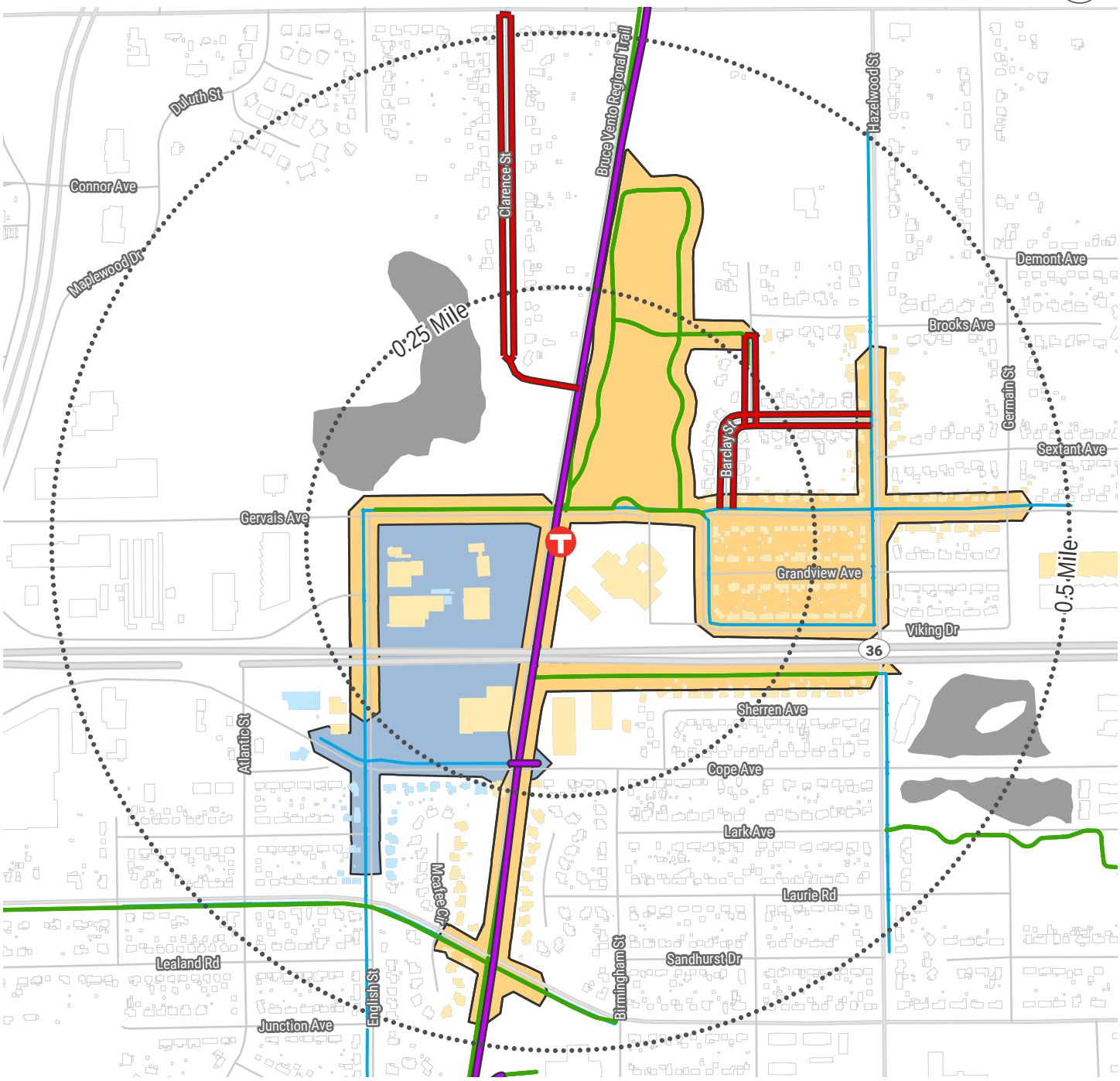

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3/31/2020

Station Name: Highway 36

Improvement Location	From	To	Directional (Side of Roadway)	Distance to Station (mile buffer)	Proximity to the adjacent stations (mile buffer)	City Improvement Location
North Barclay Street	Gervais Avenue	Harvest Park	West and East	0.25 mile	N/A	Maplewood
Clarence Street	Trail Connection (No ROW)	Bruce Vento Regional Trail	Trail Connection	0.25 mile	N/A	Maplewood
Sextant Avenue East	Barclay Street North	Hazelwood Street	North and South	0.25 mile	N/A	Maplewood

PEDESTRIAN WALKSHED ANALYSIS

Additional Sidewalk Projects to Consider

Station Name: Maplewood Mall Transit Center

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
- Project Improvements and Projects by Others Walkshed**
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements and Projects by Others Walkshed

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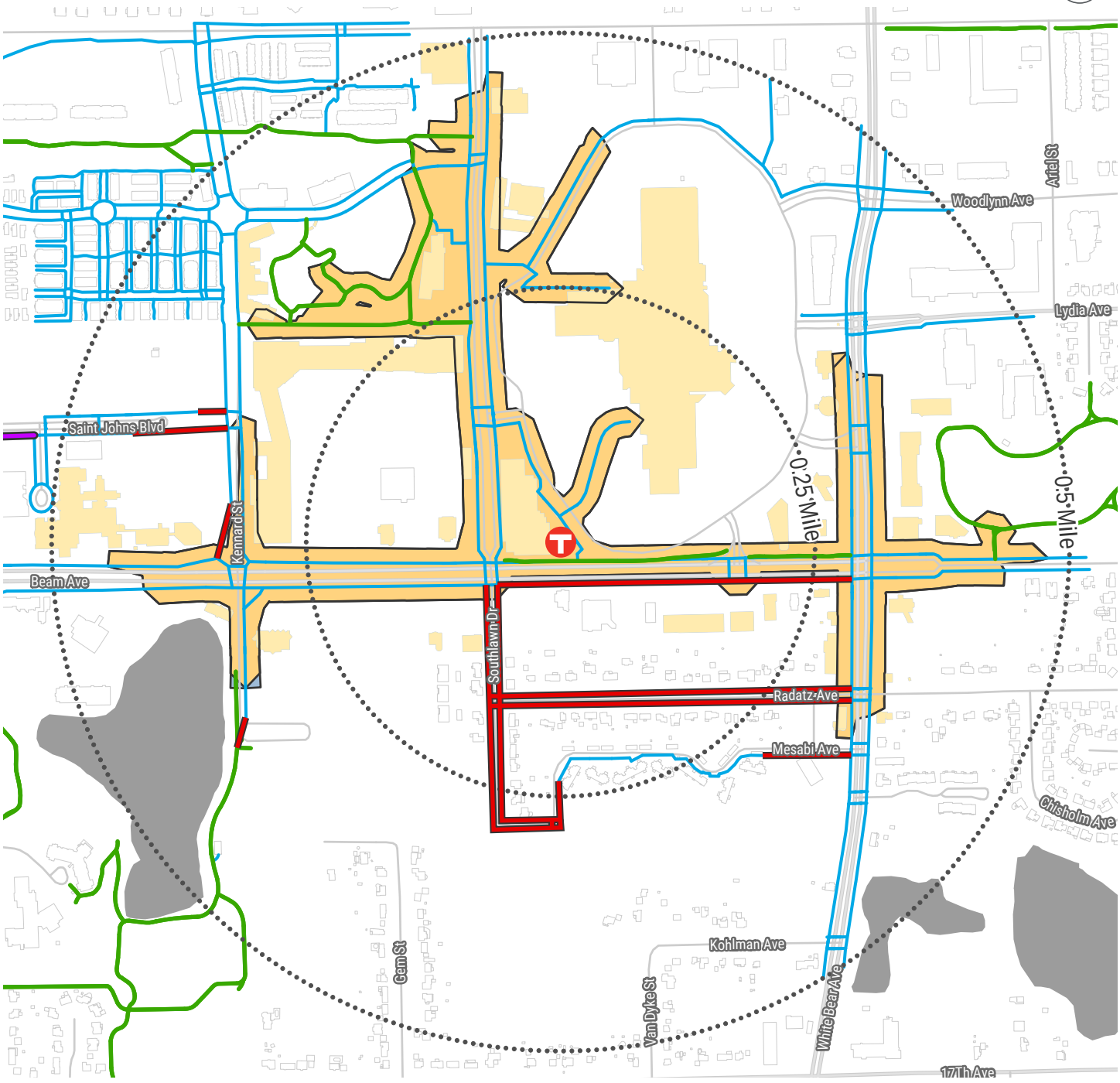

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3/31/2020

Station Name: Maplewood Mall Transit Center

Improvement Location	From	To	Directional (Side of Roadway)	Distance to Station (mile buffer)	Proximity to the adjacent stations (mile buffer)	City Improvement Location
Kennard Street	Kennard Street	Beam Avenue	Diagonal West	0.5 mile	Street. John's Boulevard (0.5)	Maplewood
Kennard Street	Kennard Street	North Hazelwood Park	East	0.5 mile	St. John's Boulevard (0.5)	Maplewood
Mesabi Avenue	Southlawn Drive	White Bear Avenue	North, South and East	0.5 mile	St. John's Boulevard (>0.5)	Maplewood
Southlawn Drive	Mesabi Avenue	Beam Avenue	West and East	0.25 mile	St. John's Boulevard (>0.5)	Maplewood
Radatz Avenue	Southlawn Drive	White Bear Avenue	North and South	0.25 mile	St. John's Boulevard (>0.5)	Maplewood
Beam Avenue	Southlawn Drive	White Bear Avenue	South	0.25 mile	St. John's Boulevard (0.25)	Maplewood
Saint John’s Boulevard	Parking Lot Driveways	Kennard Street	North and South	0.5 mile	St. John's Boulevard (0.25)	Maplewood

PEDESTRIAN WALKSHED ANALYSIS

Additional Sidewalk Projects to Consider

Station Name: St. John's Boulevard

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
- Project Improvements and Projects by Others Walkshed**
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements and Projects by Others Walkshed

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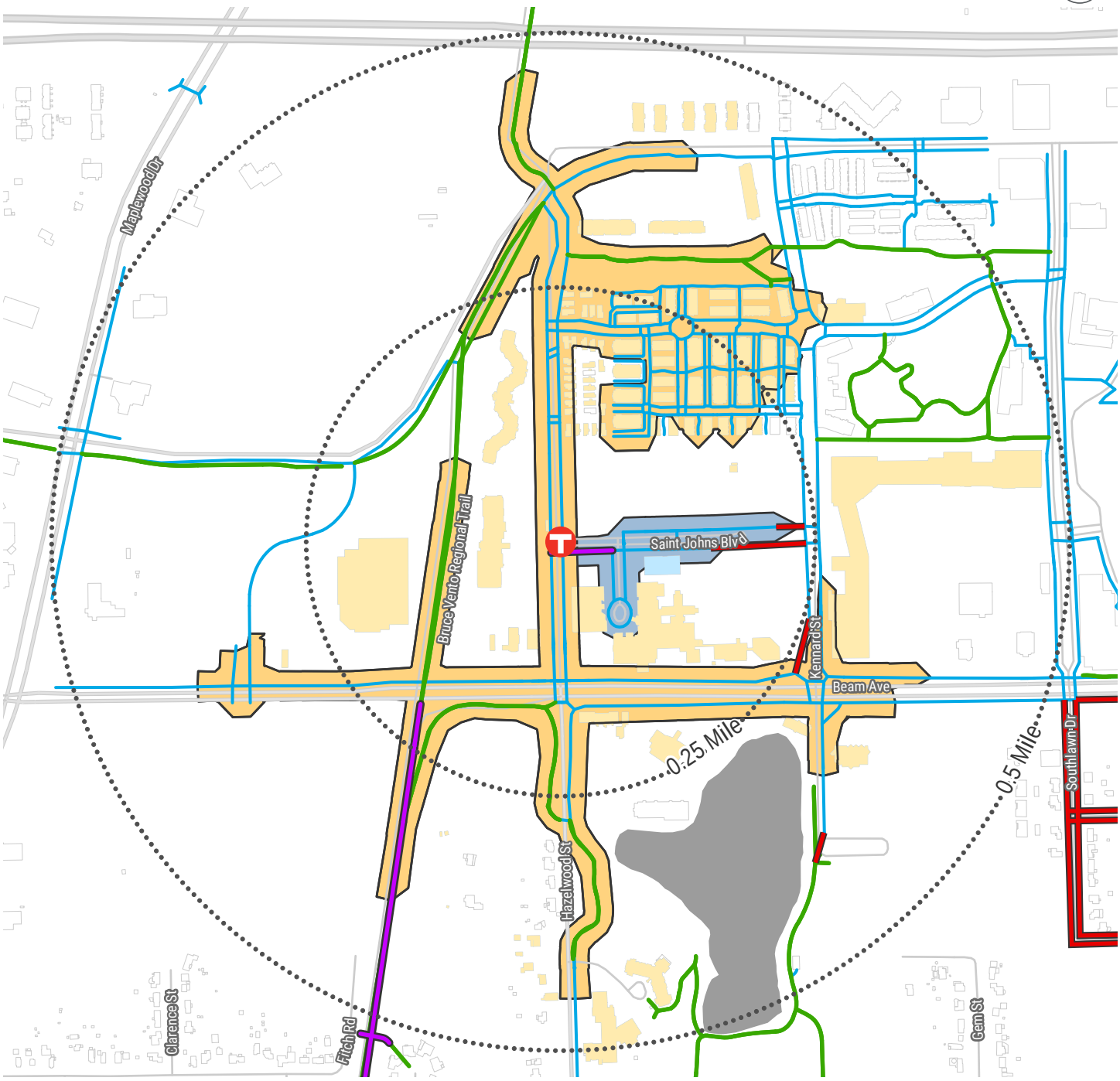

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3/31/2020

Station Name: St. John’s Boulevard

Improvement Location	From	To	Directional (Side of Roadway)	Distance to Station (mile buffer)	Proximity to the adjacent stations (mile buffer)	City Improvement Location
Kennard Street	Kennard Street	Beam Avenue	Diagonal West	0.5 mile	St. John's Boulevard (0.5)	Maplewood
Kennard Street	Kennard Street	North Hazelwood Park	East	0.5 mile	Maplewood Mall Transit Center (0.5)	Maplewood
Southlawn Drive	Mesabi Avenue	Beam Avenue	West and East	>0.5 mile	Maplewood Mall Transit Center (0.25)	Maplewood
Saint John’s Boulevard	Parking Lot Driveways	Kennard Street	North and South	0.25 mile	Maplewood Mall Transit Center (0.5)	Maplewood
Mesabi Avenue	Southlawn Drive	White Bear Avenue	North, South and East	>0.5 mile	Maplewood Mall Transit Center (0.5)	Maplewood
Radatz Avenue	Southlawn Drive	White Bear Avenue	North and South	>0.5 mile	Maplewood Mall Transit Center (0.25)	Maplewood
Beam Avenue	Southlawn Drive	White Bear Avenue	South	>0.5 mile	Maplewood Mall Transit Center (0.25)	Maplewood

PEDESTRIAN WALKSHED ANALYSIS

Additional Sidewalk Projects to Consider

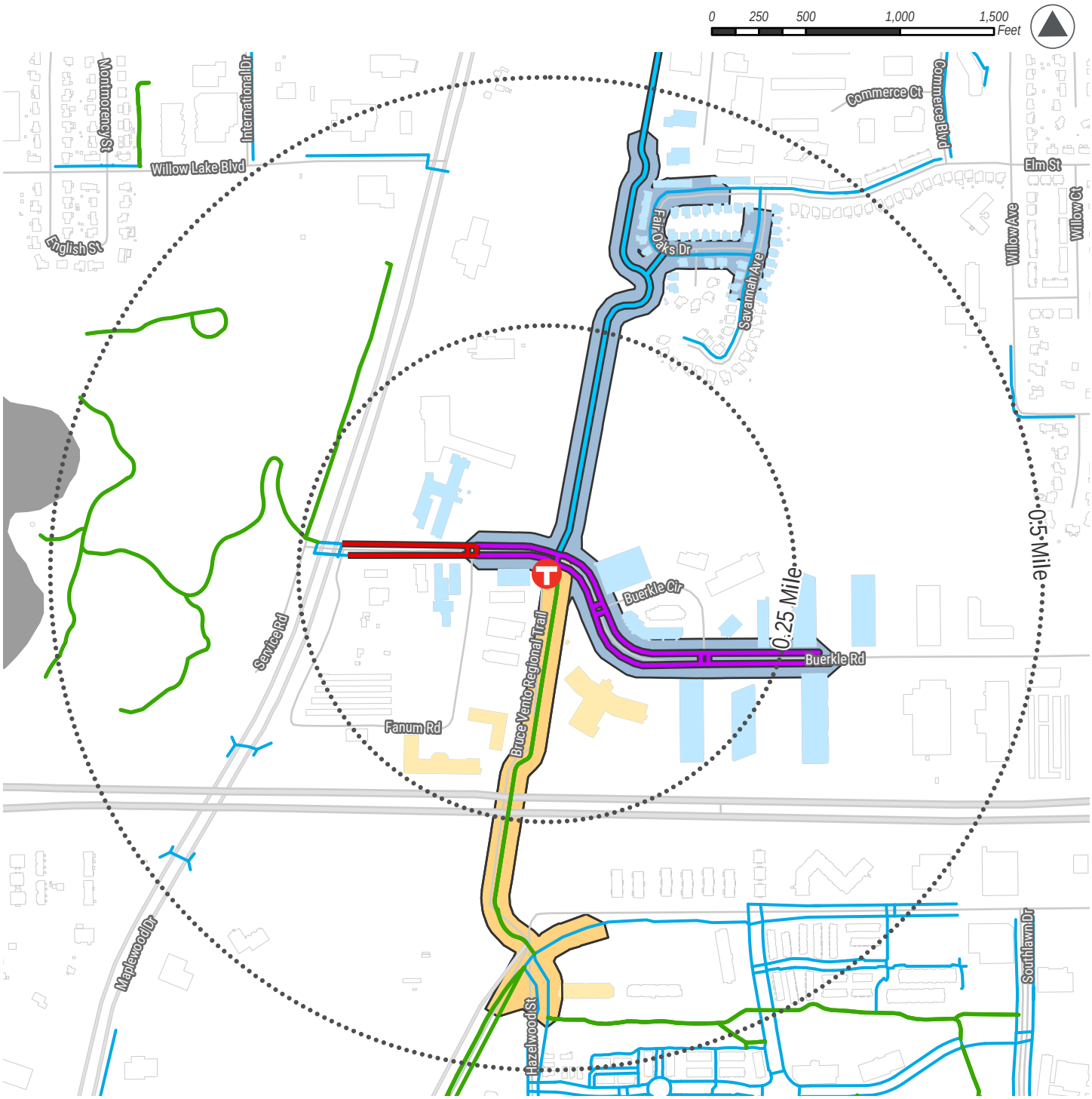
Station Name: Buerkle Road

Rush Line

B R T

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
- Project Improvements and Projects by Others Walkshed**
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements and Projects by Others Walkshed



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3/31/2020

Station Name: Buerkle Road

Improvement Location	From	To	Directional (Side of Roadway)	Distance to Station (mile buffer)	Proximity to the adjacent stations (mile buffer)	City Improvement Location
Buerkle Road	Highway 61 North	Fanum Road	North and South	0.25 mile	N/A	Vadnais Heights

PEDESTRIAN WALKSHED ANALYSIS

Additional Sidewalk Projects to Consider

Station Name: County Road E

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
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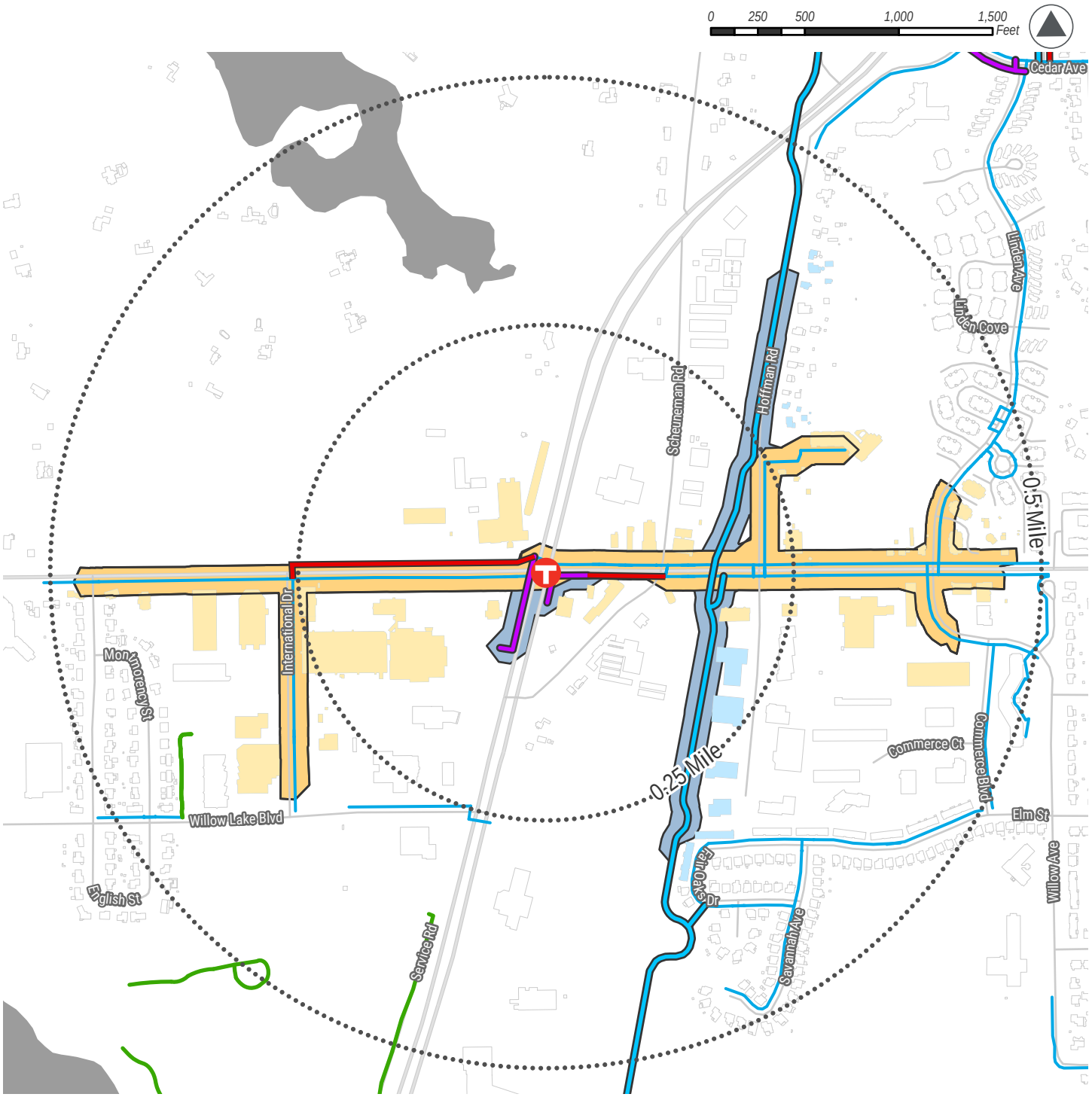

