Application

10353 - 2018 Roadway Expansion

11001 - Helmo/Bielenberg Bridge

Regional Solicitation - Roadways Including Multimodal Elements

Status:	Submitted
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Primary Contact

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What Grant Programs are you most interested in?	Regional Solicitation - Bicycle and Pedestrian Facilities

Organization Information

Name:	WASHINGTON CTY
Jurisdictional Agency (if different):	

Organization Type:	
Organization Website:	
Address:	PUBLIC WORKS
	11660 MYERON RD
*	STILLWATER (City) · Minnesota (State/Province) · 55082 (Postal Code/Zip)
County:	Washington
Phone:*	651-430-4325 Ext.
Fax:	
PeopleSoft Vendor Number	0000028637A10

Project Information

Project Name	Helmo/Bielenberg Bridge
Primary County where the Project is Located	Washington
Cities or Townships where the Project is Located:	City of Oakdale, City of Woodbury
Jurisdictional Agency (If Different than the Applicant):	

Brief Project Description (Include location, road name/functional class, type of improvement, etc.)

The proposed project is a new bridge connection across Interstate 94 (I-94) from Helmo Avenue in Oakdale to Bielenberg Drive in Woodbury that includes two to three lanes for high volume general purpose traffic and a ten-foot pedestrian and bicycle lane with buffer. The bridge as a whole also includes two dedicated Bus Rapid Transit (BRT) lanes to be constructed and funded through the METRO Gold Line Bus Rapid Transit (BRT) project. The roadway, bike and pedestrian lanes proposed in this application are not funded by Gold Line.

The new bridge relieves one of the most congested intersections in Washington County, CSAH 13 (Radio Drive/Inwood Avenue), in the heart of Oakdale and Woodbury commercial districts. Relieving congestion on CSAH 13 benefits commuters, freight haulers, transit and express service users by reducing delay at the intersection of the I-94 south ramps and CSAH 13. A reduction in congestion also means a reduction in air pollution from idling exhaust, a result of congestion.

The bridge design was created in close collaboration with the Gold Line Project and MnDOT to ensure it complements the bus rapid transit lanes and does not preclude potential future installation of a southbound I-694 to eastbound I-94 interchange.

A pedestrian and bicycle lane will connect existing trails to the north and south of I-94, closing a critical bike and pedestrian gap created by the interstate. In addition, Bus Rapid Transit Oriented Development (BRTOD) plans have identified Gold Line corridor-wide walk and bike access routes that in general follow the Gold Line alignment between Woodbury and Saint Paul. The Helmo/Bielenberg Bridge connection is a crucial component linking

	the rest of the corridor-wide trail with major destination centers in Woodbury. The roadway, pedestrian and bicycle connections provided by the new bridge were identified in the 2030 Oakdale and Woodbury Comprehensive Plans, and building these connections in conjunction with Gold Line BRT, a major east metro transportation investment, creates efficiencies and cost savings for the region. Continued and coordinated transportation investments in a congested and rapidly growing corridor benefits the east metro as a whole, and better situates the cities of Oakdale and Woodbury to meet their planning goals in 2040 and beyond.
(Limit 2,800 characters; approximately 400 words)	
TIP Description Guidance (will be used in TIP if the project is selected for funding)	construct new br. Helmo/Bielenberg over I-94
Project Length (Miles)	0.19
to the nearest one-tenth of a mile	

Project Funding

Are you applying for competitive funds from another source(s) to implement this project?	Yes
If yes, please identify the source(s)	Federal Transit Administration (FTA) New Starts funding for BRT lanes only. No other funding source for ped/bike, general purpose lanes is being sought.
Federal Amount	$4,400,000.00
Match Amount	$1,100,000.00
Minimum of 20% of project total	
Project Total	$5,500,000.00
Match Percentage	20.0%
Minimum of 20% *Compute the match percentage by dividing the match amount by the project total*	
Source of Match Funds	Washington County

A minimum of 20% of the total project cost must come from non-federal sources; additional match funds over the 20% minimum can come from other federal sources

Preferred Program Year

Select one:	2023

Select 2020 or 2021 for TDM projects only. For all other applications, select 2022 or 2023.