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3/31/2020

Station Name: County Road East

Improvement Location	From	To	Directional (Side of Roadway)	Distance to Station (mile buffer)	Proximity to the adjacent stations (mile buffer)	City Improvement Location
County Road East	International Drive	Highway 61 North	North	0.25 mile	N/A	Gem Lake
County Road East	Highway 61 North	Scheuneman Road	South	0.25 mile	N/A	Gem Lake

PEDESTRIAN WALKSHED ANALYSIS

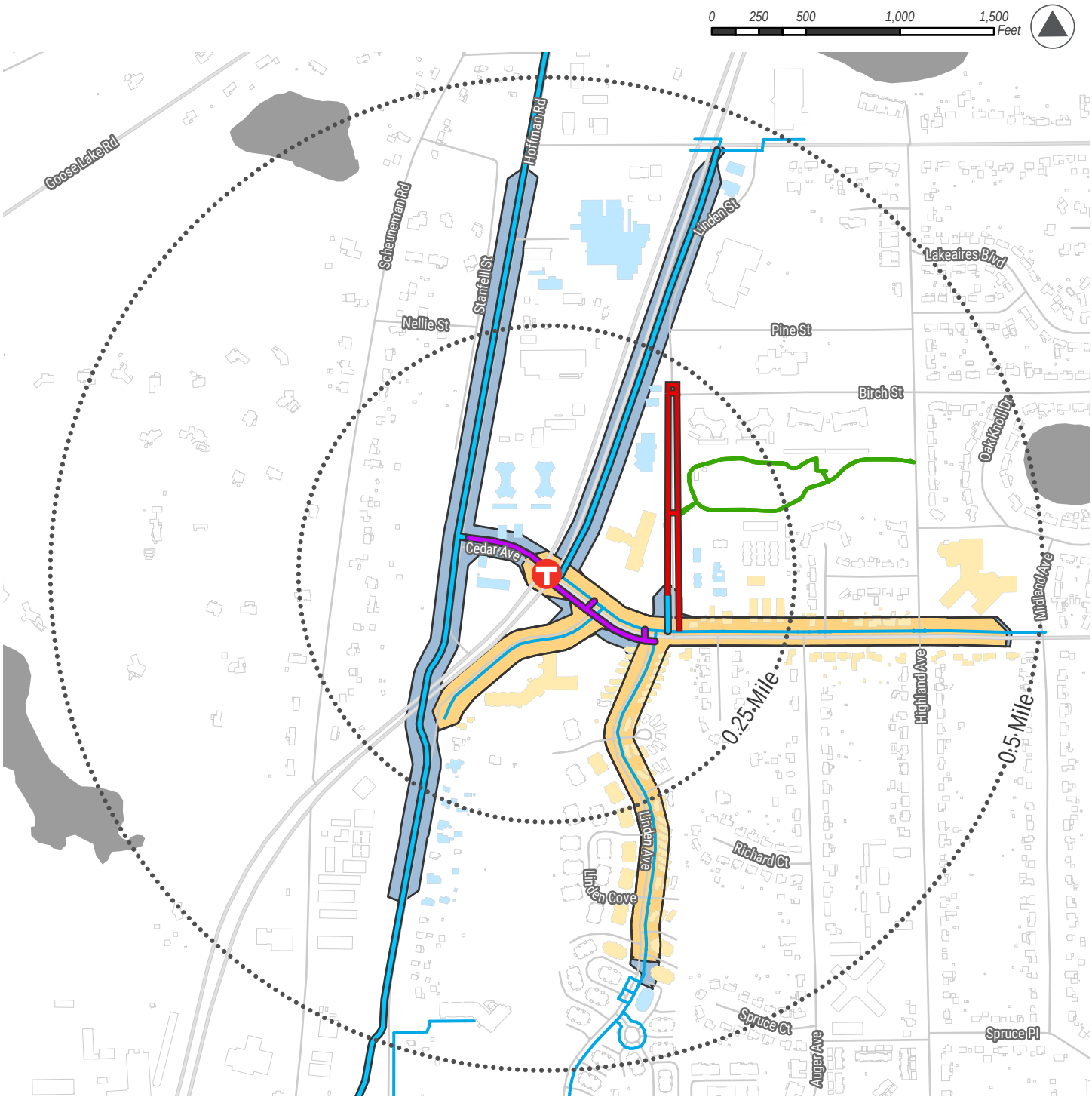
Additional Sidewalk Projects to Consider

Station Name: Cedar Avenue

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
- Project Improvements and Projects by Others Walkshed**
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements and Projects by Others Walkshed



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3/31/2020

Station Name: Cedar Avenue

Improvement Location	From	To	Directional (Side of Roadway)	Distance to Station (mile buffer)	Proximity to the adjacent stations (mile buffer)	City Improvement Location
Linden Street	Cedar Avenue	Birch Street	West and East	0.25 mile	N/A	White Bear Lake

PEDESTRIAN WALKSHED ANALYSIS

Additional Sidewalk Projects to Consider

Station Name: Whitaker Street

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
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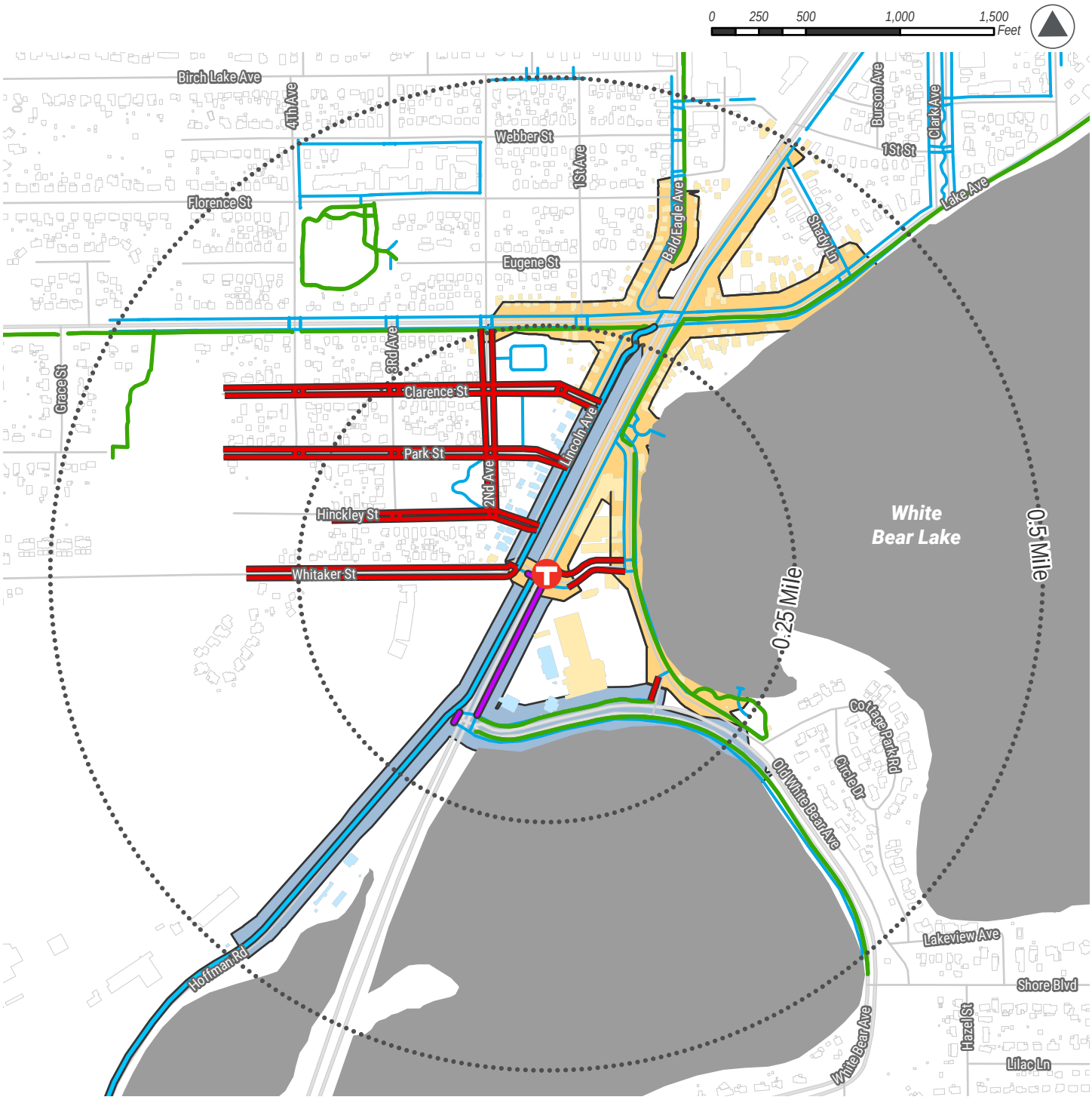

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3/31/2020

Station Name: Whitaker Street

Improvement Location	From	To	Directional (Side of Roadway)	Distance to Station (mile buffer)	Proximity to the adjacent stations (mile buffer)	City Improvement Location
2nd Avenue	Hinckley Street	Highway 96 East	West and East	0.25 mile	N/A	White Bear Lake
Lake Avenue South	White Bear Avenue	Old White Bear Avenue North	West	0.25 mile	N/A	White Bear Lake
Whitaker Street	Whitaker Court	Lincoln Avenue	North and South	0.25 mile	N/A	White Bear Lake
Whitaker Street	Highway 61 East	Lake Avenue South	North and South	0.25 mile	N/A	White Bear Lake
Hinckley Street	Hinckley Street (Dead End)	Lincoln Avenue	North and South	0.25 mile	N/A	White Bear Lake
Park Street	Park Street (Dead End)	Lincoln Avenue	North and South	0.25 mile	N/A	White Bear Lake
Clarence Street	Clarence Street (Dead End)	Lincoln Avenue	North and South	0.25 mile	N/A	White Bear Lake

PEDESTRIAN WALKSHED ANALYSIS

Additional Sidewalk Projects to Consider

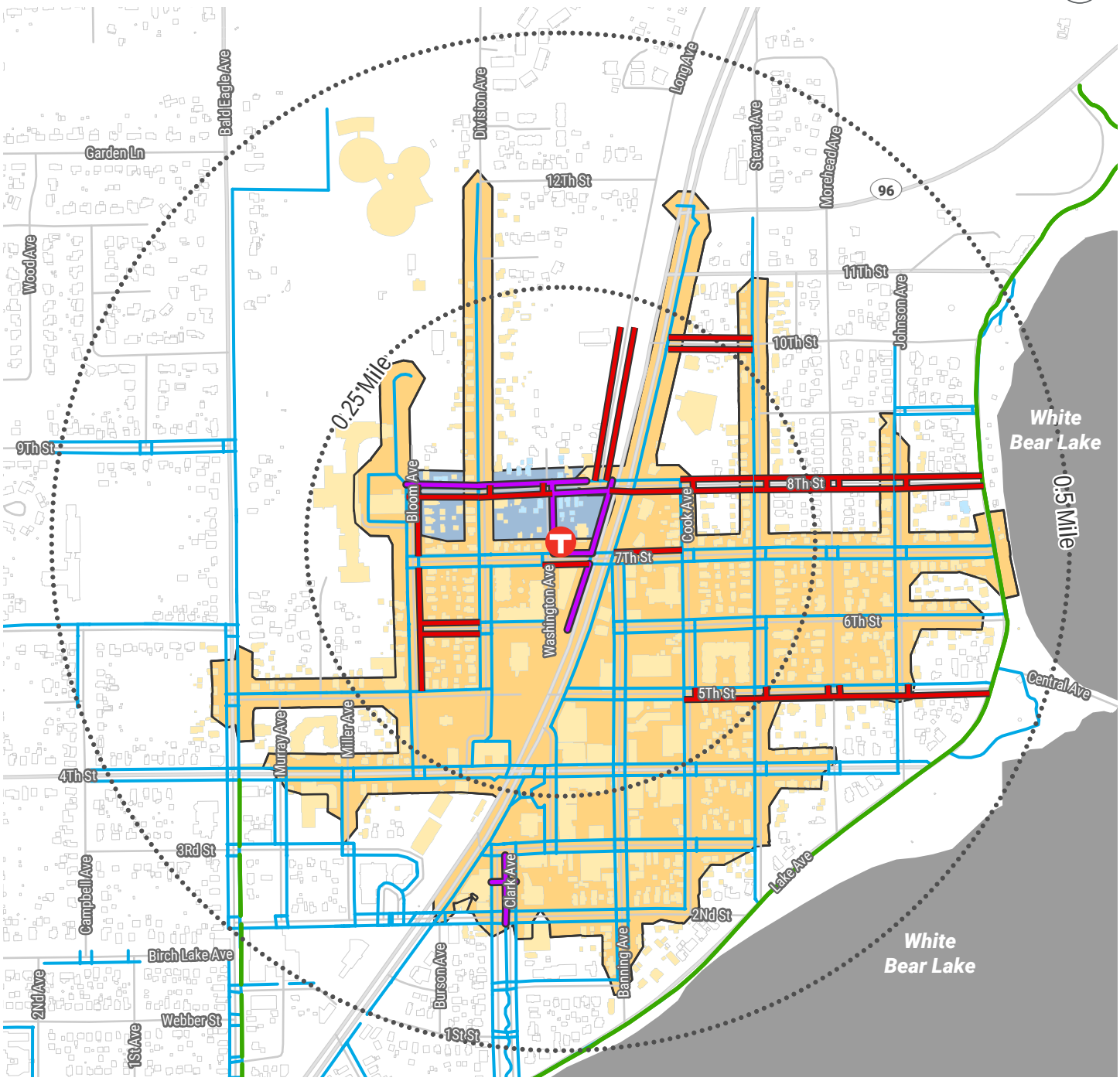
Station Name: Downtown White Bear Lake

Rush Line BRT

Key

- Planned Station
- Existing Sidewalk
- Existing Shared-Use Path
- Proposed Rush Line BRT Pedestrian Improvements
- Additional Pedestrian Improvement Projects by Others
- Additional Sidewalk Projects to Consider
- New Bridge to Consider
- Existing Conditions Walkshed*
- Project Improvements and Projects by Others Walkshed**
- Buildings near the Existing Conditions Walkshed
- Buildings near the Project Improvements and Projects by Others Walkshed

0 250 500 1,000 1,500 Feet



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3/31/2020

Station Name: Downtown White Bear Lake

Improvement Location	From	To	Directional (Side of Roadway)	Distance to Station (mile buffer)	Proximity to the adjacent stations (mile buffer)	City Improvement Location
Bloom Avenue	5th Street	8th Street	East	0.25 mile	N/A	White Bear Lake
Long Avenue	8th Street	White Bear Center for the Arts	West and East	0.25 mile	N/A	White Bear Lake
5th Street	Cook Avenue	Lake Avenue	South	0.25 mile	N/A	White Bear Lake
6th Street	Bloom Avenue	Division Avenue	North and South	0.25 mile	N/A	White Bear Lake
7th Street	Washington Avenue	Highway 61 North	South	0.25 mile	N/A	White Bear Lake
7th Street	Highway 61 North	Cook Avenue	North	0.25 mile	N/A	White Bear Lake
8th Street	Bloom Avenue	Washington Avenue	South	0.25 mile	N/A	White Bear Lake
8th Street	Highway 61 North	Lake Avenue	South	0.25 mile	N/A	White Bear Lake
8th Street	Cook Avenue	Lake Avenue	North	0.25 mile	N/A	White Bear Lake
10th Street	Highway 61 North	Stewart Avenue	North and South	0.25 mile	N/A	White Bear Lake

Barriers and Opportunities for Pedestrian Improvements Summary Table

Closest Station	Improvement Location	From	To	Directional (Side of Roadway)	Adjacent Land Use	Barriers	Comfort	Constructability	Desire Lines	Proximity to the Planned Station	Street Pattern
Olive Street	Acker Street	Acker Street	Gateway State Trail	South	Residential	Noise wall	Local	Path through noise wall	No evidence	¼ mile	
Cayuga Street	East Cayuga Street	Westminster Street	Arkwright Street	South	Residential / Commercial	None	Local	Steep slope; fence	No evidence	¼ mile	Grid
	Arkwright Street	East Cayuga Street	Whitall Street	West	Residential / Commercial	None	Local	Steep slope; fence	No evidence	¼ mile	Grid
	Whitall Street	Arkwright Street	Clark Street	North	Residential / Commercial	None	Local		No evidence	¼ mile	Grid
	Trail Connection (No ROW)	Bruce Vento Regional Trail	Burr Street	Diagonal (West of Burr Street)	Residential	Traverses a steep slope	Local (Dead End)	Steep slope; need easement / ROW	No evidence	¼ mile	Grid
	Burr Street Bridge	Burr Street (North of Phalen Boulevard)	Burr Street (South of Phalen Boulevard)	West and East	Residential	Bridge over an Arterial	Crosses an Arterial	New bridge	No evidence	¼ mile	Grid
Cayuga Street / Payne Avenue	Bush Avenue	Desoto Street	Edgerton Street	South	Residential / Warehouse	None	Local		No evidence	¼ mile	Grid
Payne Avenue	Trail Connection (No ROW)	Bush Avenue	Bruce Vento Regional Trail	Trail Connection	Residential	Traverses a steep slope; vegetation	Local (Dead End)	Steep slope; vegetation; need easement / ROW	No evidence	¼ mile	Grid
Payne Avenue / Arcade Street	Wells Street Trail Connection	Eastside Heritage Park	YMCA	South	School / Park / YWCA	Traverses a steep slope; vegetation	Local	Vegetation	Worn path	Direct connection	Grid
Cook Avenue	Duluth Street	Cook Avenue	Magnolia Avenue	West and East	Residential	None	Local		Worn path	¼ mile	Grid
	Burnquist Street	Magnolia Avenue	Jessamine Avenue	West	Residential	None	Local		Worn path	¼ mile	Grid
Maryland Avenue	Rose Avenue East	Etna Street	Prosperity Avenue	North	Commercial	None	Local		No evidence	¼ mile	Grid
	Etna Street	Maryland Avenue	Ivy Avenue	West and East	Residential / Commercial	None	Local		No evidence	¼ mile / ½ mile	Grid
Larpenteur Avenue	Mcafee Street	Idaho Avenue	Larpenteur Avenue	West and East	Residential	None	Local	May require easement / ROW	No evidence	¼ mile	Grid
	Hoyt Avenue	Bruce Vento Regional Trail	Mcafee Street	Trail Connection	Residential	None	Local	May require easement / ROW	No evidence	½ mile	Grid
	Larpenteur Avenue	Birmingham Street	Dieter Street	North and South	Residential	None	Arterial	Vegetation; fences	No evidence	½ mile	Grid

Legend:

Higher Priority for Improvement

Lower Priority for Improvement

Closest Station	Improvement Location	From	To	Directional (Side of Roadway)	Adjacent Land Use	Barriers	Comfort	Constructability	Desire Lines	Proximity to the Planned Station	Street Pattern
Larpenteur Avenue / Frost Avenue	English Street	Larpenteur Avenue	Frisbie Avenue	West	Residential	None	Collector	May require easement / ROW	Worn path	¼ mile	Grid
	English Street	Arlington Avenue	Frost Avenue	East	Residential	None	Collector	May require easement / ROW	Worn path	¼ mile	Grid
	Clarence Street	Idaho Avenue	Skillman Avenue East	West and East	Residential	None	Collector		No evidence	¼ mile	Grid
	Ripley Avenue	English Street	Clarence Street	North and South	Residential	None	Local	Vegetation	No evidence	¼ mile	Grid
Frost Avenue	Skillman Avenue East	Bruce Vento Regional Trail	Clarence Street	South	Residential	None	Local		No evidence	¼ mile	
Highway 36	North Barclay Street	Gervais Avenue	Harvest Park	West and East	Residential / Park	None	Local		No evidence	¼ mile	
	Clarence Street	Trail Connection (No ROW)	Bruce Vento Regional Trail	Trail Connection	Residential	Vegetation	Local	Vegetation; may require easement / ROW	Gravel Path	¼ mile	
	Sextant Avenue East	Barclay Street North	Hazelwood Street	North and South	Residential	None	Local		No evidence	½ mile	
Maplewood Mall Transit Center	Mesabi Avenue	Southlawn Drive	White Bear Avenue	North, South and East	Residential / Commercial	None	Local	Vegetation; fences	No evidence	½ mile	
	Southlawn Drive	Mesabi Avenue	Beam Avenue	West and East	Residential / Commercial	None	Local	Vegetation	No evidence	Direct connection	
	Radatz Avenue	Southlawn Drive	White Bear Avenue	North and South	Residential	None	Local		No evidence	¼ mile	
	Beam Avenue	Southlawn Drive	White Bear Avenue	South	Commercial	None	Arterial		No evidence	Direct connection	
Maplewood Mall Transit Center / St. John's Boulevard	Kennard Street	Kennard Street	Beam Avenue	Diagonal West	Commercial	None	Local		No evidence	½ mile	
	Kennard Street	Kennard Street	North Hazelwood Park	East	Park	None	Local		No evidence	½ mile	
St. John's Boulevard	Saint John's Boulevard	Parking Lot Driveways	Kennard Street	North and South	Commercial / Hospital	None	Local		No evidence	Direct connection	
Buerkle Road	Buerkle Road	Highway 61 North	Fanum Road	North and South	Commercial	None	Local	Fences	No evidence	Direct connection	
County Road East	County Road East	International Drive	Highway 61 North	North	Commercial	None	Arterial		No evidence	Direct connection	
	County Road East	Highway 61 North	Scheuneman Road	South	Commercial	None	Arterial		No evidence	Direct connection	

Legend:

Higher Priority for Improvement

Lower Priority for Improvement

Closest Station	Improvement Location	From	To	Directional (Side of Roadway)	Adjacent Land Use	Barriers	Comfort	Constructability	Desire Lines	Proximity to the Planned Station	Street Pattern
Cedar Avenue	Linden Street	Cedar Avenue	Birch Street	West and East	Residential / Park / Commercial	None	Local		No evidence	¼ mile	
Whitaker Street	2nd Avenue	Hinckley Street	Highway 96 East	West and East	Residential	None	Local	No curb / gutter; limited ROW	No evidence	¼ mile	Grid
	Lake Avenue South	White Bear Avenue	Old White Bear Avenue North	West	Commercial	None	Local		No evidence	¼ mile	Grid
	Whitaker Street	Whitaker Court	Lincoln Avenue	North and South	Residential	None	Local	No curb / gutter; limited ROW	No evidence	Direct connection	Grid
	Whitaker Street	Highway 61 East	Lake Avenue South	North and South	Commercial	None	Local		No evidence	Direct connection	Grid
	Hinckley Street	Hinckley Street (Dead End)	Lincoln Avenue	North and South	Residential	None	Local	No curb / gutter; limited ROW	No evidence	¼ mile	Grid
	Park Street	Park Street (Dead End)	Lincoln Avenue	North and South	Residential	None	Local	No curb/gutter; limited ROW	No evidence	¼ mile	Grid
	Clarence Street	Clarence Street (Dead End)	Lincoln Avenue	North and South	Residential	None	Local	No curb / gutter; limited ROW	No evidence	¼ mile	Grid
Downtown White Bear Lake	Bloom Avenue	5th Street	8th Street	East	Residential / Recreation Center / School	None	Local		No evidence	¼ mile	Grid
	Long Avenue	8th Street	White Bear Center for the Arts	West and East	Commercial / White Bear Center for the Arts	None	Local		No evidence	¼ mile	Grid
	5th Street	Cook Avenue	Lake Avenue	South	Residential	None	Local		No evidence	¼ mile	Grid
	6th Street	Bloom Avenue	Division Avenue	North and South	Residential	None	Local		No evidence	¼ mile	Grid
	7th Street	Washington Avenue	Highway 61 North	South	Residential / Commercial	None	Local	Railroad crossing	No evidence	Direct connection	Grid
	7th Street	Highway 61 North	Cook Avenue	North	Residential	None	Local		No evidence	Direct connection	Grid
	8th Street	Bloom Avenue	Washington Avenue	South	Residential	None	Local		No evidence	¼ mile / ½ mile	Grid
	8th Street	Highway 61 North	Lake Avenue	South	Residential	None	Local		No evidence	¼ mile / ½ mile	Grid
	8th Street	Cook Avenue	Lake Avenue	North	Residential	None	Local		No evidence	¼ mile / ½ mile	Grid
	10th Street	Highway 61 North	Stewart Avenue	North and South	Residential	None	Local		No evidence	¼ mile	Grid

Legend:

Higher Priority for Improvement

Lower Priority for Improvement

ATTACHMENT 3

RUSH LINE BRT PLANNED STATION EXISTING AND IMPROVED BIKESHEDS AND BICYCLE LEVEL OF TRAFFIC STRESS

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: 14th Street

Rush Line BRT

Key

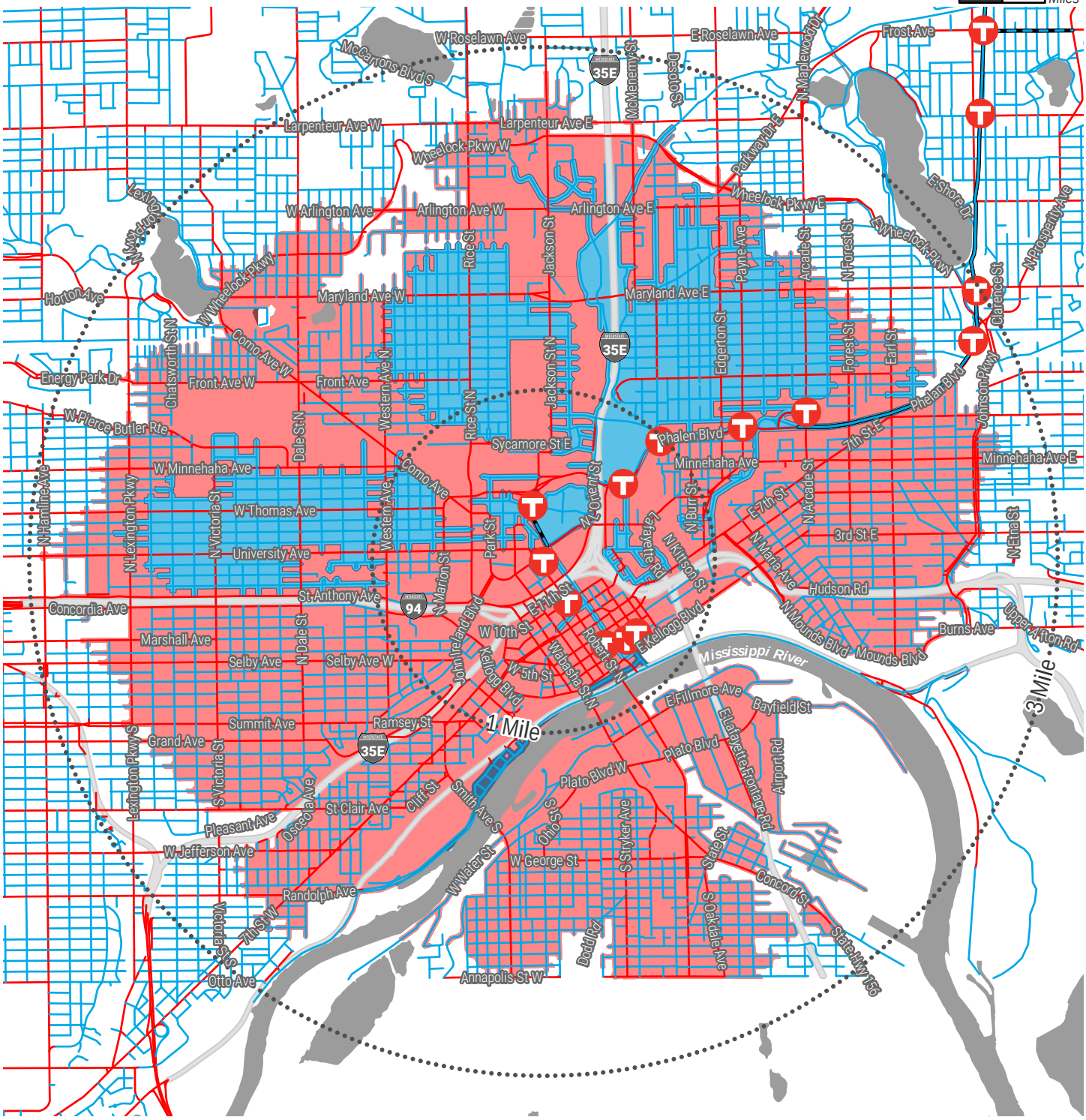
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: 14th Street

Rush Line BRT

Key

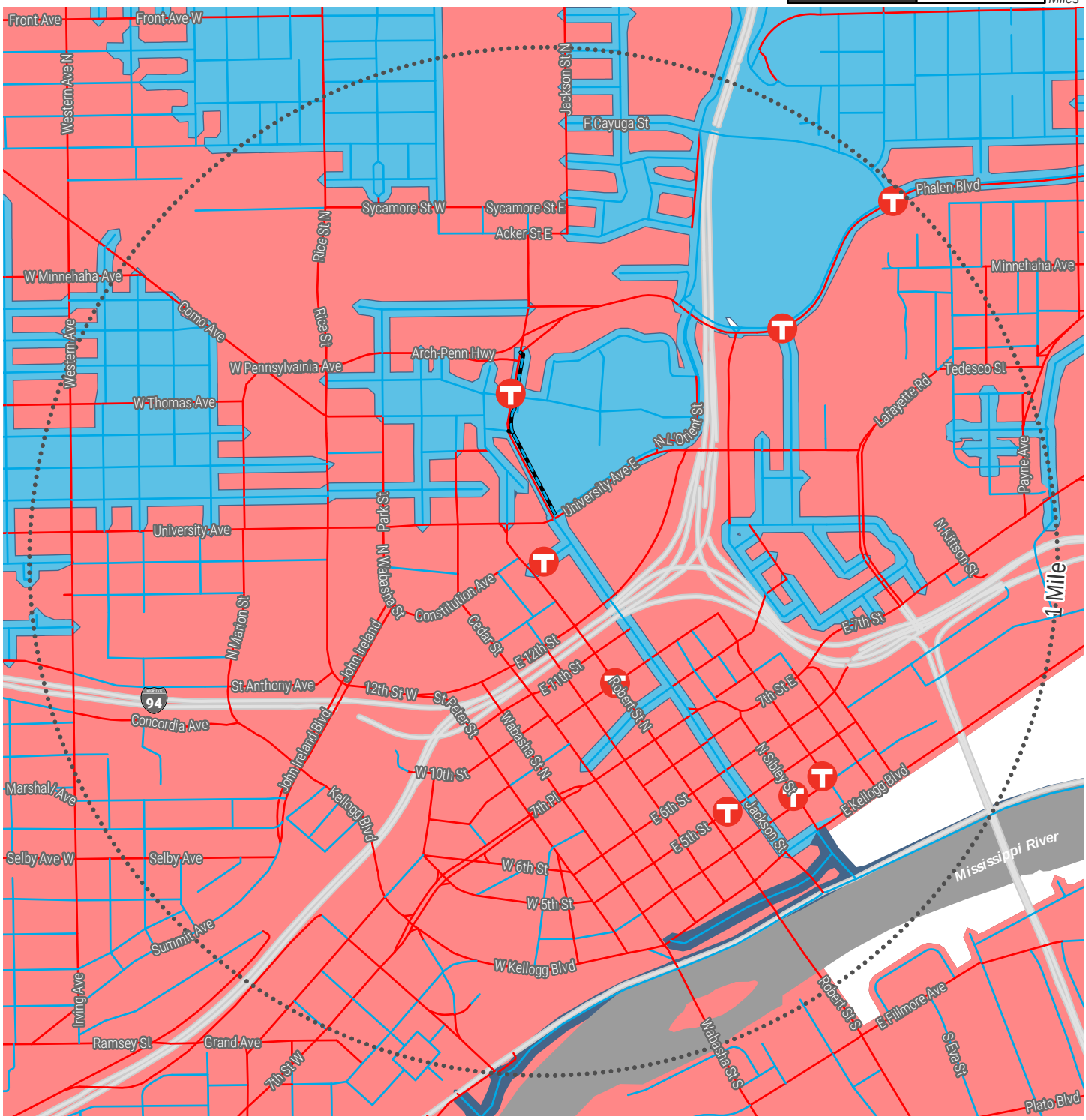
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Mt. Airy

Rush Line BRT

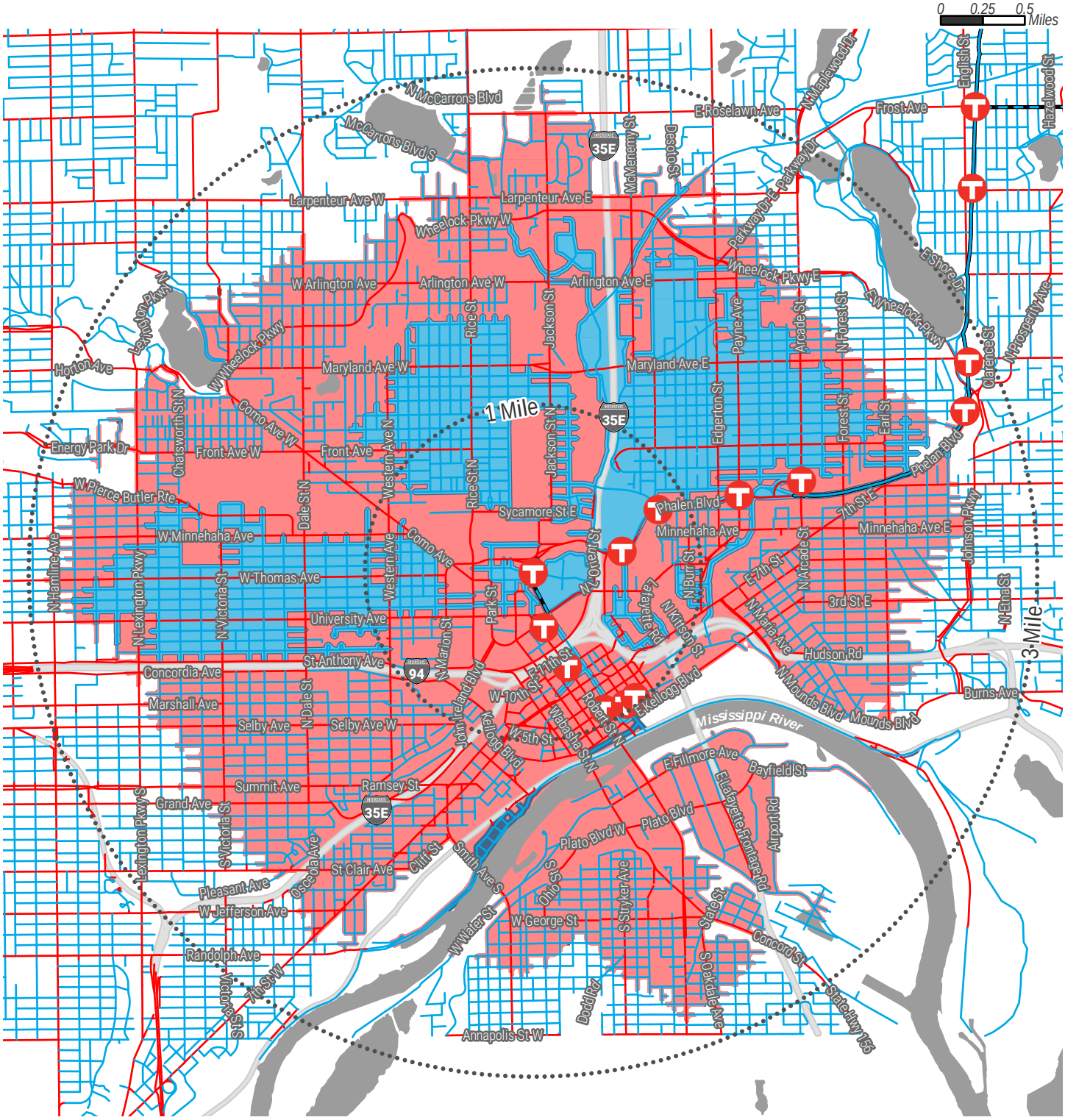
Key

- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Mt. Airy

Rush Line BRT

Key

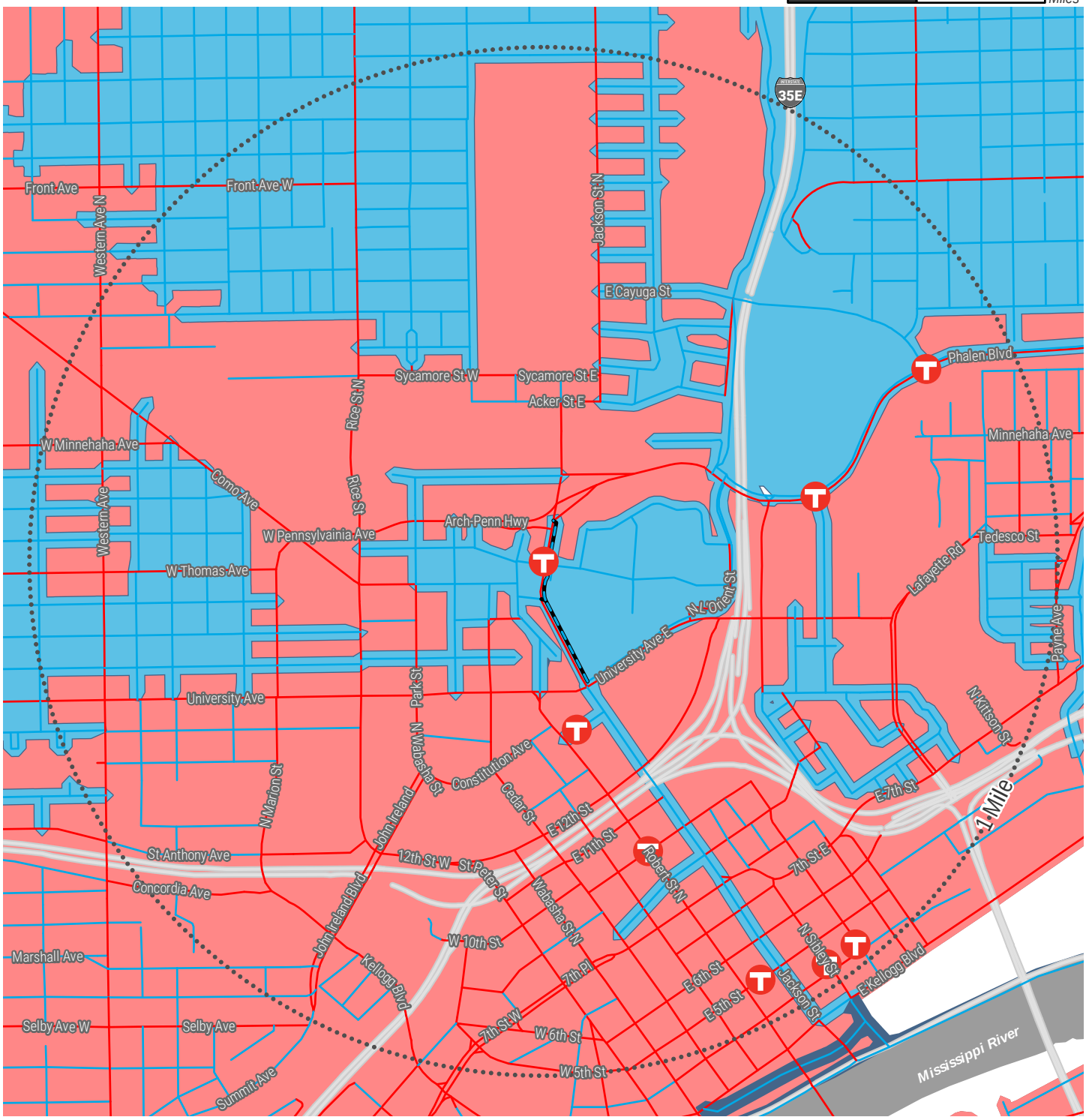
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Olive Street

Rush Line BRT

Key

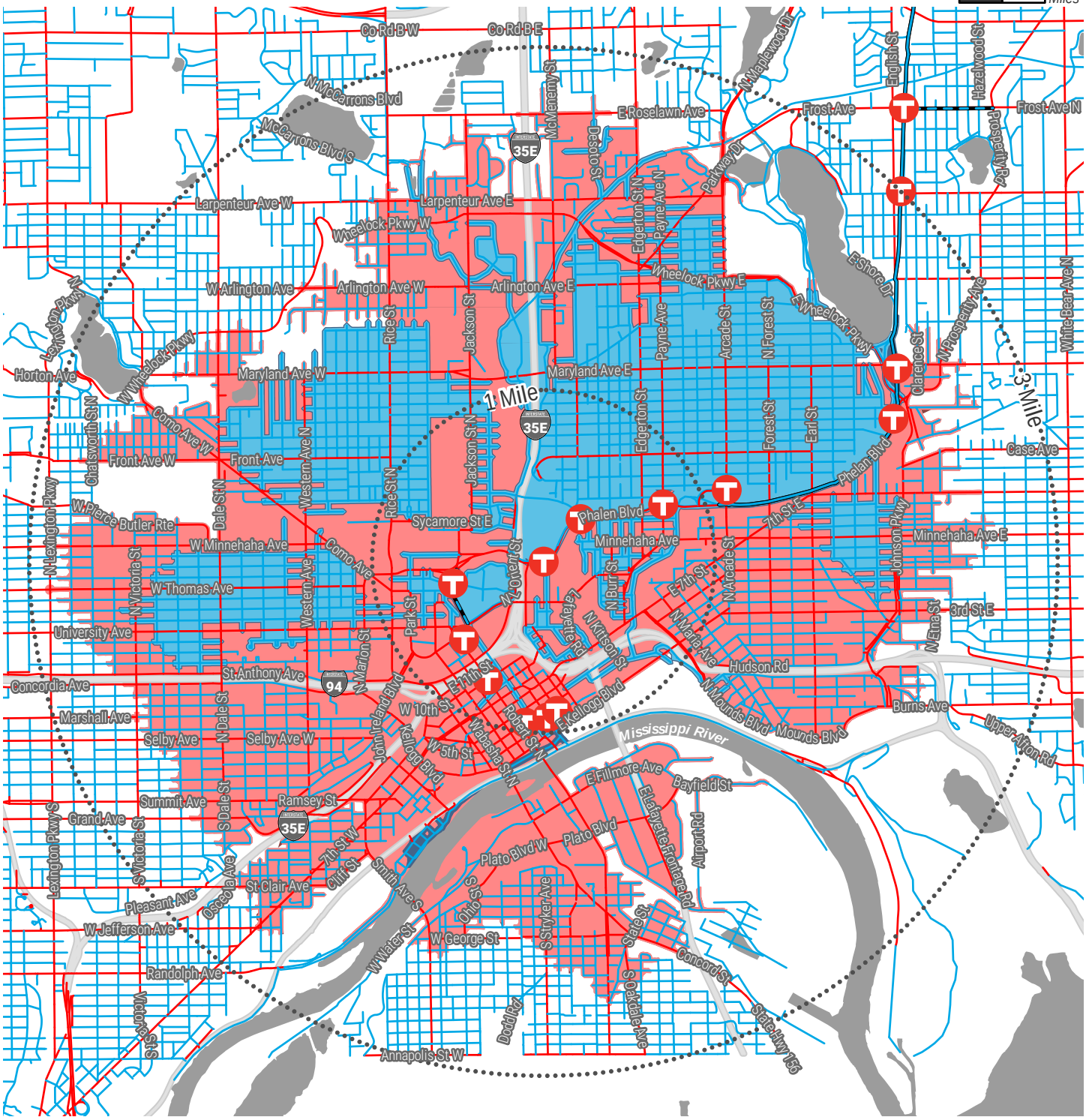
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Olive Street

Rush Line BRT

Key

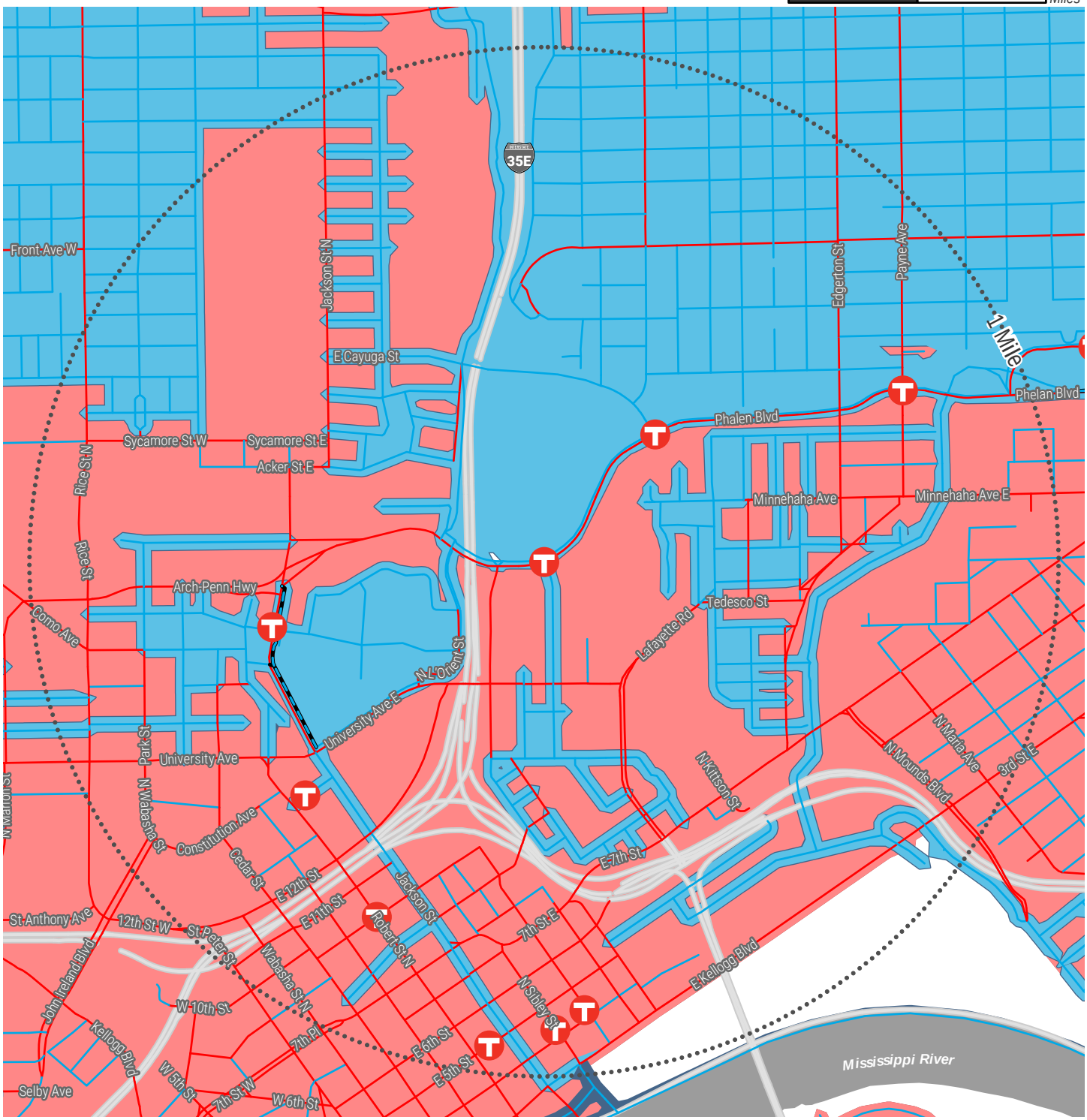
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Cayuga Street