Additional Program Years:

Select all years that are feasible if funding in an earlier year becomes available.

Project Information: Roadway Projects

County, City, or Lead Agency	Washington County
Functional Class of Road	A-Minor Reliever
Road System	Currently city streets of Helmo Avenue in Oakdale and Bielenberg Drive in Woodbury

TH, CSAH, MSAS, CO. RD., TWP. RD., CITY STREET

Road/Route No.

i.e., 53 for CSAH 53

Name of Road	Helmo Avenue and Bielenberg Drive

Example; 1st ST., MAIN AVE

Zip Code where Majority of Work is Being Performed	55128
(Approximate) Begin Construction Date	01/01/2023
(Approximate) End Construction Date	12/31/2023

TERMINI:(Termini listed must be within 0.3 miles of any work)

From:
(Intersection or Address)

To:
(Intersection or Address)

DO NOT INCLUDE LEGAL DESCRIPTION

Or At

Primary Types of Work

Examples: GRADE, AGG BASE, BIT BASE, BIT SURF, SIDEWALK, CURB AND GUTTER,STORM SEWER, SIGNALS, LIGHTING, GUARDRAIL, BIKE PATH, PED RAMPS, BRIDGE, PARK AND RIDE, ETC.

BRIDGE/CULVERT PROJECTS (IF APPLICABLE)

Old Bridge/Culvert No.:

New Bridge/Culvert No.:

Structure is Over/Under
(Bridge or culvert name):

Requirements - All Projects

All Projects

1.The project must be consistent with the goals and policies in these adopted regional plans: Thrive MSP 2040 (2014), the 2040 Transportation Policy Plan (2015), the 2040 Regional Parks Policy Plan (2015), and the 2040 Water Resources Policy Plan (2015).

Check the box to indicate that the project meets this requirement. Yes

2.The project must be consistent with the 2040 Transportation Policy Plan. Reference the 2040 Transportation Plan goals, objectives, and strategies that relate to the project.

List the goals, objectives, strategies, and associated pages: See the attached Local Planning Documents - Helmo/Bielenberg Bridge

3.The project or the transportation problem/need that the project addresses must be in a local planning or programming document. Reference the name of the appropriate comprehensive plan, regional/statewide plan, capital improvement program, corridor study document [studies on trunk highway must be approved by the Minnesota Department of Transportation and the Metropolitan Council], or other official plan or program of the applicant agency [includes Safe Routes to School Plans] that the project is included in and/or a transportation problem/need that the project addresses.

List the applicable documents and pages: See the attached Local Planning Documents - Helmo/Bielenberg Bridge

4.The project must exclude costs for studies, preliminary engineering, design, or construction engineering. Right-of-way costs are only eligible as part of transit stations/stops, transit terminals, park-and-ride facilities, or pool-and-ride lots. Noise barriers, drainage projects, fences, landscaping, etc., are not eligible for funding as a standalone project, but can be included as part of the larger submitted project, which is otherwise eligible.

Check the box to indicate that the project meets this requirement. Yes

5.Applicants that are not cities or counties in the seven-county metro area with populations over 5,000 must contact the MnDOT Metro State Aid Office prior to submitting their application to determine if a public agency sponsor is required.

Check the box to indicate that the project meets this requirement. Yes

6.Applicants must not submit an application for the same project elements in more than one funding application category.

Check the box to indicate that the project meets this requirement. Yes

7.The requested funding amount must be more than or equal to the minimum award and less than or equal to the maximum award. The cost of preparing a project for funding authorization can be substantial. For that reason, minimum federal amounts apply. Other federal funds may be combined with the requested funds for projects exceeding the maximum award, but the source(s) must be identified in the application. Funding amounts by application category are listed below.
Roadway Expansion: *$1,000,000 to $7,000,000*
Roadway Reconstruction/ Modernization Modernization and Spot Mobility: *$1,000,000 to $7,000,000*
Traffic Management Technologies (Roadway System Management): *$250,000 to $7,000,000*
Bridges Rehabilitation/ Replacement: *$1,000,000 to $7,000,000*

Check the box to indicate that the project meets this requirement. Yes

8.The project must comply with the Americans with Disabilities Act (ADA).

Check the box to indicate that the project meets this requirement. Yes

9.In order for a selected project to be included in the Transportation Improvement Program (TIP) and approved by USDOT, the public agency sponsor must either have, or be substantially working towards, completing a current Americans with Disabilities Act (ADA) self-evaluation or transition plan that covers the public right of way/transportation, as required under Title II of the ADA.

The applicant is a public agency that employs 50 or more people and has an adopted ADA transition plan that covers the public right of way/transportation. Yes

06/18/2015

Date plan adopted by governing body

The applicant is a public agency that employs 50 or more people and is currently working towards completing an ADA transition plan that covers the public rights of way/transportation.

Date process started

Date of anticipated plan completion/adoption

The applicant is a public agency that employs fewer than 50 people and has a completed ADA self-evaluation that covers the public rights of way/transportation.

Date self-evaluation completed

The applicant is a public agency that employs fewer than 50 people and is working towards completing an ADA self-evaluation that covers the public rights of way/transportation.

Date process started

Date of anticipated plan completion/adoption

(TDM Applicants Only) The applicant is not a public agency subject to the self-evaluation requirements in Title II of the ADA.

10.The project must be accessible and open to the general public.

Check the box to indicate that the project meets this requirement. Yes

11.The owner/operator of the facility must operate and maintain the project year-round for the useful life of the improvement, per FHWA direction established 8/27/2008 and updated 6/27/2017.

Check the box to indicate that the project meets this requirement. Yes

12.The project must represent a permanent improvement with independent utility. The term independent utility means the project provides benefits described in the application by itself and does not depend on any construction elements of the project being funded from other sources outside the regional solicitation, excluding the required non-federal match. Projects that include traffic management or transit operating funds as part of a construction project are exempt from this policy.

Check the box to indicate that the project meets this requirement. Yes

13.The project must not be a temporary construction project. A temporary construction project is defined as work that must be replaced within five years and is ineligible for funding. The project must also not be staged construction where the project will be replaced as part of future stages. Staged construction is eligible for funding as long as future stages build on, rather than replace, previous work.

Check the box to indicate that the project meets this requirement. Yes

14.The project applicant must send written notification regarding the proposed project to all affected state and local units of government prior to submitting the application.

Check the box to indicate that the project meets this requirement. Yes

Roadways Including Multimodal Elements

1.All roadway and bridge projects must be identified as a principal arterial (non-freeway facilities only) or A-minor arterial as shown on the latest TAB approved roadway functional classification map.

Check the box to indicate that the project meets this requirement. Yes

Roadway Expansion and Reconstruction/Modernization and Spot Mobility projects only:

2.The project must be designed to meet 10-ton load limit standards.

Check the box to indicate that the project meets this requirement. Yes

Bridge Rehabilitation/Replacement projects only:

3.Projects requiring a grade-separated crossing of a principal arterial freeway must be limited to the federal share of those project costs identified as local (non-MnDOT) cost responsibility using MnDOTs Cost Participation for Cooperative Construction Projects and Maintenance Responsibilities manual. In the case of a federally funded trunk highway project, the policy guidelines should be read as if the funded trunk highway route is under local jurisdiction.

Check the box to indicate that the project meets this requirement.

4.The bridge must carry vehicular traffic. Bridges can carry traffic from multiple modes. However, bridges that are exclusively for bicycle or pedestrian traffic must apply under one of the Bicycle and Pedestrian Facilities application categories. Rail-only bridges are ineligible for funding.

Check the box to indicate that the project meets this requirement.

5.The length of the bridge must equal or exceed 20 feet.

Check the box to indicate that the project meets this requirement.

6. The bridge must have a sufficiency rating less than 80 for rehabilitation projects and less than 50 for replacement projects. Additionally, the bridge must also be classified as structurally deficient or functionally obsolete.

Check the box to indicate that the project meets this requirement.