Rush Line BRT

Key

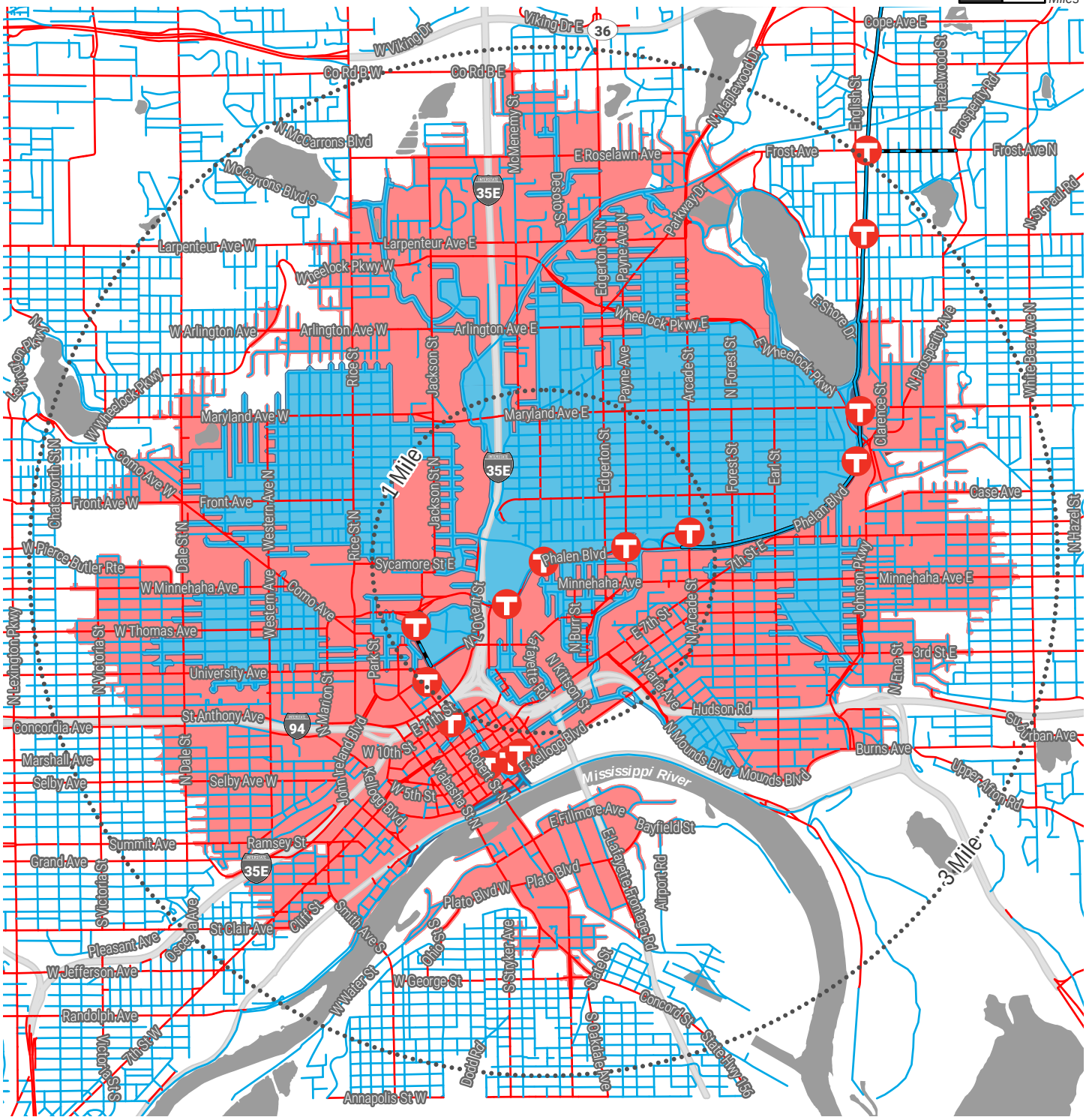
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Cayuga Street

Rush Line BRT

Key

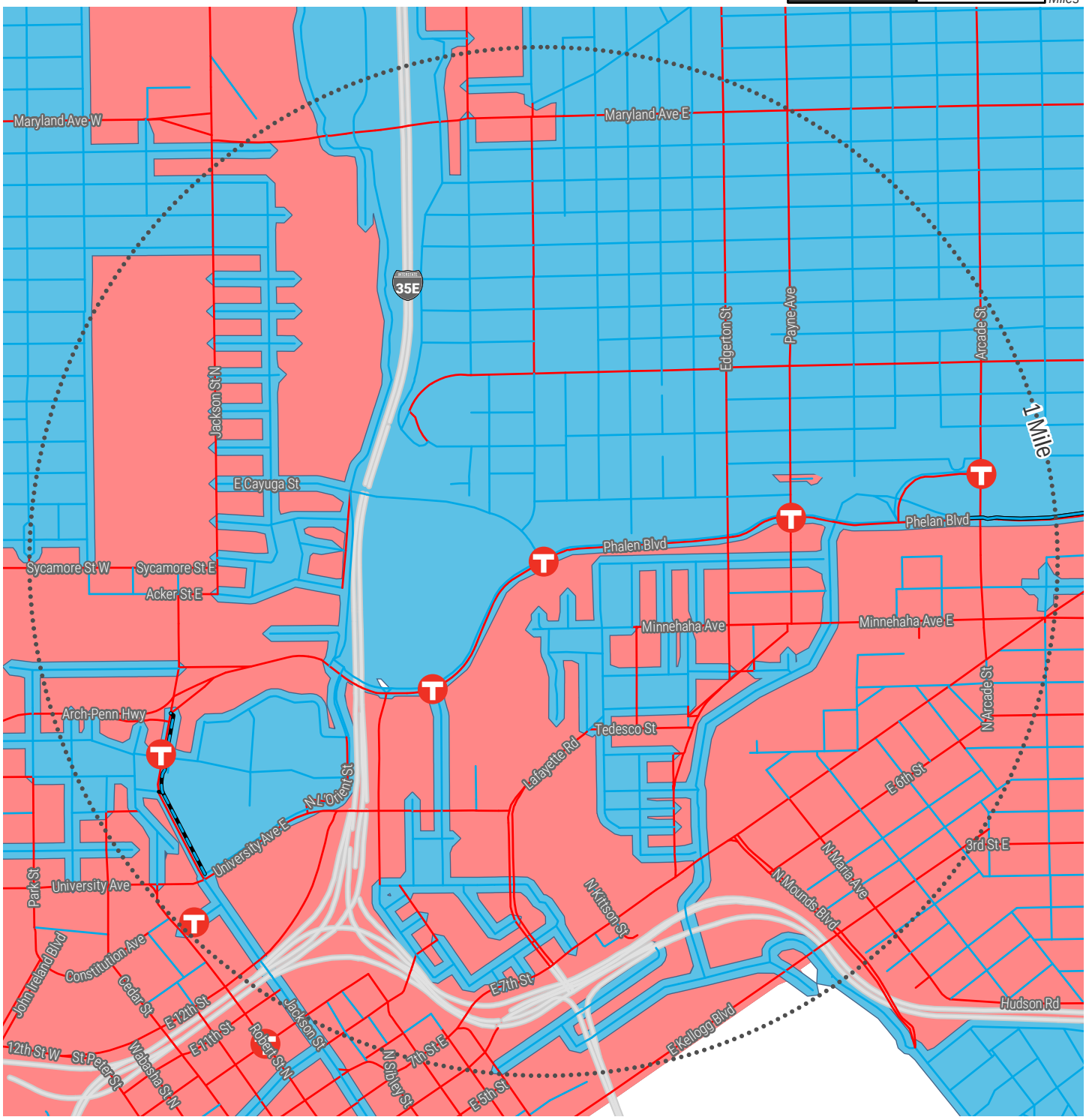
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Payne Avenue

Rush Line BRT

Key

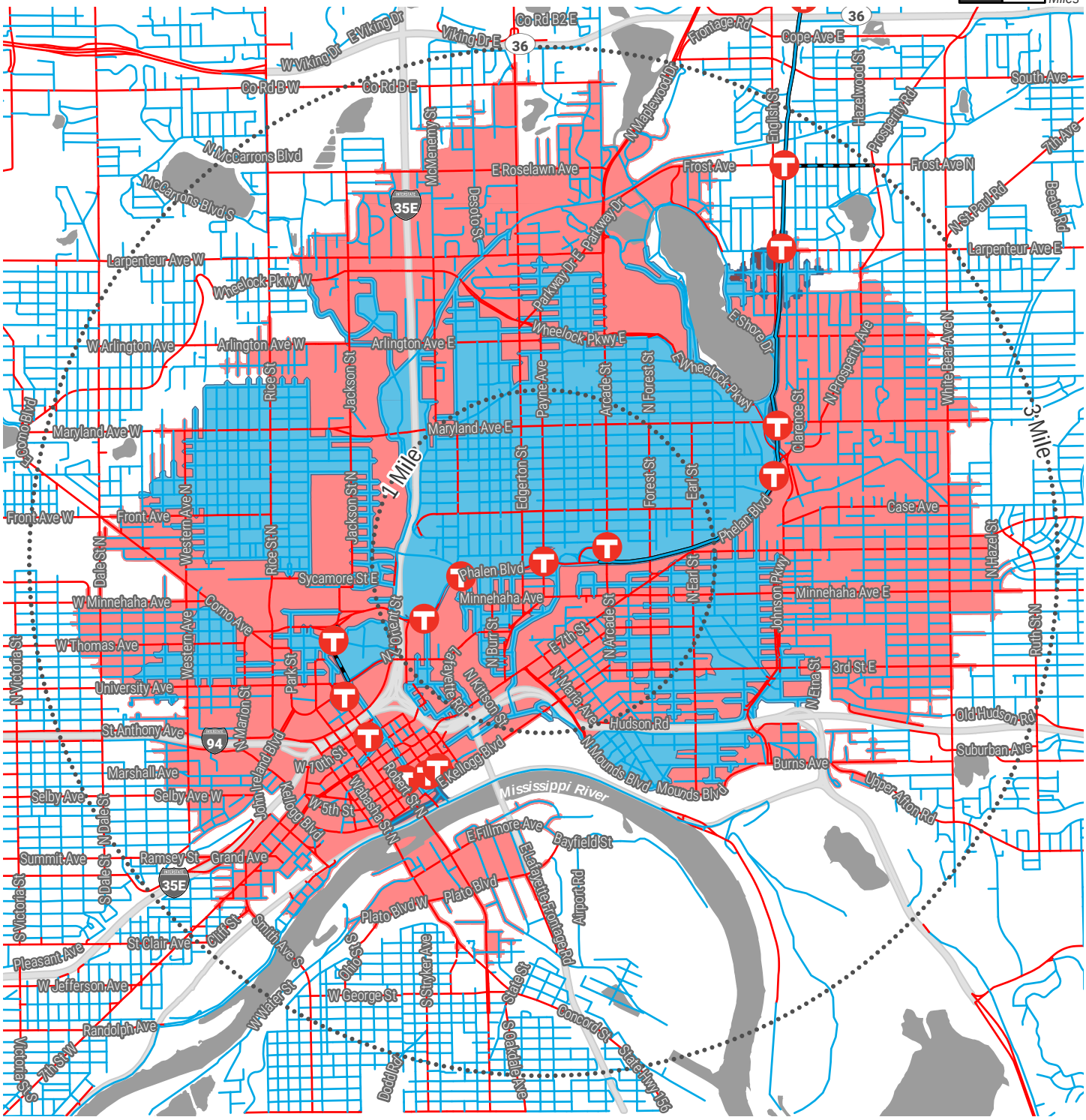
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Payne Avenue

Rush Line BRT

Key

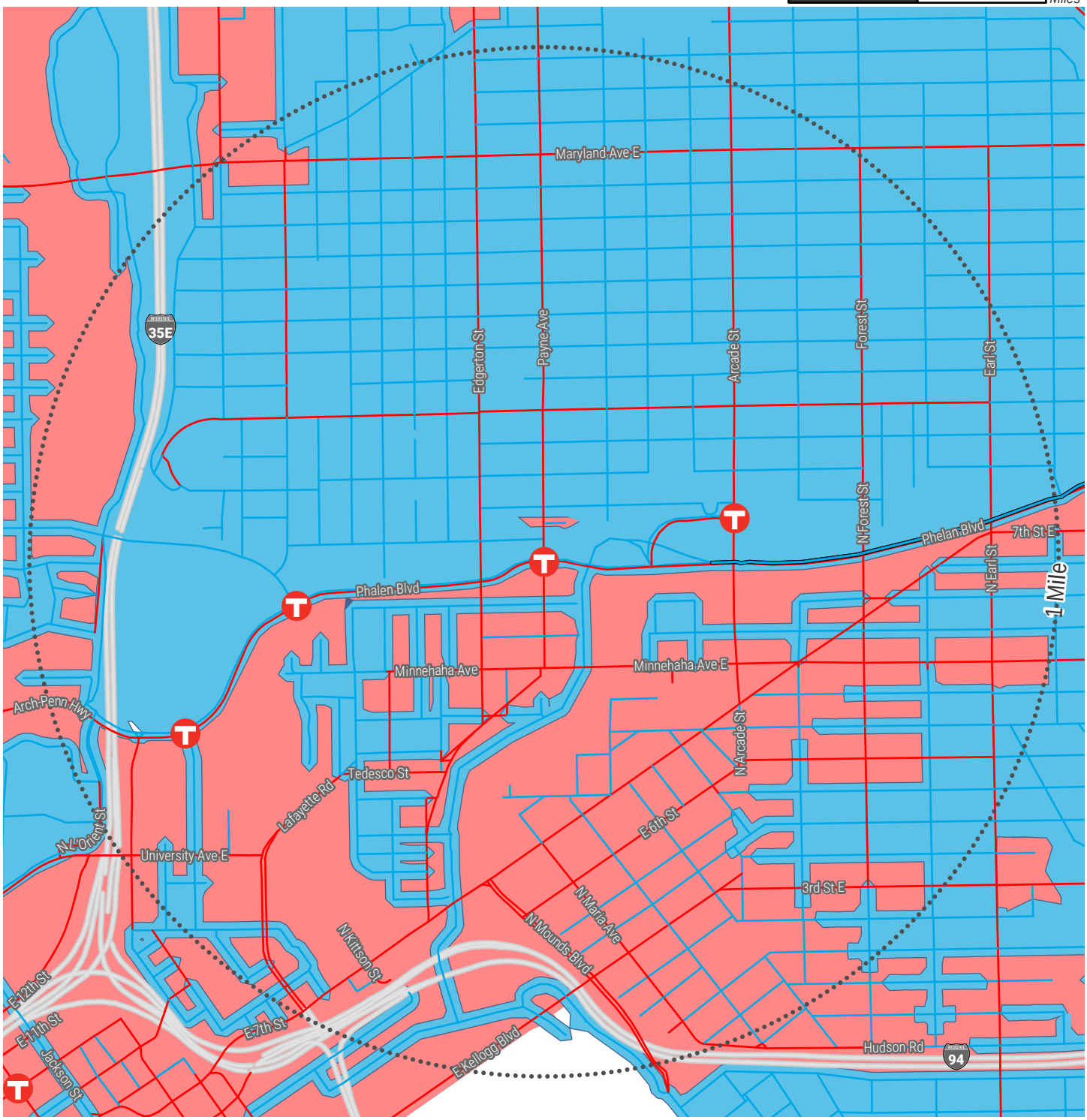
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Arcade Street

Rush Line

B R T

Key

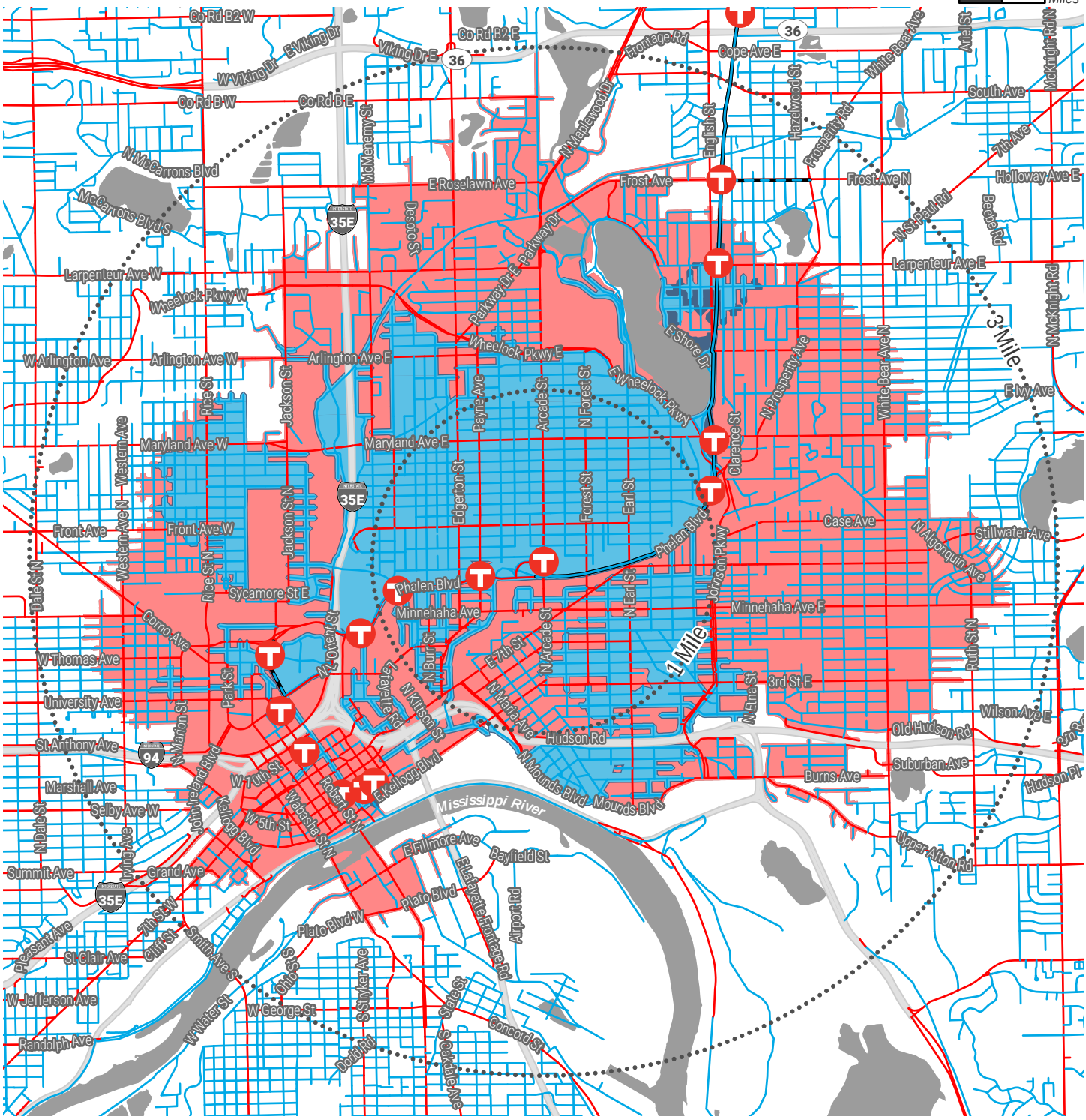
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Arcade Street

Rush Line BRT

Key

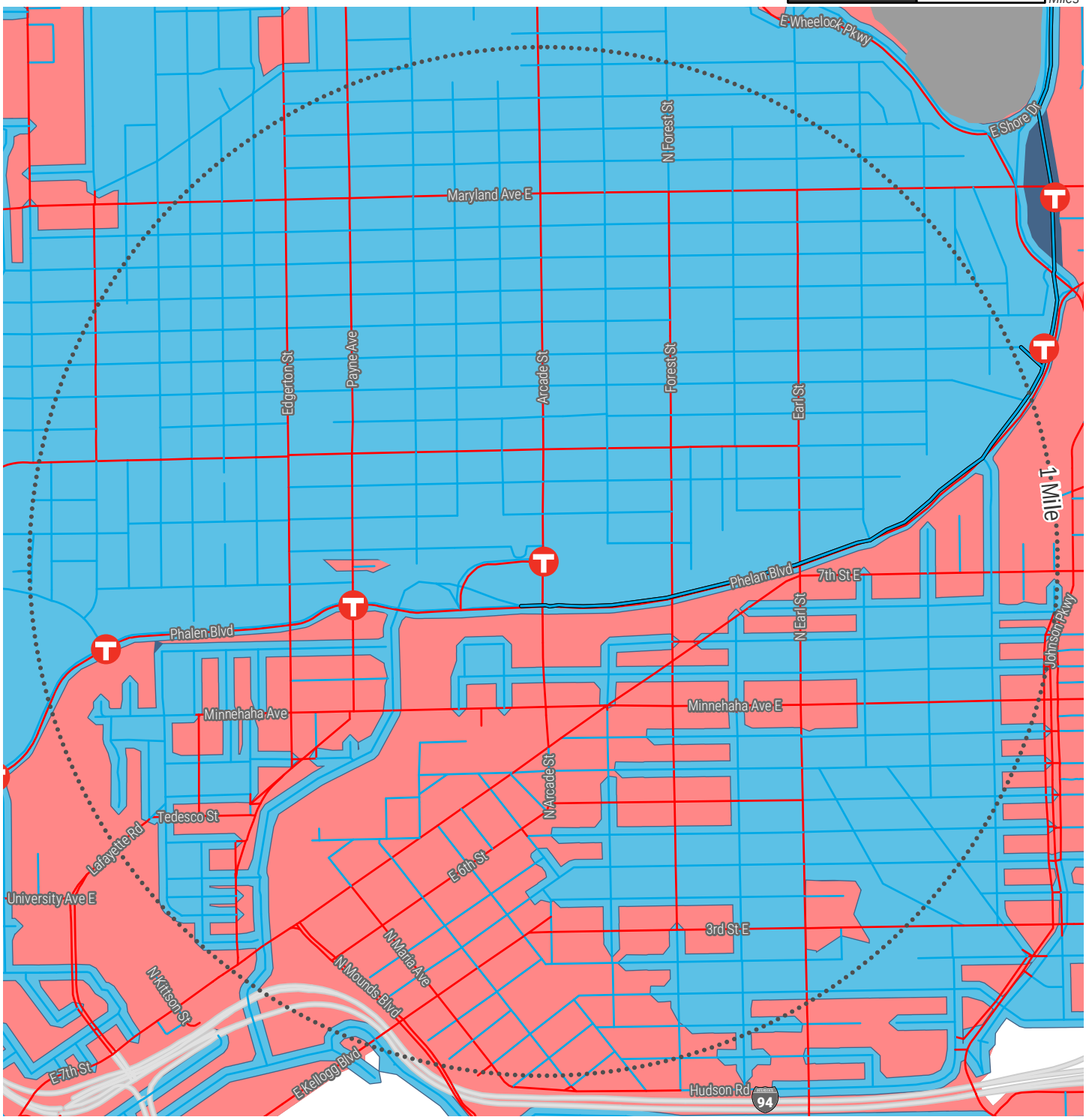
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Cook Avenue