Roadway Expansion, Reconstruction/Modernization and Spot Mobility, and Bridge Rehabilitation/Replacement projects only:

7. All roadway projects that involve the construction of a new/expanded interchange or new interchange ramps must have approval by the Metropolitan Council/MnDOT Interchange Planning Review Committee prior to application submittal. Please contact Michael Corbett at MnDOT (Michael.J.Corbett@state.mn.us or 651-234-7793) to determine whether your project needs to go through this process.

Check the box to indicate that the project meets this requirement.

Requirements - Roadways Including Multimodal Elements

Specific Roadway Elements

CONSTRUCTION PROJECT ELEMENTS/COST ESTIMATES	Cost
Mobilization (approx. 5% of total cost)	$165,000.00
Removals (approx. 5% of total cost)	$165,000.00
Roadway (grading, borrow, etc.)	$30,000.00
Roadway (aggregates and paving)	$70,000.00
Subgrade Correction (muck)	$0.00
Storm Sewer	$25,000.00
Ponds	$50,000.00
Concrete Items (curb & gutter, sidewalks, median barriers)	$0.00
Traffic Control	$50,000.00
Striping	$5,000.00
Signing	$5,000.00
Lighting	$50,000.00
Turf - Erosion & Landscaping	$50,000.00
Bridge	$2,748,000.00
Retaining Walls	$0.00
Noise Wall (not calculated in cost effectiveness measure)	$0.00
Traffic Signals	$0.00
Wetland Mitigation	$0.00

Other Natural and Cultural Resource Protection	$0.00
RR Crossing	$0.00
Roadway Contingencies	$683,000.00
Other Roadway Elements	$0.00
Totals	**$4,096,000.00**

Specific Bicycle and Pedestrian Elements

CONSTRUCTION PROJECT ELEMENTS/COST ESTIMATES	Cost
Path/Trail Construction	$1,120,000.00
Sidewalk Construction	$0.00
On-Street Bicycle Facility Construction	$0.00
Right-of-Way	$0.00
Pedestrian Curb Ramps (ADA)	$0.00
Crossing Aids (e.g., Audible Pedestrian Signals, HAWK)	$0.00
Pedestrian-scale Lighting	$50,000.00
Streetscaping	$0.00
Wayfinding	$0.00
Bicycle and Pedestrian Contingencies	$234,000.00
Other Bicycle and Pedestrian Elements	$0.00
Totals	**$1,404,000.00**

Specific Transit and TDM Elements

CONSTRUCTION PROJECT ELEMENTS/COST ESTIMATES	Cost
Fixed Guideway Elements	$0.00
Stations, Stops, and Terminals	$0.00
Support Facilities	$0.00
Transit Systems (e.g. communications, signals, controls, fare collection, etc.)	$0.00
Vehicles	$0.00
Contingencies	$0.00
Right-of-Way	$0.00
Other Transit and TDM Elements	$0.00
Totals	**$0.00**

Transit Operating Costs

Number of Platform hours	0
Cost Per Platform hour (full loaded Cost)	$0.00
Subtotal	$0.00
Other Costs - Administration, Overhead,etc.	$0.00

Totals

Total Cost	$5,500,000.00
Construction Cost Total	$5,500,000.00
Transit Operating Cost Total	$0.00

Congestion on adjacent Parallel Routes:

Adjacent Parallel Corridor Inwood Avenue in Oakdale to Radio Drive in Woodbury

Adjacent Parallel Corridor Start and End Points:

Start Point:	Inwood at 3rd St N
End Point:	Radio at Hudson Rd N
Free-Flow Travel Speed:	35

The Free-Flow Travel Speed is black number.

Peak Hour Travel Speed: 22

The Peak Hour Travel Speed is red number.