Rush Line BRT

Key

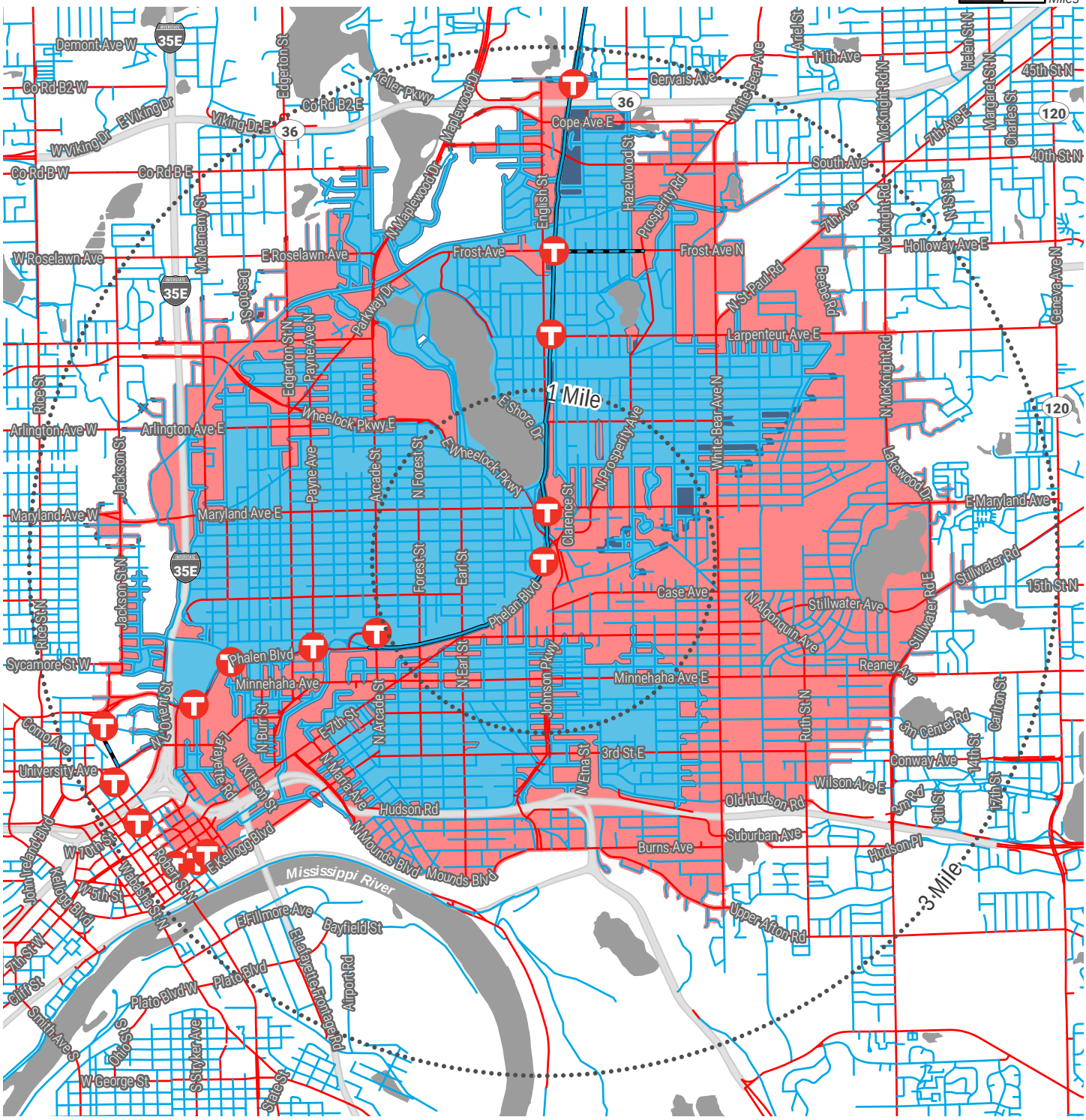
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Cook Avenue

Rush Line BRT

Key

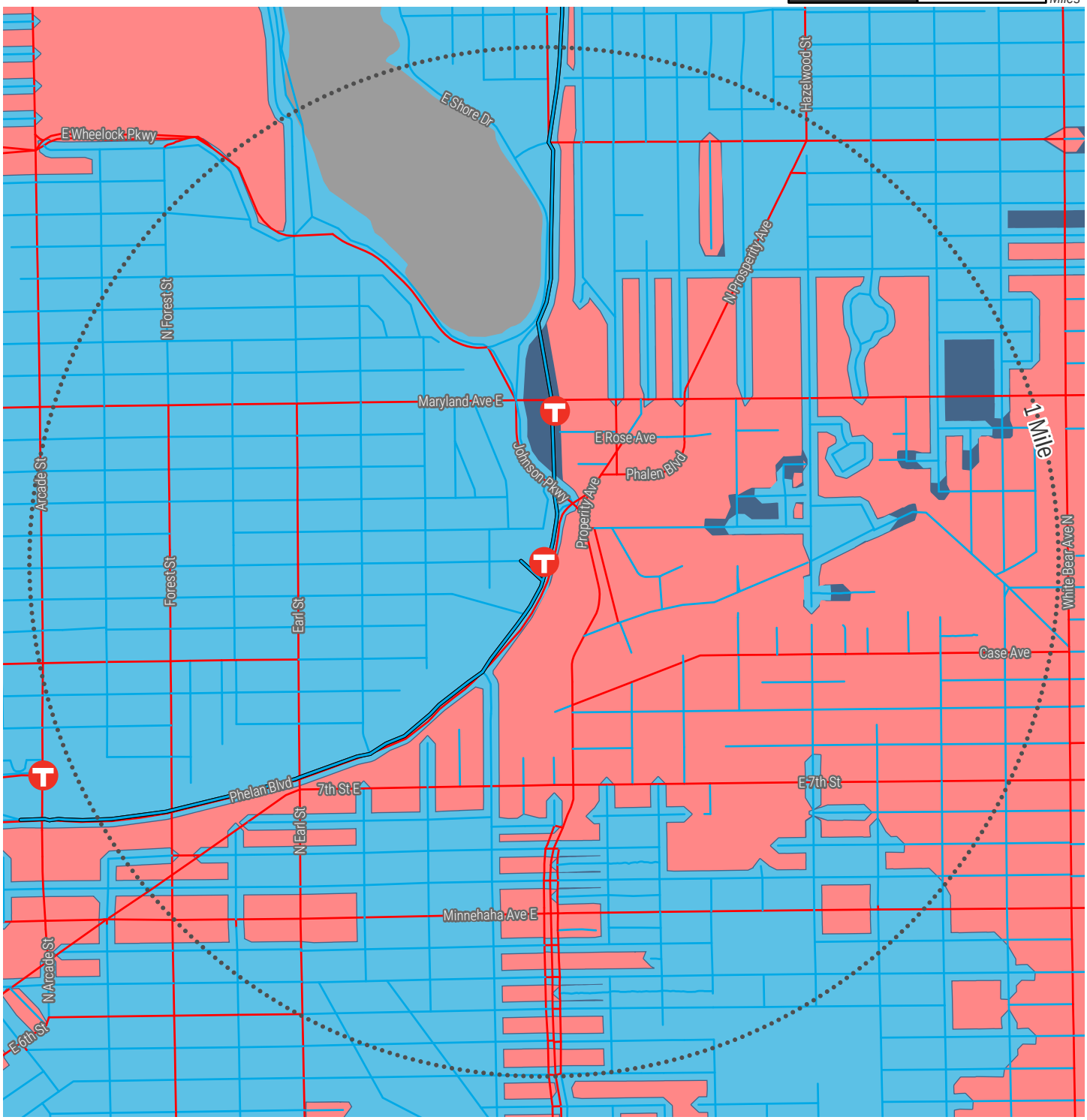
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Maryland Avenue

Rush Line BRT

Key

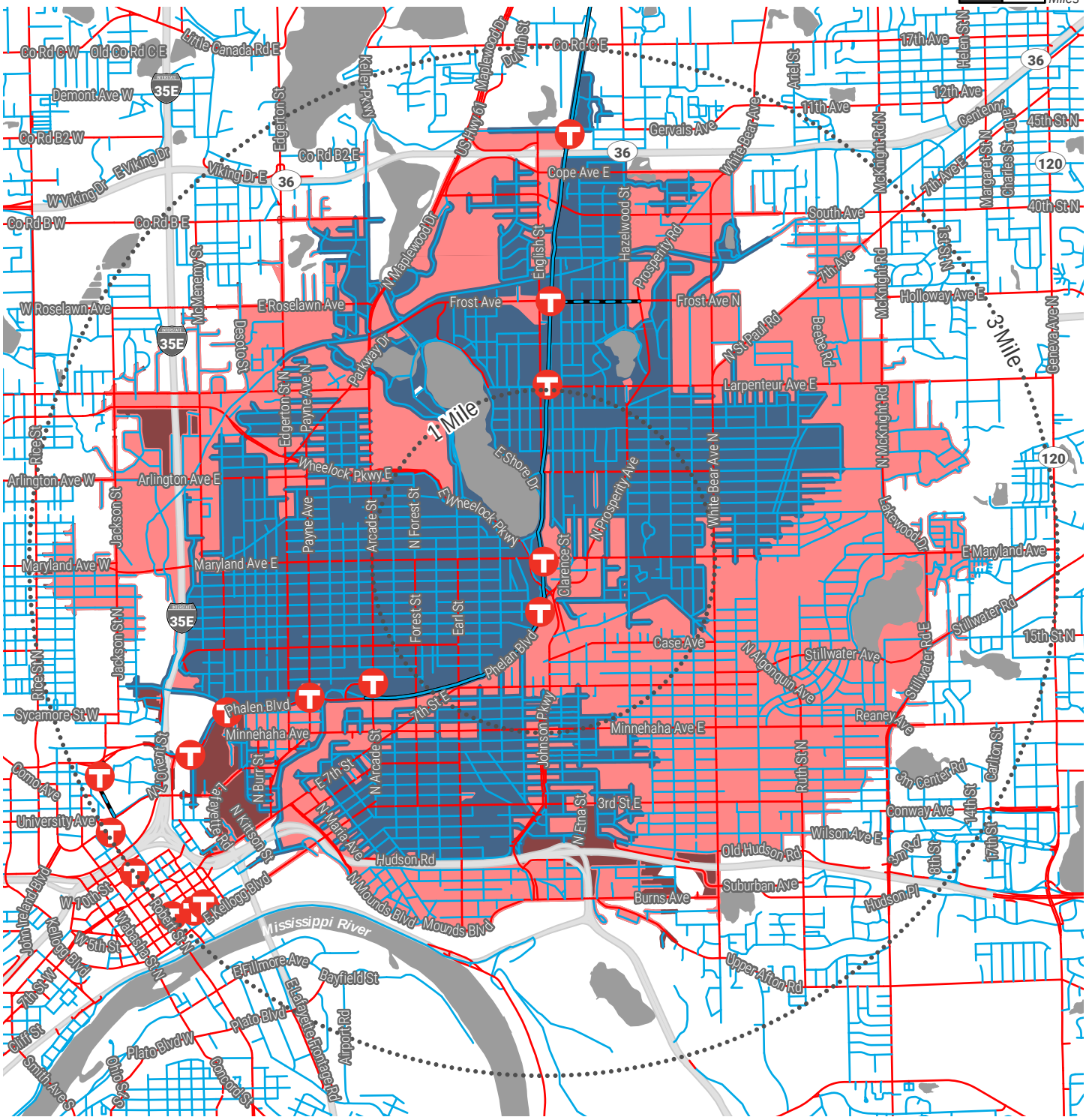
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Maryland Avenue

Rush Line BRT

Key

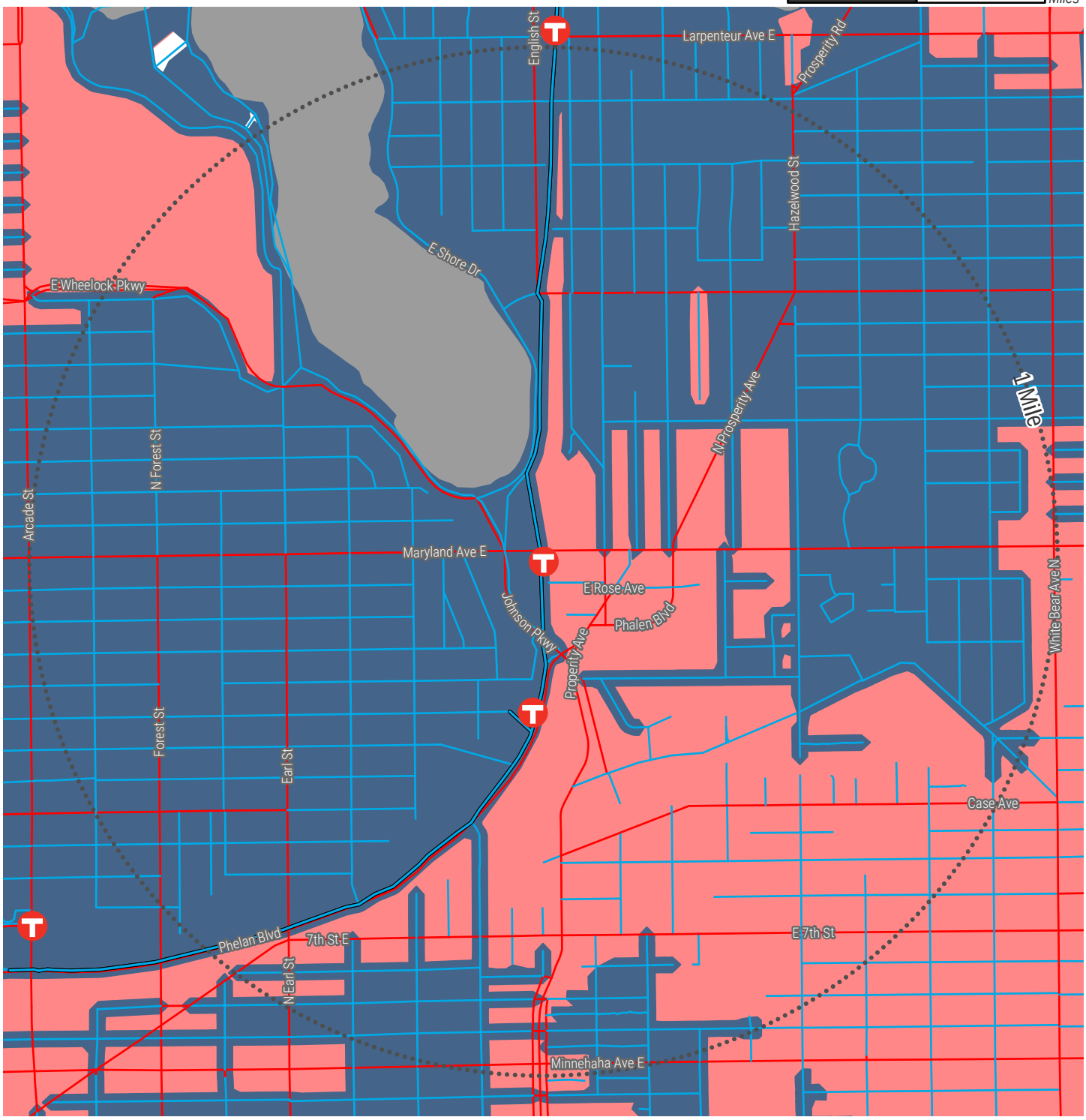
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Larpenteur Avenue

Rush Line BRT

Key

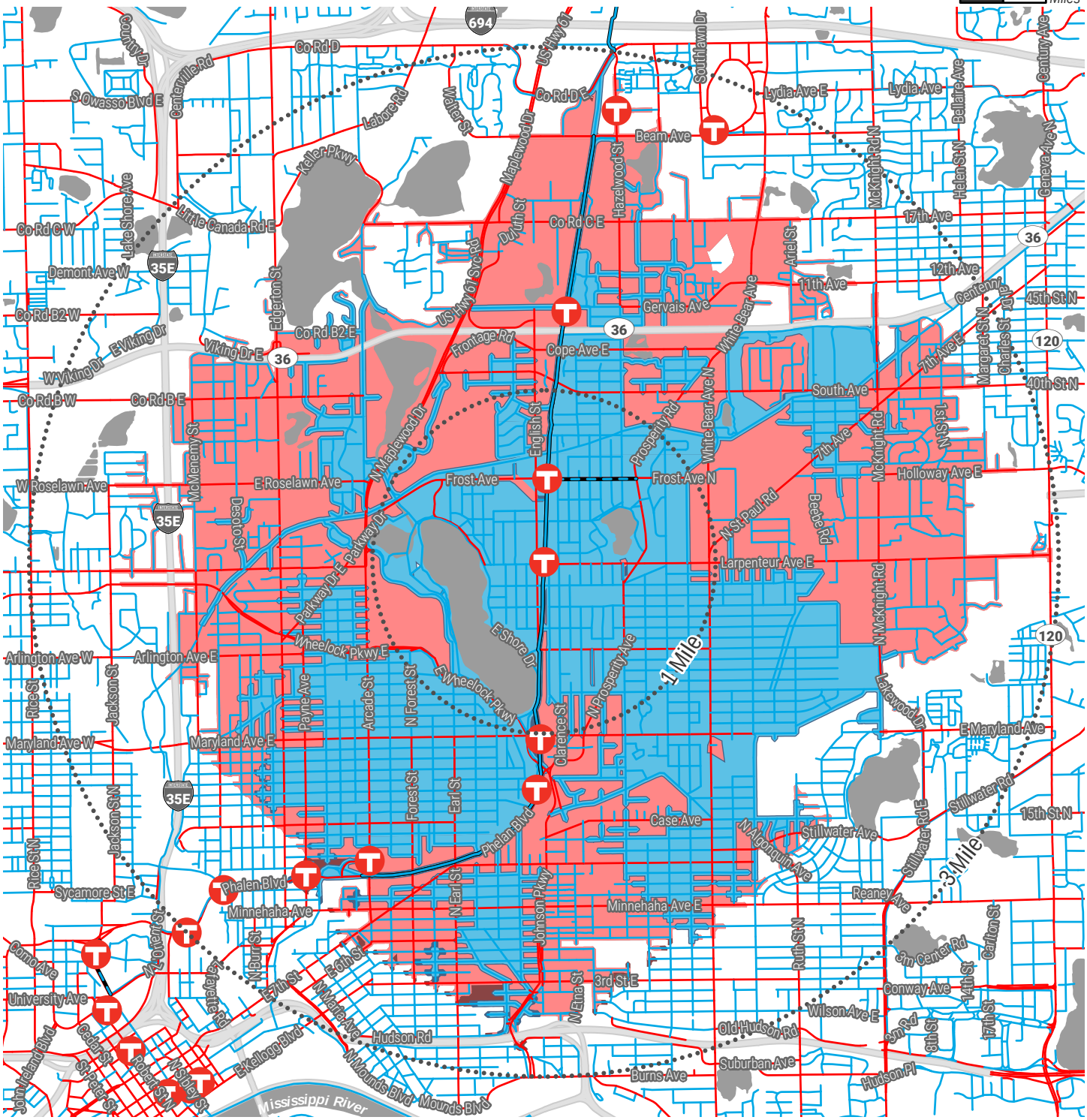
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Larpenteur Avenue

Rush Line

B R T

Key

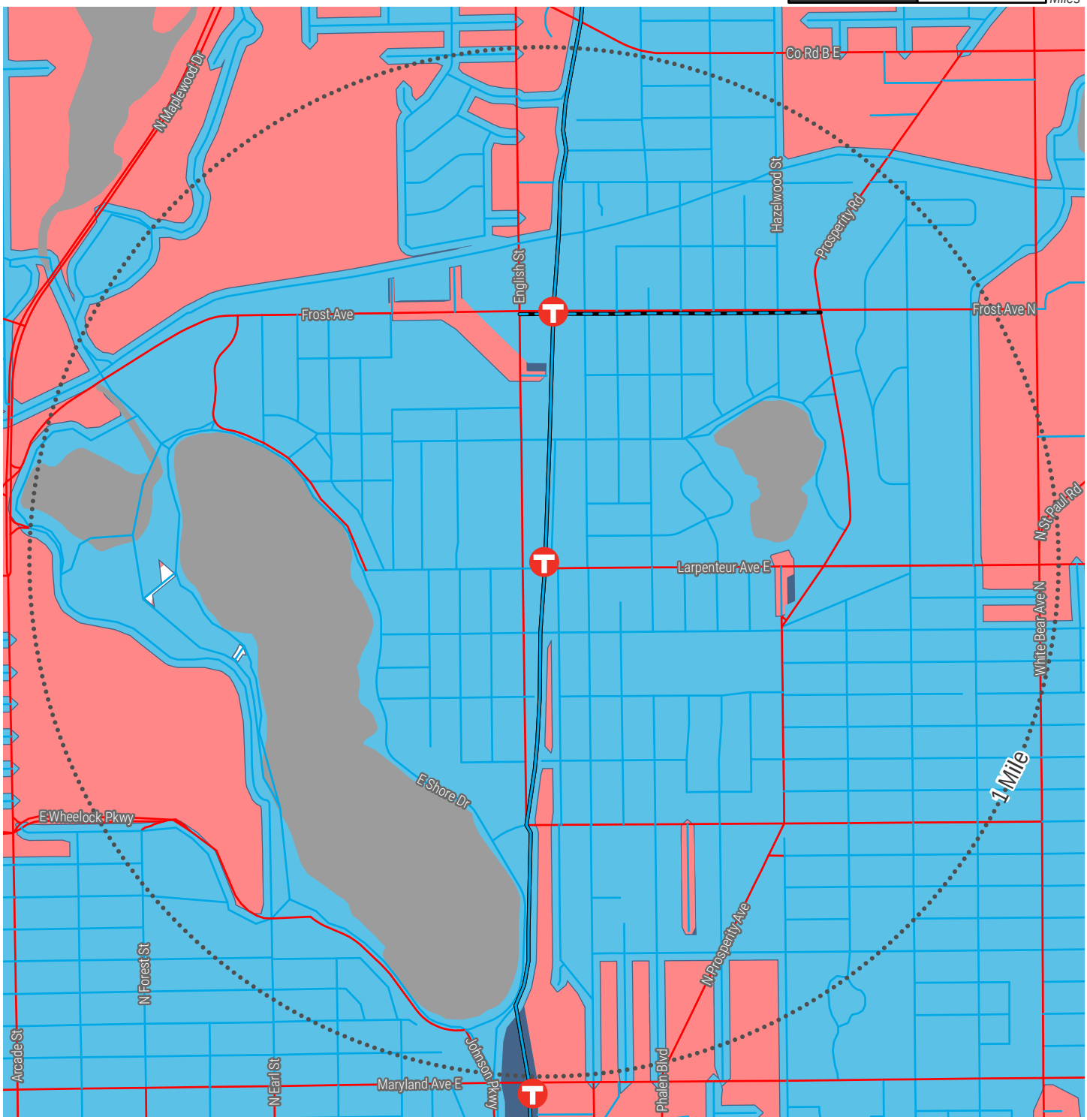
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Frost Avenue