Percentage Decrease in Travel Speed in Peak Hour Compared to Free-Flow:	37.14%
Upload Level of Congestion Map:	1531492941015_Level of Congestion.pdf

Principal Arterial Intersection Conversion Study:

Proposed interchange or at-grade project that reduces delay at a High Priority Intersection:

(80 Points)

Proposed at-grade project that reduces delay at a Medium Priority Intersection:

(60 Points)

Proposed at-grade project that reduces delay at a Low Priority Intersection:

(50 Points)

Proposed interchange project that reduces delay at a Medium Priority Intersection:

(40 Points)

Proposed interchange project that reduces delay at a Low Priority Intersection:

(0 Points)

Not listed as a priority in the study:	Yes

(0 Points)

Measure B: Project Location Relative to Jobs, Manufacturing, and Education

Existing Employment within 1 Mile:	13974
Existing Manufacturing/Distribution-Related Employment within 1 Mile:	1007
Existing Post-Secondary Students within 1 Mile:	547
Upload Map	1531497396421_Regional Economy.pdf

Please upload attachment in PDF form.

Measure C: Current Heavy Commercial Traffic

RESPONSE: Select one for your project, based on the Regional Truck Corridor Study:

Along Tier 1:	Yes
Along Tier 2:	
Along Tier 3:	
The project provides a direct and immediate connection (i.e., intersects) with either a Tier 1, Tier 2, or Tier 3 corridor:	
None of the tiers:	

Measure A: Current Daily Person Throughput

Location	Helmo Avenue over I-94
Current AADT Volume	8000
Existing Transit Routes on the Project	N/A

For New Roadways only, list transit routes that will likely be diverted to the new proposed roadway (if applicable).

Upload Transit Connections Map	1531497599718_Transit Connections.pdf

Please upload attachment in PDF form.

Response: Current Daily Person Throughput

Average Annual Daily Transit Ridership	0

Current Daily Person Throughput 10400.0

Measure B: 2040 Forecast ADT

Use Metropolitan Council model to determine forecast (2040) ADT volume	Yes
If checked, METC Staff will provide Forecast (2040) ADT volume	
OR	
Identify the approved county or city travel demand model to determine forecast (2040) ADT volume	Based on approved Metropolitan Council ABM model runs for Gold Line BRT
Forecast (2040) ADT volume	10500

Measure A: Connection to disadvantaged populations and projects benefits, impacts, and mitigation

Select one:

Project located in Area of Concentrated Poverty with 50% or more of residents are people of color (ACP50):	
(up to 100% of maximum score)	
Project located in Area of Concentrated Poverty:	
(up to 80% of maximum score)	
Projects census tracts are above the regional average for population in poverty or population of color:	Yes
(up to 60% of maximum score)	
Project located in a census tract that is below the regional average for population in poverty or populations of color or includes children, people with disabilities, or the elderly:	
(up to 40% of maximum score)	

1.(0 to 3 points) A successful project is one that has actively engaged low-income populations, people of color, children, persons with disabilities, and the elderly during the project's development with the intent to limit negative impacts on them and, at the same time, provide the most benefits.

Describe how the project has encouraged or will engage the full cross-section of community in decision-making. Identify the communities to be engaged and where in the project development process engagement has occurred or will occur. Elements of quality engagement include: outreach to specific communities and populations that are likely to be directly impacted by the project; techniques to reach out to populations traditionally not involved in the community engagement related to transportation projects; residents or users identifying potential positive and negative elements of the project; and surveys, study recommendations, or plans that provide feedback from populations that may be impacted by the proposed project. If relevant, describe how NEPA or Title VI regulations will guide engagement activities.

The Gold Line BRT draft environmental assessment (EA) process (following NEPA protocol), which began in 2013, includes longstanding engagement with the communities of Oakdale and Woodbury. A BRTOD planning process began in 2017, and directly collaborates with Oakdale and Woodbury to create community driven visions for TOD around Helmo and Tamarack Stations.

Response:

Through the definition of the Gold Line BRT route, after an extensive public engagement process, it was recognized that a new connection over I-94 between Oakdale and Woodbury was not only needed for the transit project, but also identified in the 2030 Comprehensive Plans for the Cities of Oakdale and Woodbury as a desired connection between the two growing communities.

This new connection between Oakdale and Woodbury provides access to jobs, housing, medical and retail and is critical for people with disabilities or elderly, who may have compromised balance or use motorized wheelchairs to navigate. Transit-dependent households in the area will benefit, as the project provides access to high frequency, reliable transit at the Helmo or Tamarack BRT stations, or park and rides: for BRT at Helmo, or to express bus service at Guardian Angels and the Woodbury Theatre.