Rush Line BRT

Key

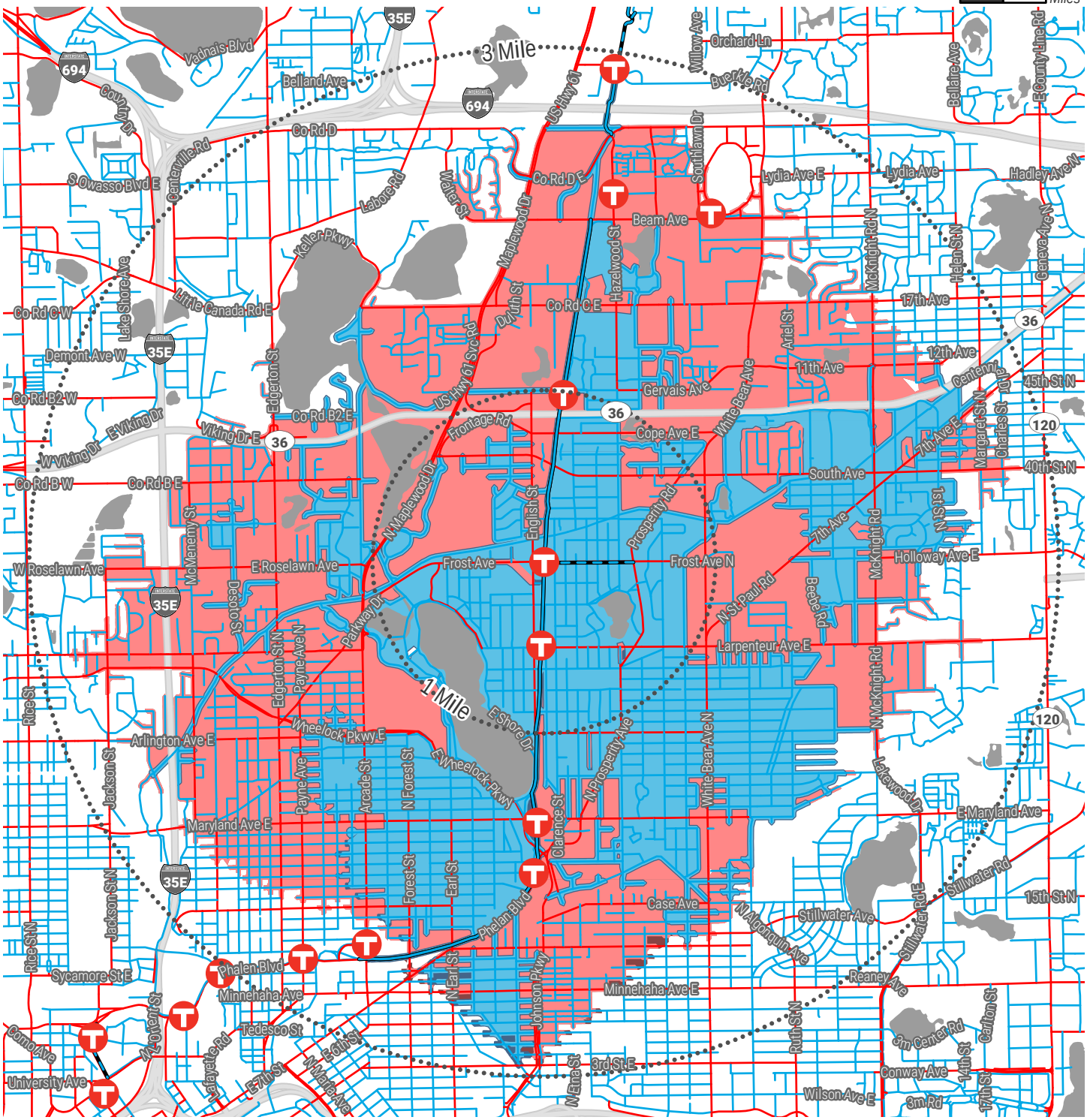
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Frost Avenue

Rush Line BRT

Key

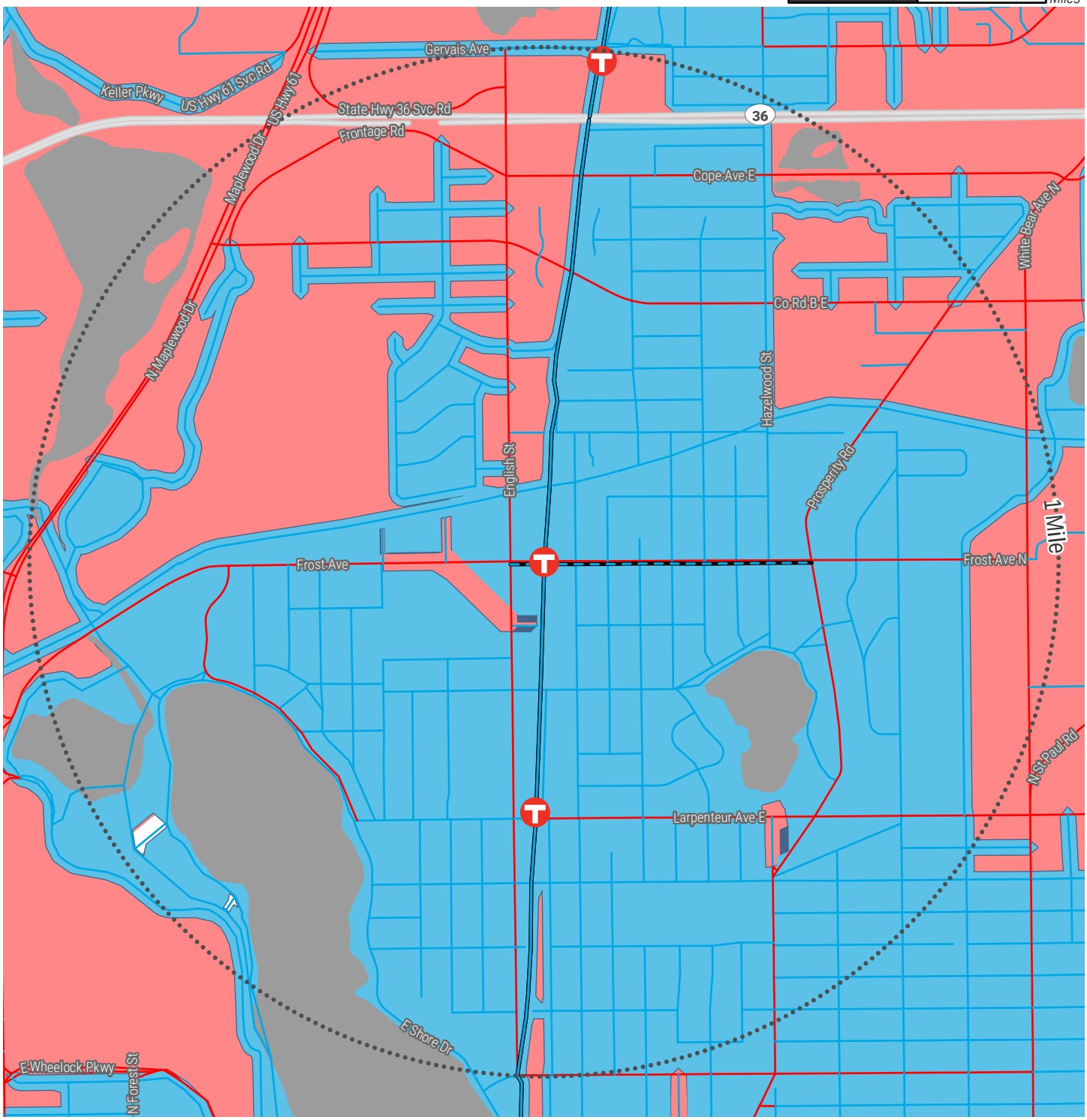
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Highway 36

Rush Line BRT

Key

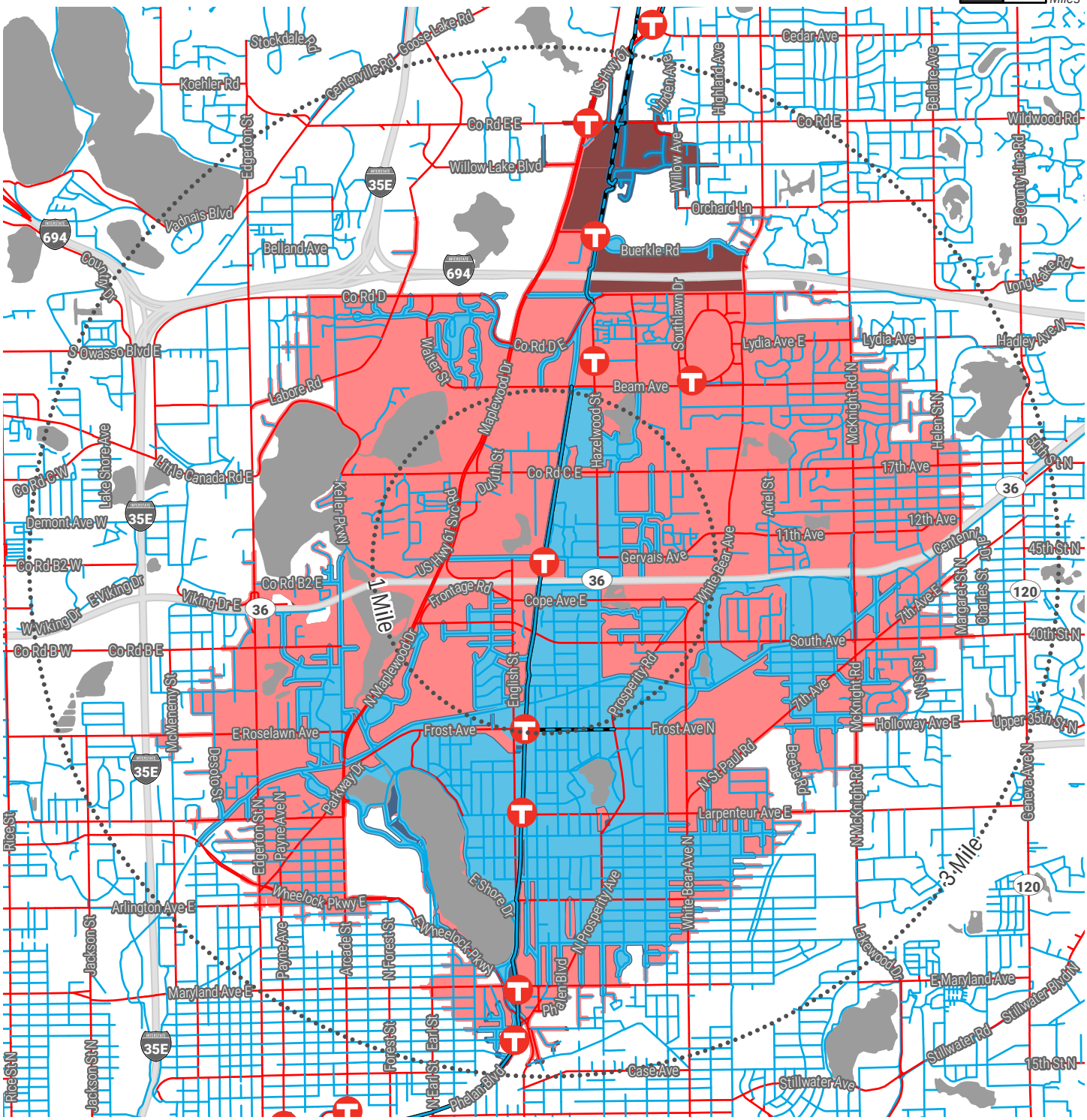
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Highway 36

Rush Line BRT

Key

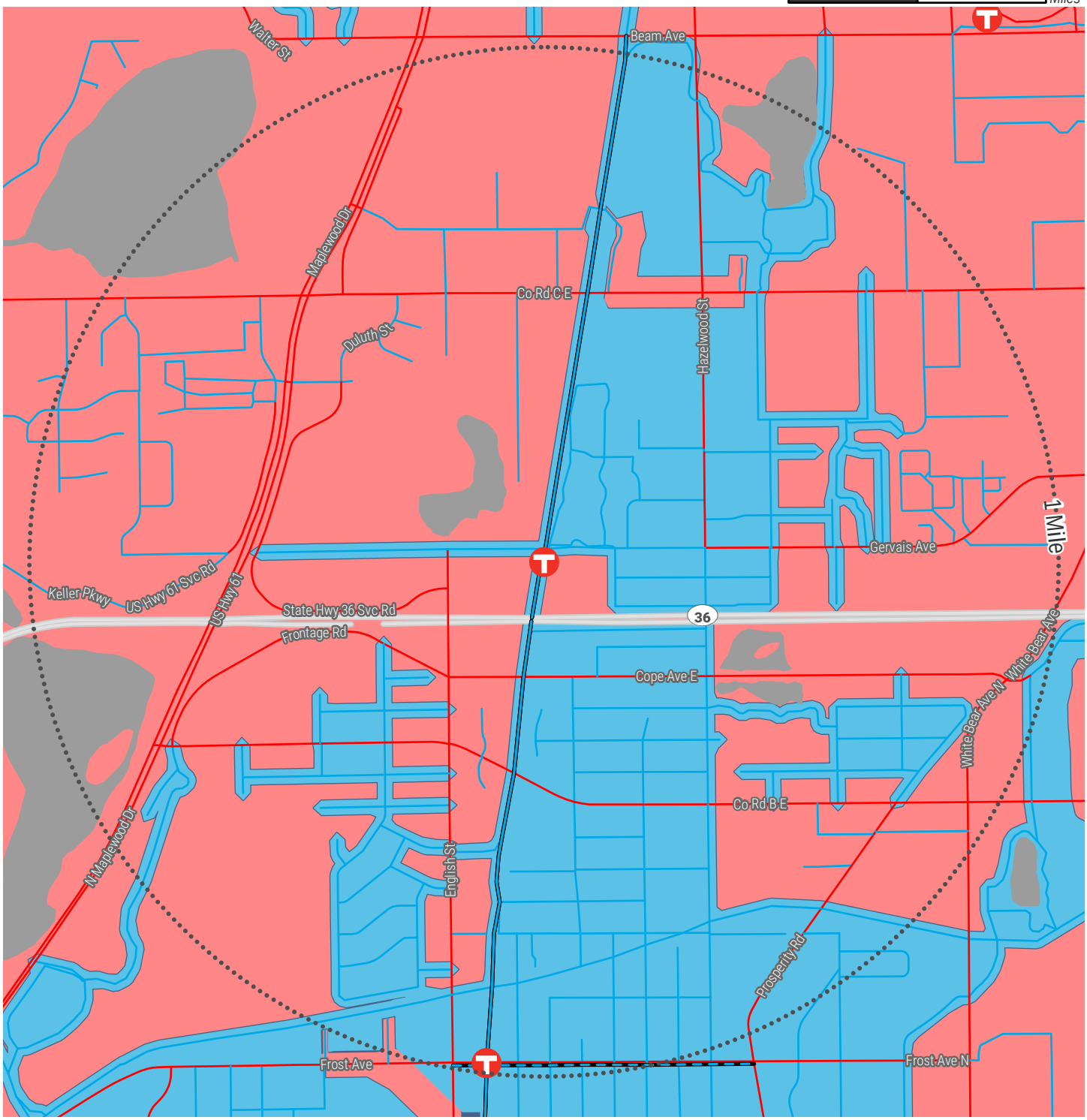
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Maplewood Mall Transit Center

Rush Line BRT

Key

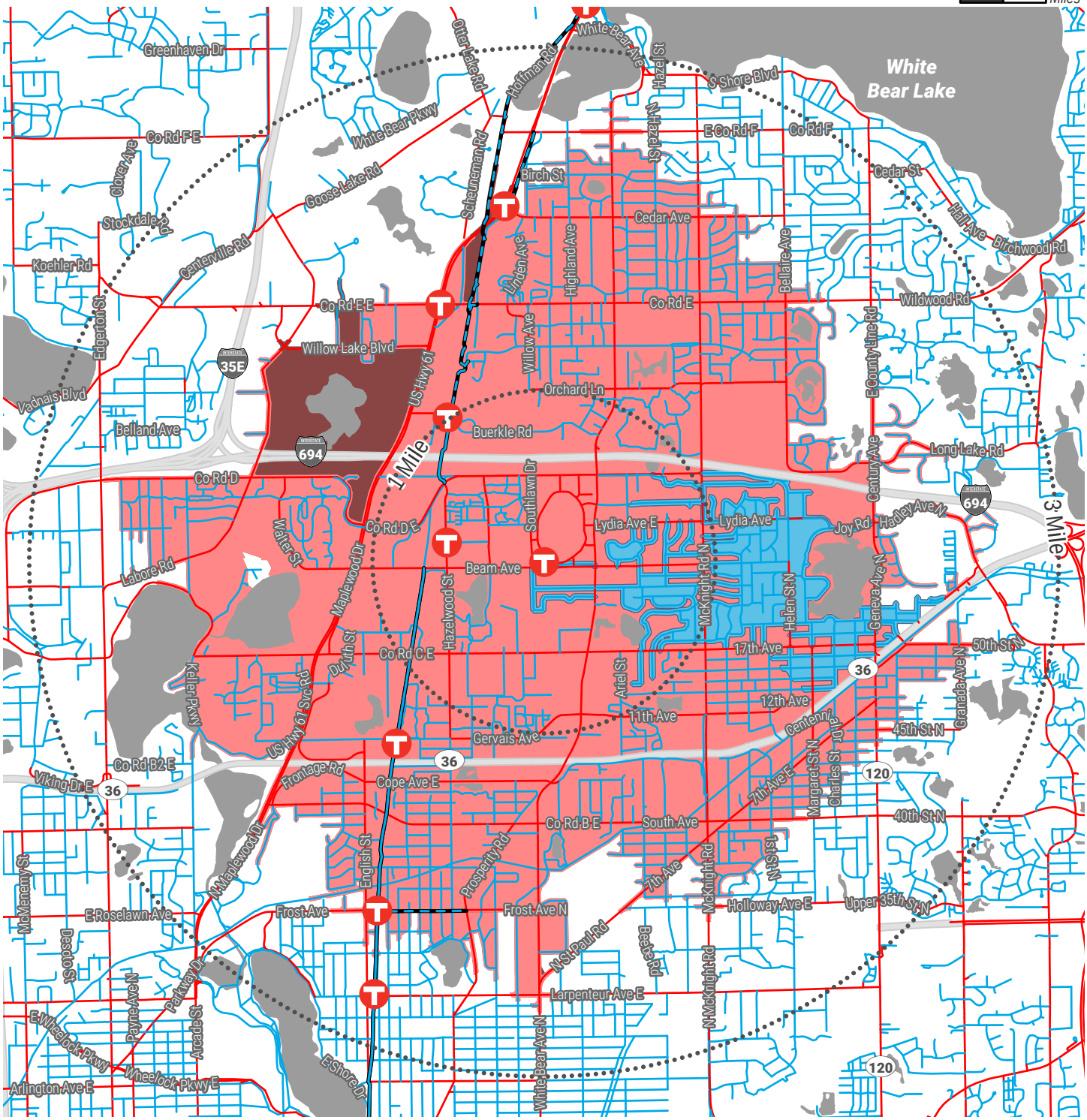
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Maplewood Mall Transit Center

Rush Line BRT

Key

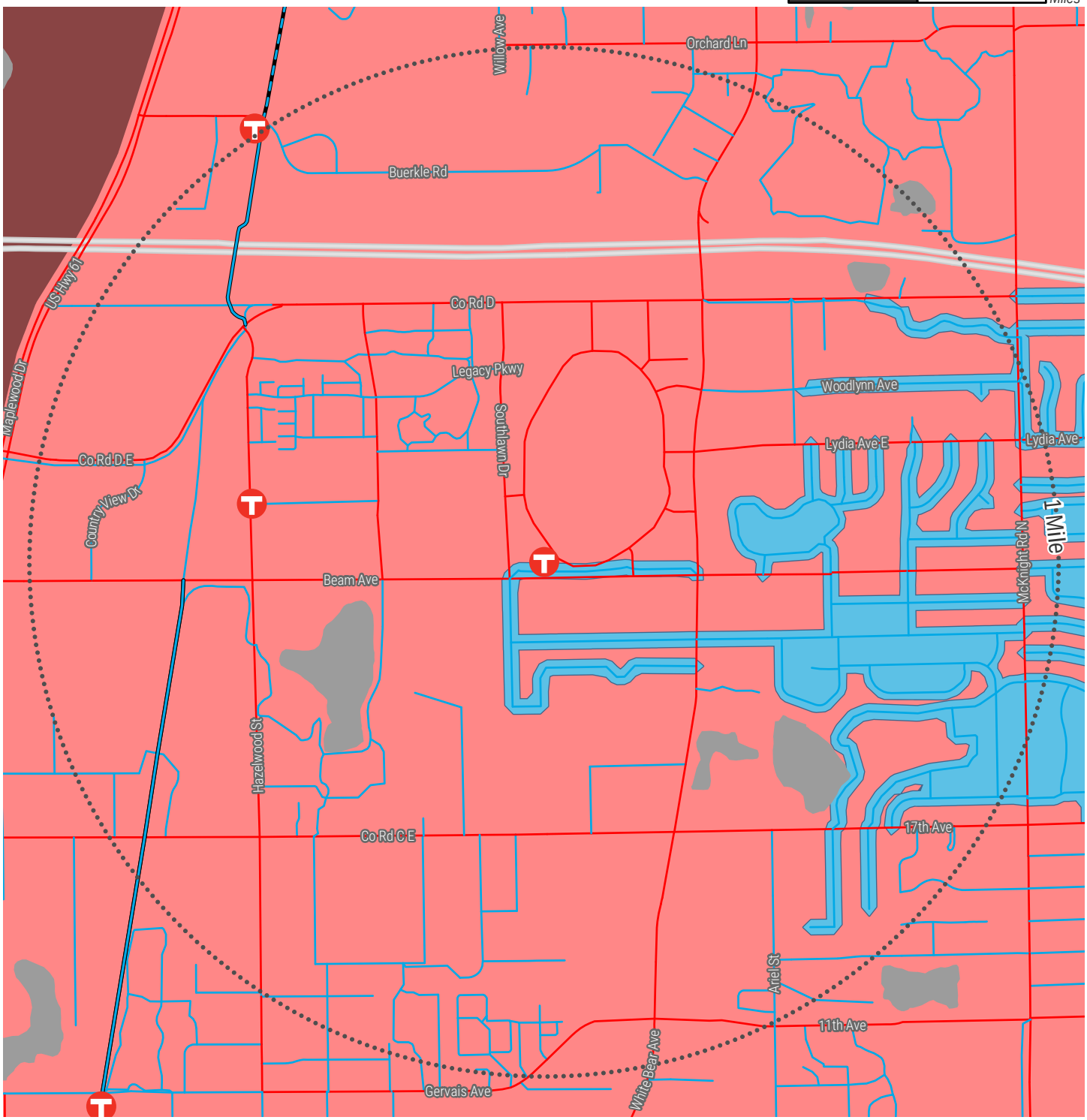
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: St. John's Boulevard

Rush Line BRT

Key

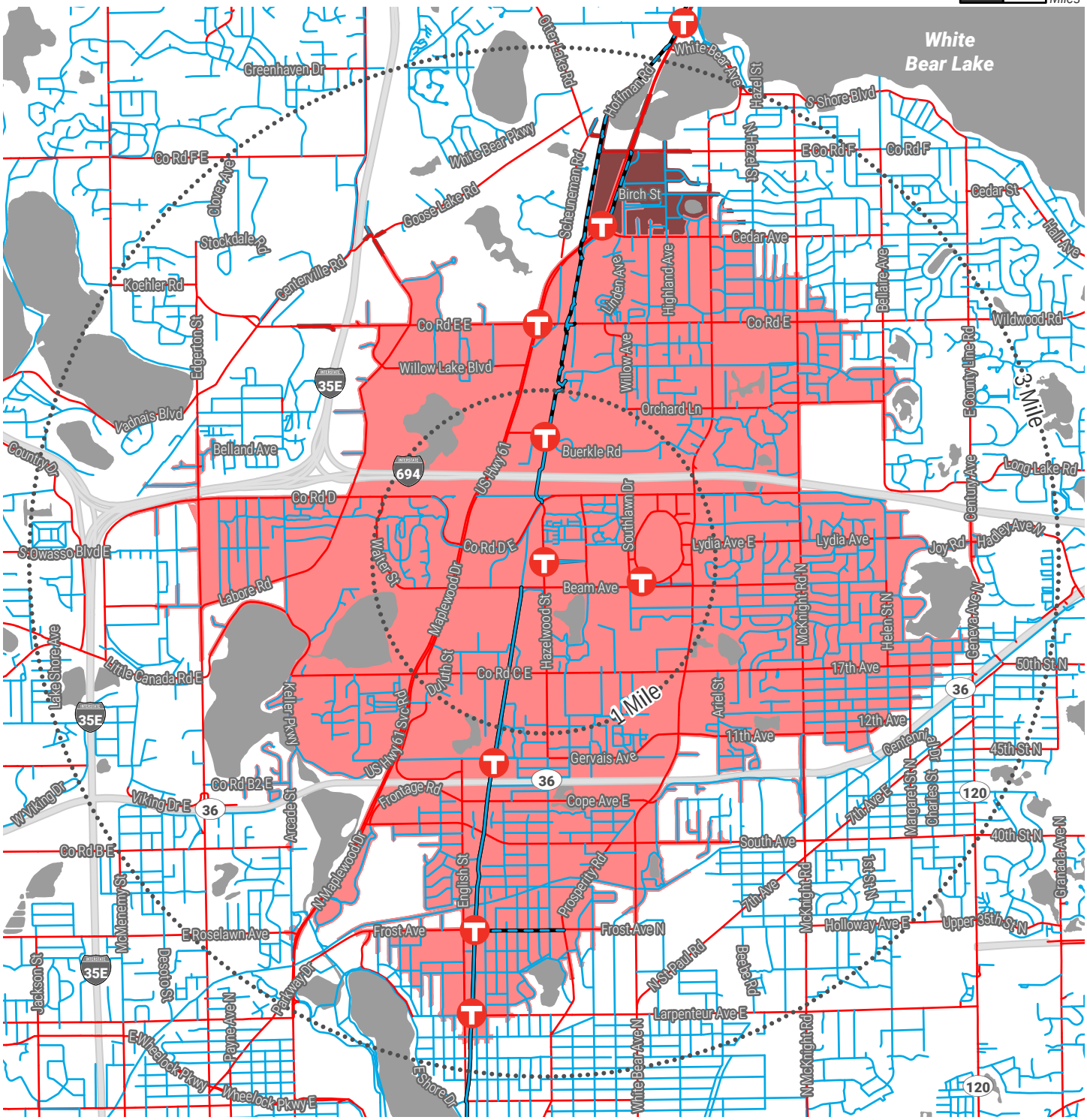
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: St. John's Boulevard

B R T

Key

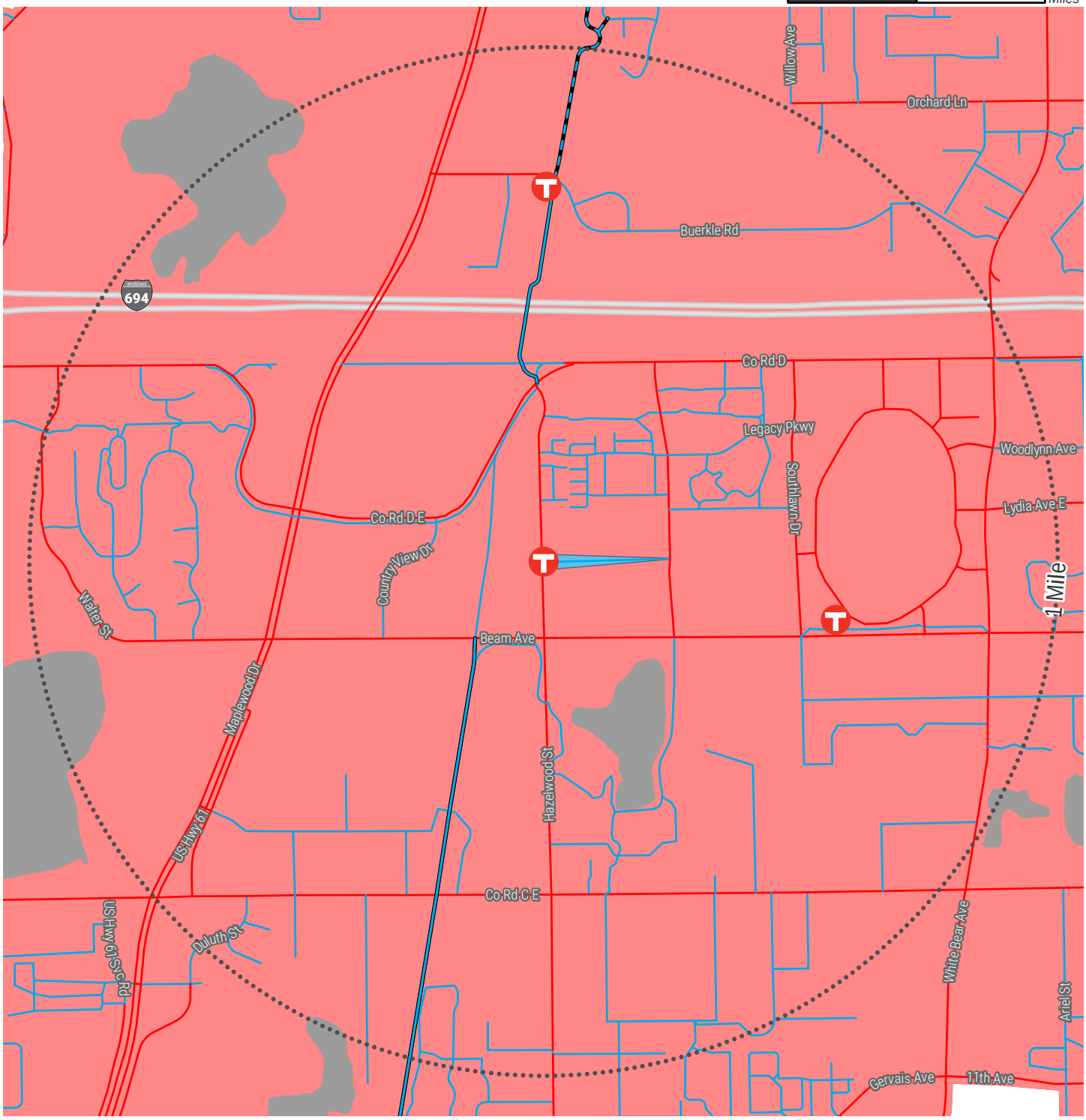
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Buerkle Road

Rush Line BRT

Key

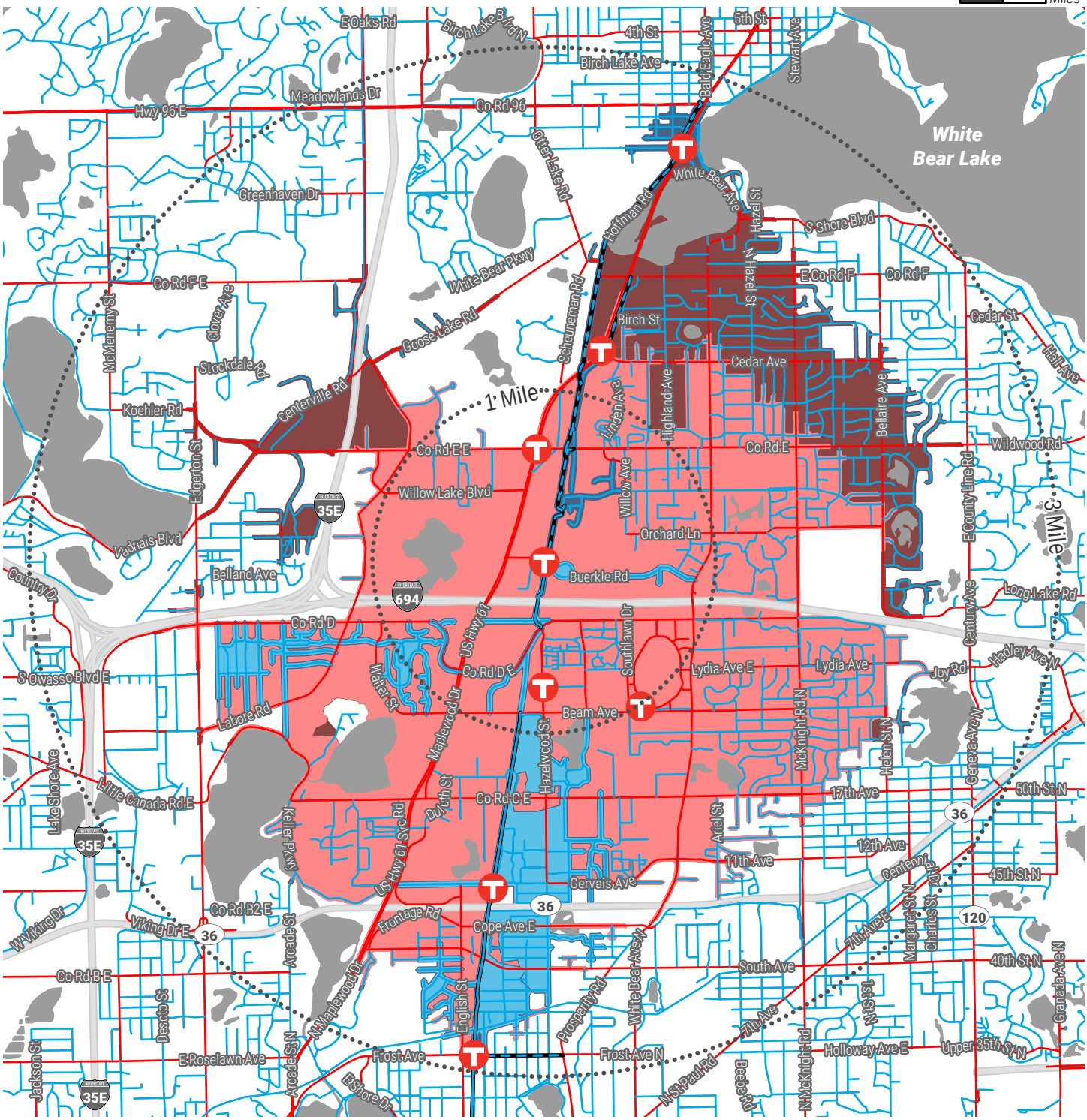
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Buerkle Road

Rush Line BRT

Key

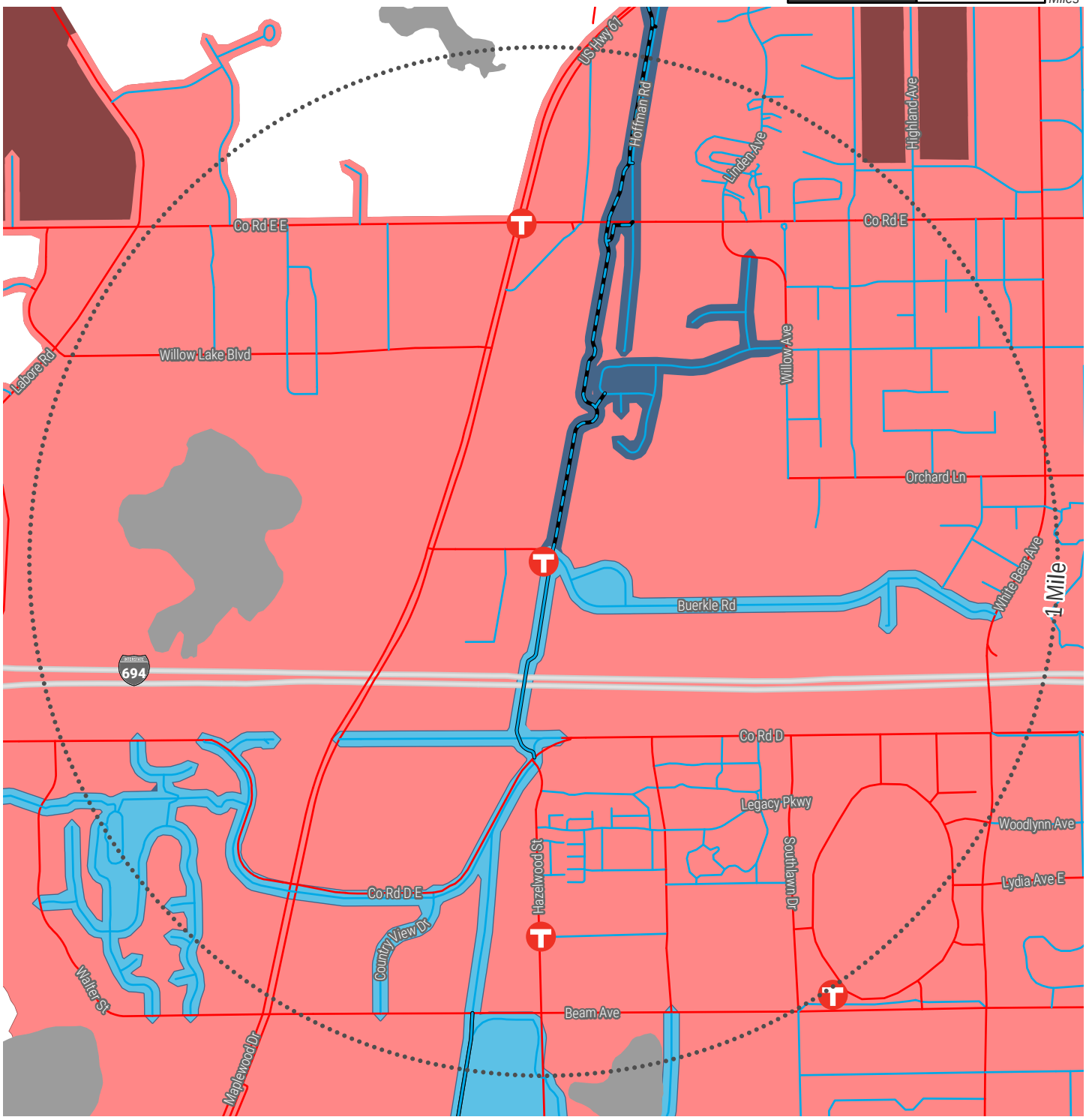
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: County Road E

Rush Line BRT

Key

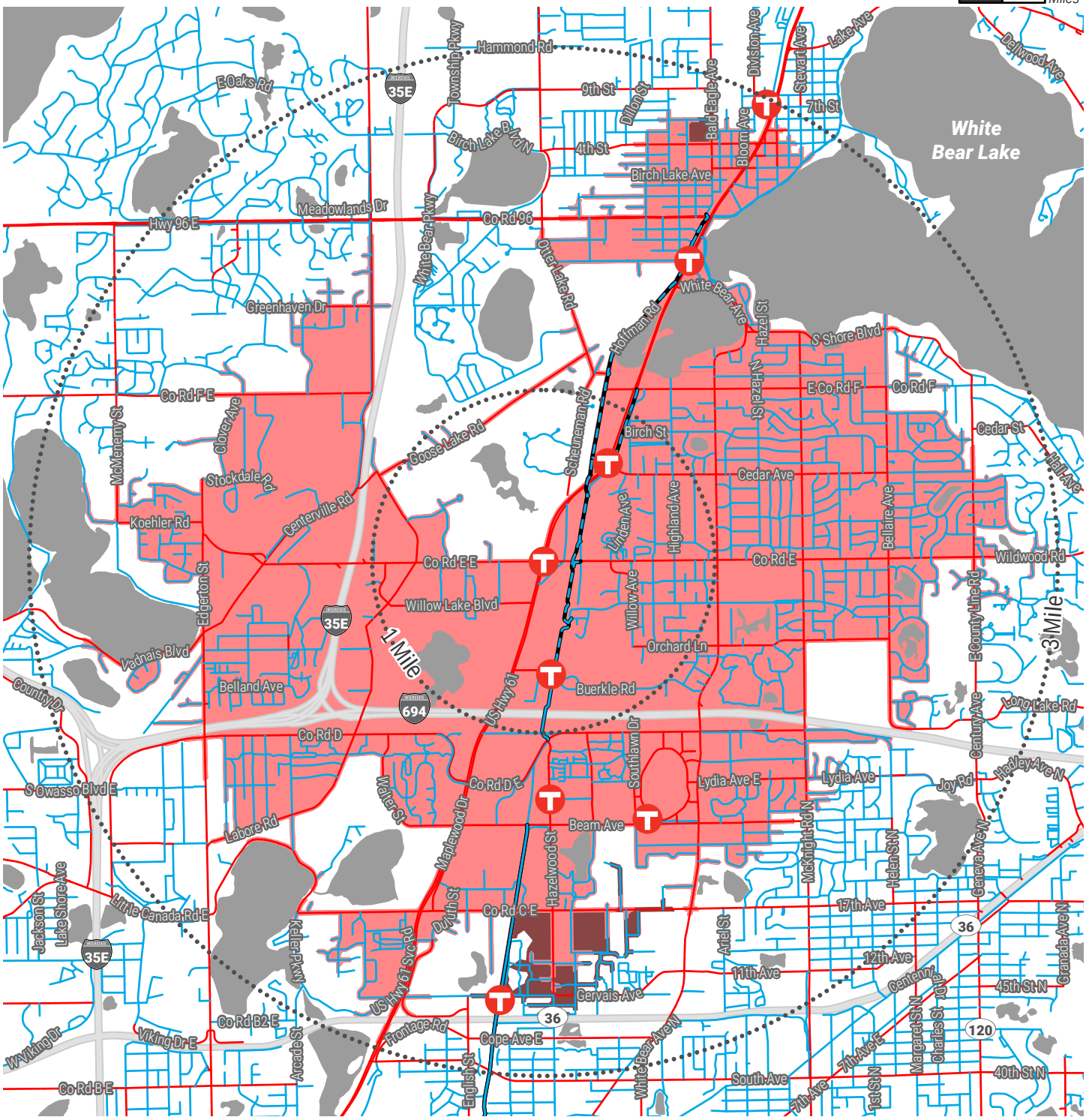
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: County Road E

Rush Line

B R T

Key

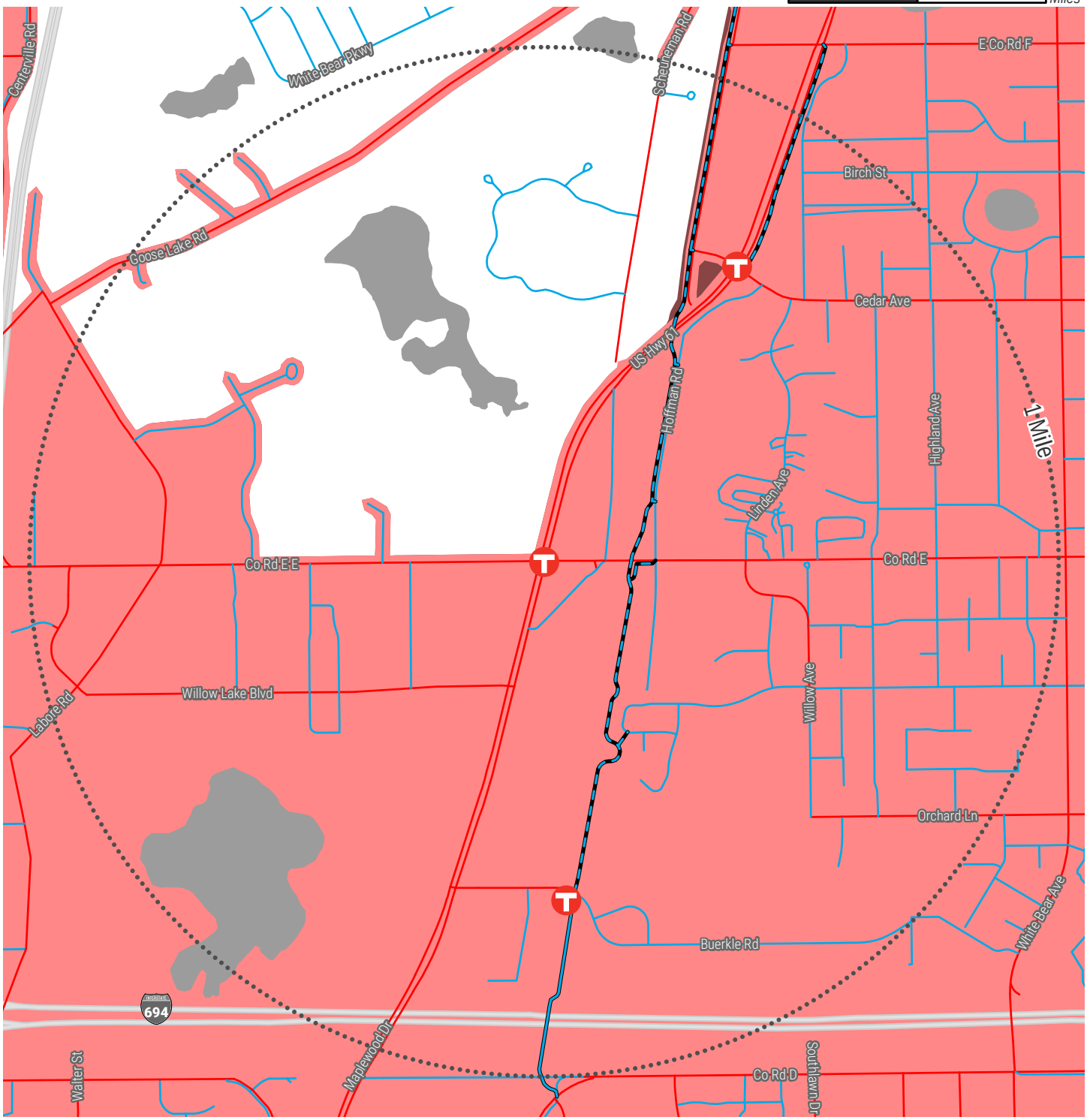
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Cedar Avenue

Rush Line BRT

Key

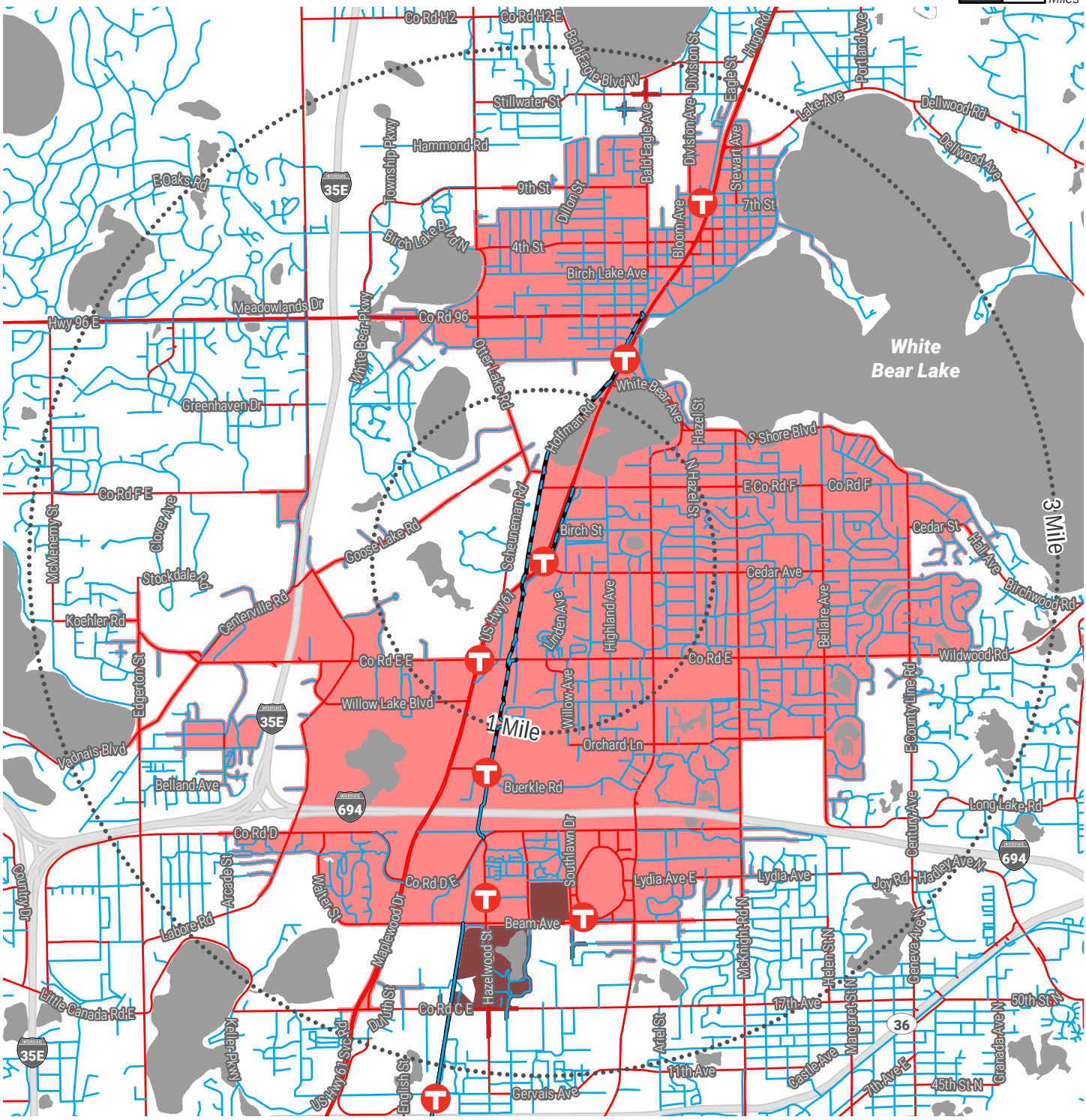
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Cedar Avenue

Rush Line

B R T

Key

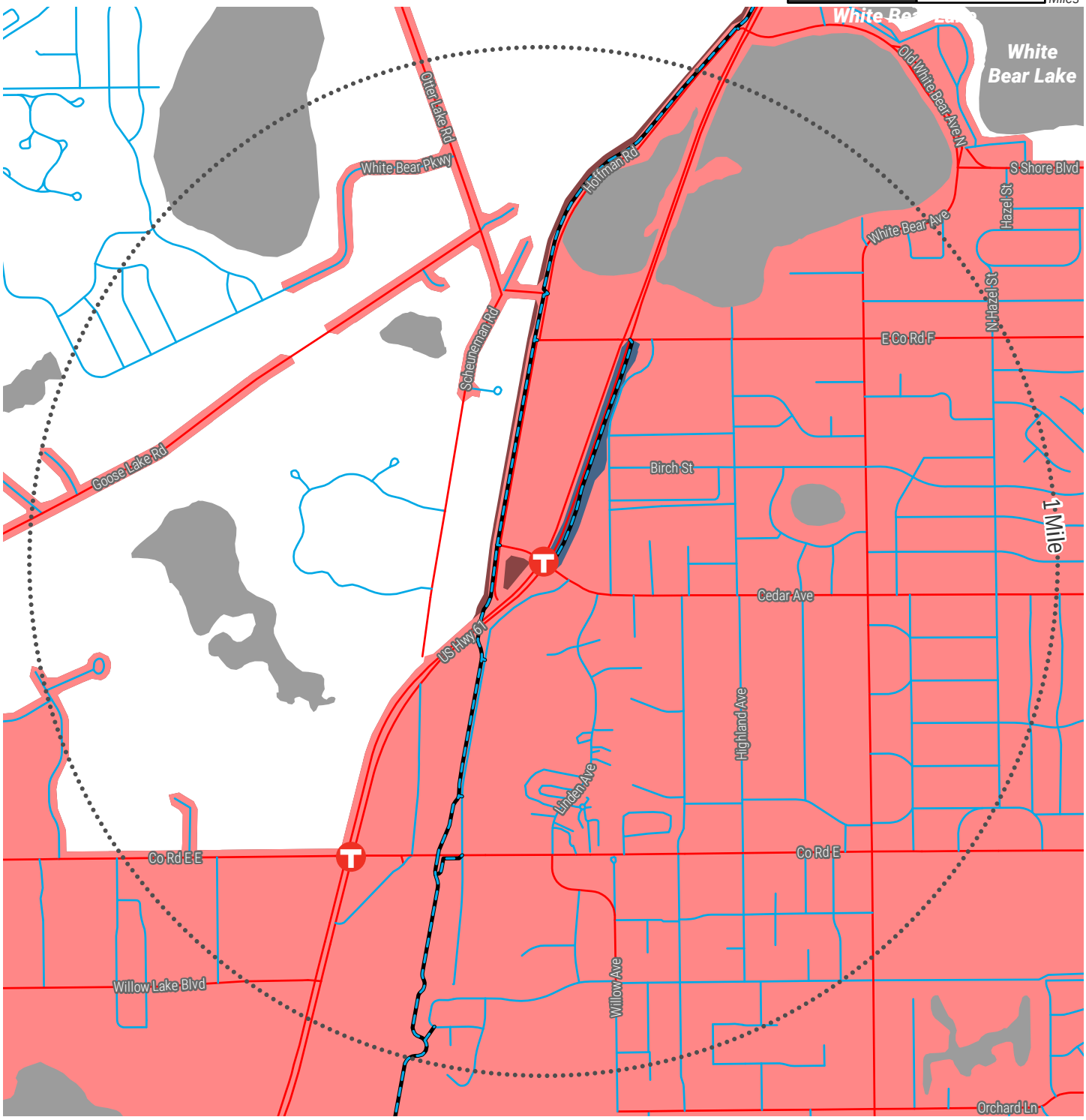
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Whitaker Street

Rush Line BRT

Key

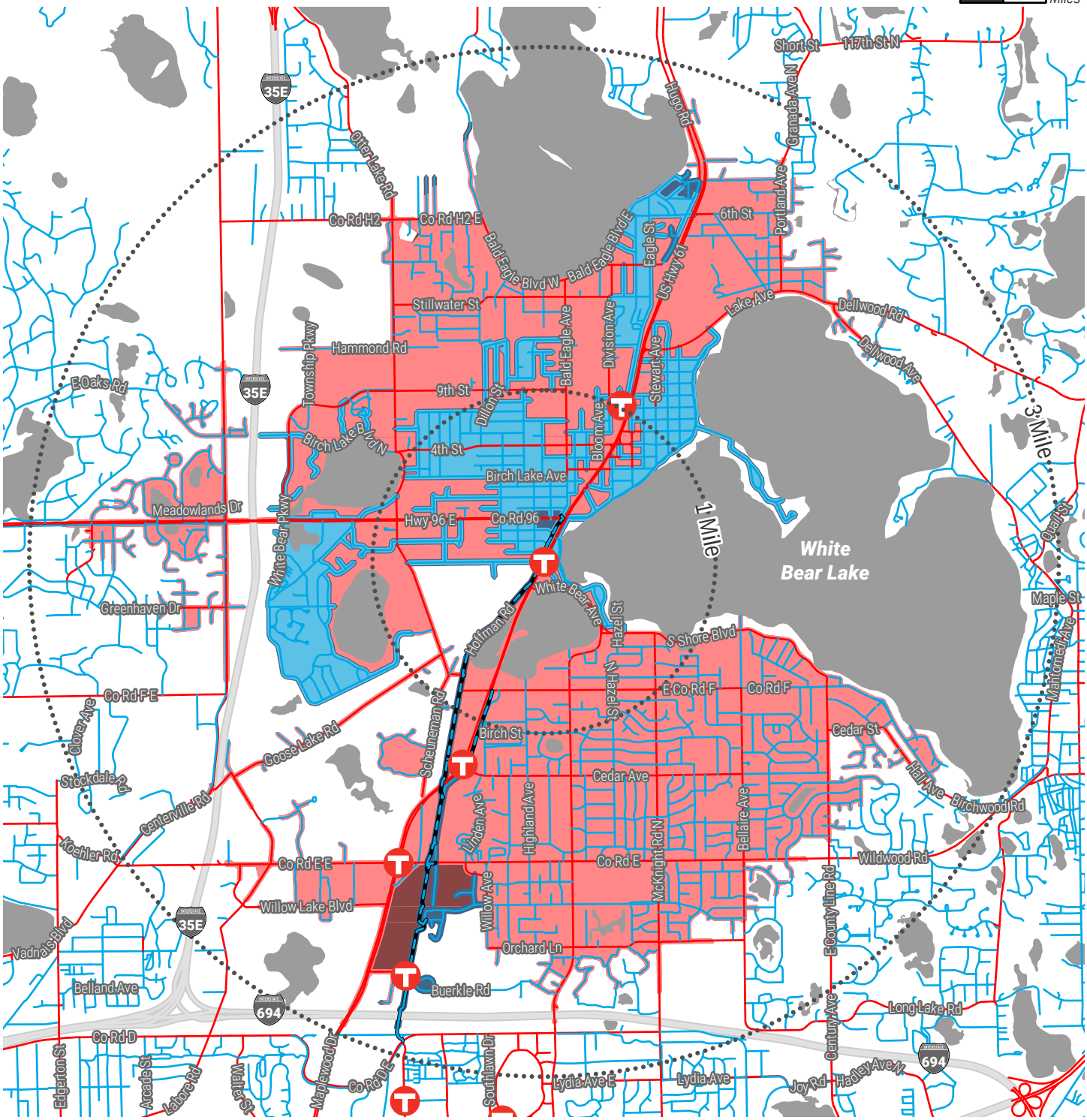
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Whitaker Street

Rush Line BRT

Key

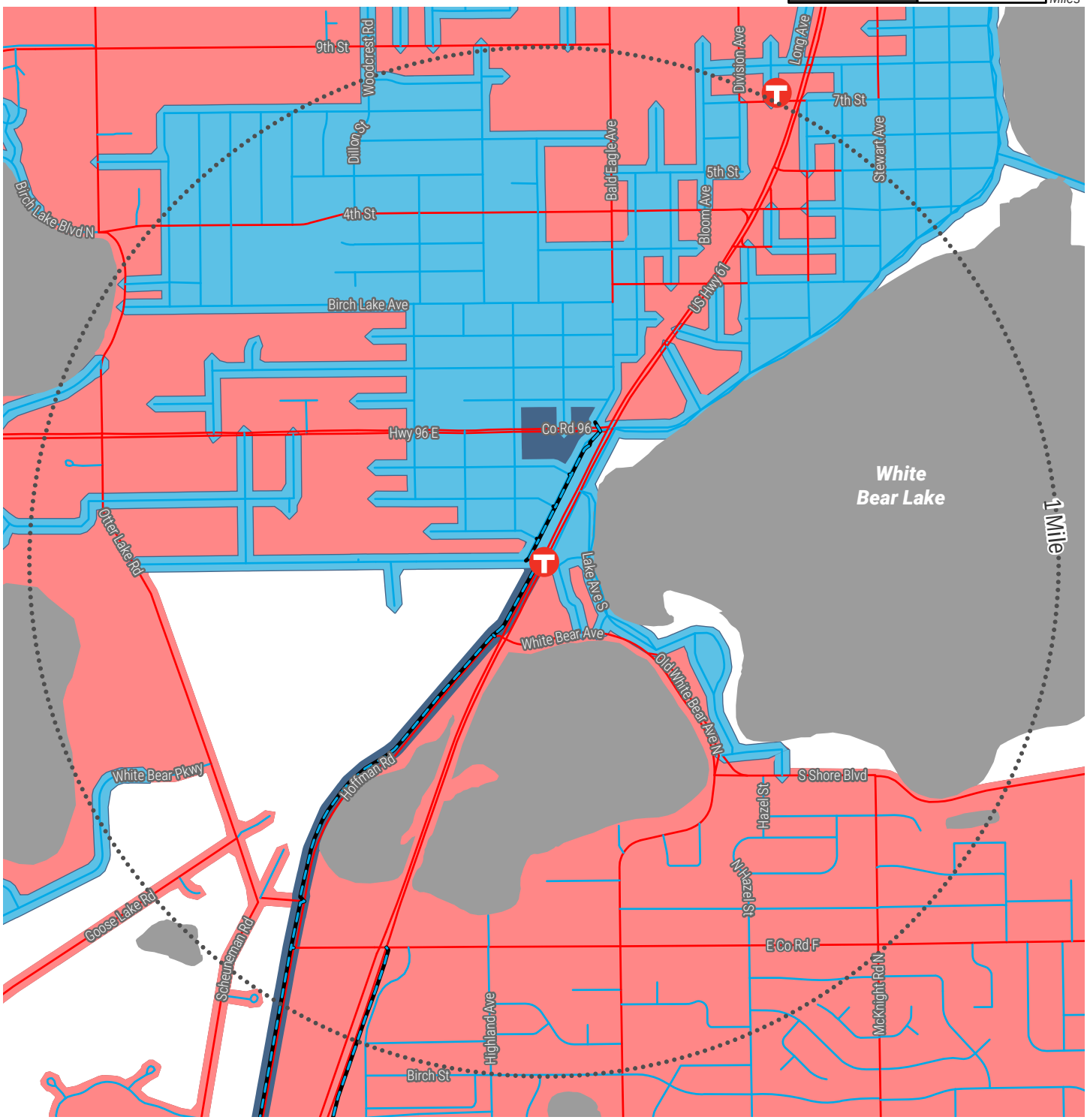
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Downtown White Bear Lake

Rush Line BRT

Key

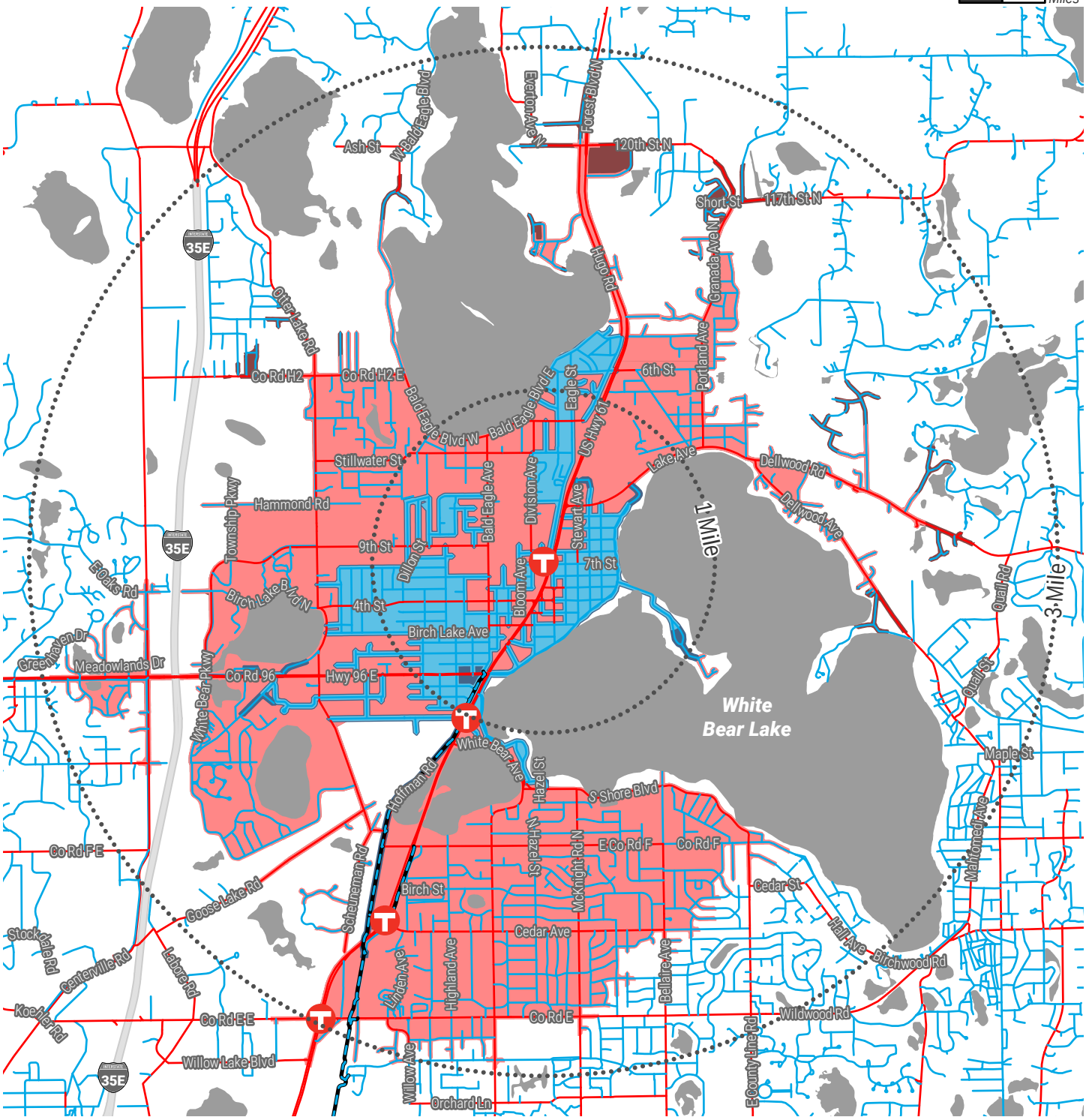
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020

BIKESHED ANALYSIS

Existing Conditions, Project Improvements, and Projects by Others

Station Name: Downtown White Bear Lake

Rush Line BRT

Key

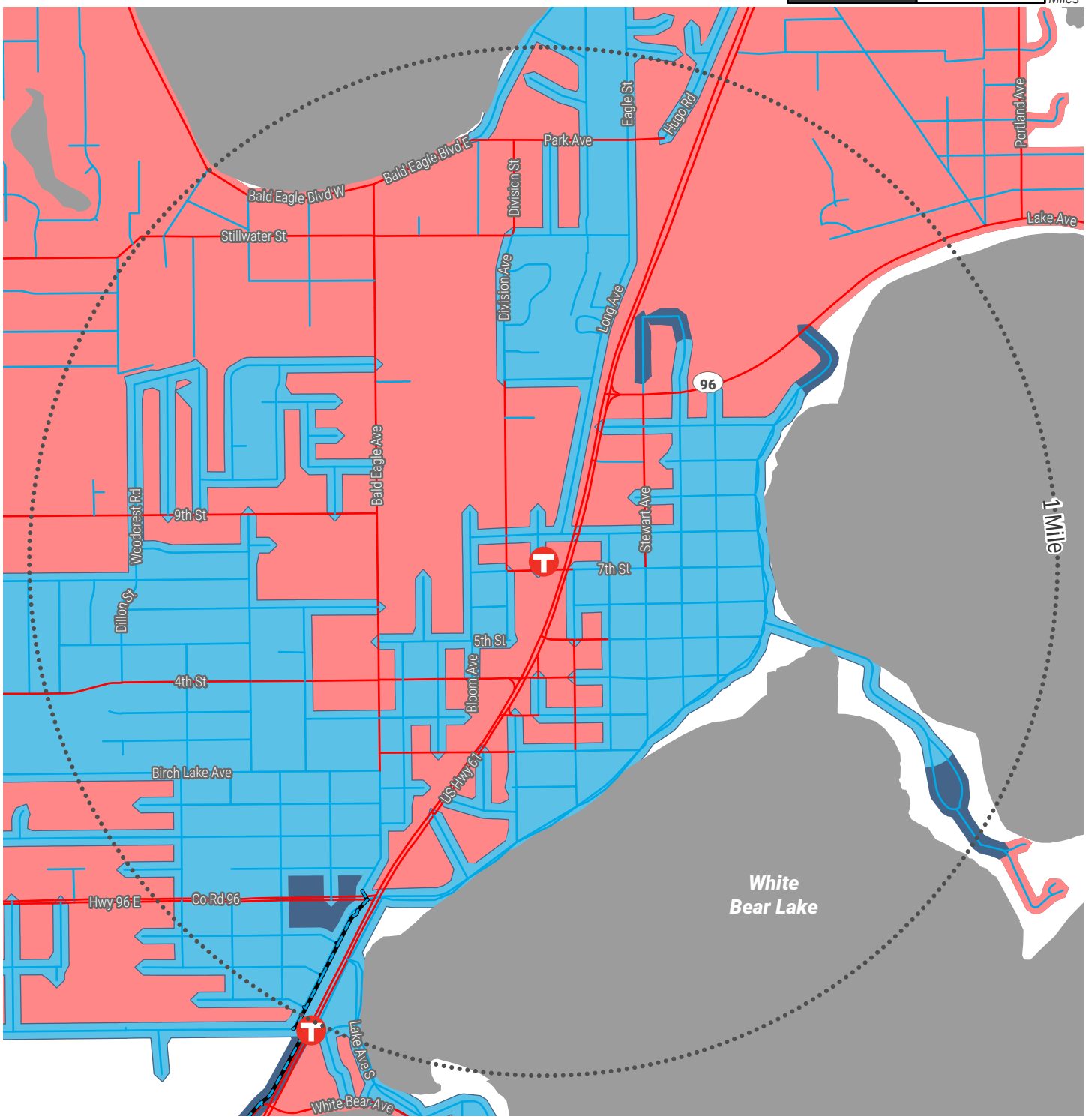
- Planned Station
- Proposed Rush Line BRT Station Area Improvements
- Additional Improvements by Others

Bicycle Level of Traffic Stress

- Low-Stress Network
- High-Stress Network

- Existing Low-Stress Bikeshed
- Future Low-Stress Bikeshed
- Existing High-Stress Bikeshed
- Future High-Stress Bikeshed

0 0.25 0.5 Miles



3/31/2020