(Limit 1,400 characters; approximately 200 words)

2.(0 to 7 points) Describe the projects benefits to low-income populations, people of color, children, people with disabilities, and the elderly. Benefits could relate to safety; public health; access to destinations; travel time; gap closure; leveraging of other beneficial projects and investments; and/or community cohesion. Note that this is not an exhaustive list.

Station access is of utmost importance throughout the cities along the new bus rapid transitway, and the city of Oakdale has made a concerted effort early on in the BRTOD planning process, to leverage transit investment along Helmo Avenue, and create a walkable and accessible neighborhood. The resulting BRTOD Plans were used as a basis to amend the city?s current 2030 Comprehensive Plan, included in the draft 2040 Comprehensive Plan, and reflected in a Planned Unit Development (PUD) for the site surrounding the future Helmo Station, near the touchdown point of the new Helmo/Bielenberg Bridge.

Response:

As a result of public input, the location of the transit route and station location at Helmo Avenue responds to safety and access concerns by residents who live within a half mile radius of the proposed Helmo Station. The BRTOD Plan shifts the proposed BRT station to the south, towards a reconnected east to west 2nd Street ? forming a new nexus for concentrated walkable retail, services and jobs ? amenities which are desirable to the neighborhood. A Senior Living facility and Hospice center have been engaged continually during the EA and BRTOD process. ADA accessible trails and a reconnected street grid provides access for people of all abilities and ages.

BRTOD Plans, created in collaboration with the cities and local community input, have resulted in a new Planned Unit Development (PUD) at the Oakdale Helmo Station. The BRTOD Plan leverages the benefits of a new transit station and new multi-modal bridge connection, increasing access for all current residents, and future residents who will live in the multi-family housing within the PUD, within walk and bike distance of the new Helmo Station, and Helmo/Bielenberg Bridge.

The Helmo/Bielenberg Bridge walk/bike path and roadway lanes, along with METRO Gold Line BRT transit only lanes, embodies the Metropolitan Council?s Thrive MSP 2040 Equity outcomes by creating choices in how east metro residents travel and recreate, and is a vital component for improving transit ridership through TOD along the corridor. A multi-modal bridge connection also aligns closely with recommendations from a Gold Line BRT Health Impact Assessment (HIA), on how to incorporate health into decision-making processes before a policy is adopted.

(Limit 2,800 characters; approximately 400 words)

3.(-3 to 0 points) Describe any negative externalities created by the project along with measures that will be taken to mitigate them. Negative externalities can result in a reduction in points, but mitigation of externalities can offset reductions.

Below is a list of negative impacts. Note that this is not an exhaustive list.

Increased difficulty in street crossing caused by increased roadway width, increased traffic speed, wider turning radii, or other elements that negatively impact pedestrian access.

Increased noise.

Decreased pedestrian access through sidewalk removal / narrowing, placement of barriers along the walking path, increase in auto-oriented curb cuts, etc.

Project elements that are detrimental to location-based air quality by increasing stop/start activity at intersections, creating vehicle idling areas, directing an increased number of vehicles to a particular point, etc.

Increased speed and/or cut-through traffic.

Removed or diminished safe bicycle access.

Inclusion of some other barrier to access to jobs and other destinations.

Displacement of residents and businesses.

Construction/implementation impacts such as dust; noise; reduced access for travelers and to businesses; disruption of utilities; and eliminated street crossings. These tend to be temporary.

Other

Response:

Construction of the bridge may cause brief delays on I-94, but the project will work to ensure that interruptions of any kind are minimized. Noise and dust mitigation will be incorporated, though many of these impacts will be avoided because the project is not immediately adjacent to residences or businesses.

The benefits of the Project far outweigh the negative impacts caused by construction. The new Bridge connection will: increase ease of street crossings with a new street grid reinvestment in Oakdale, with a transit/auto/multi-modal lane configuration that will slow traffic speeds and increase the perception of safety at crossings; increase pedestrian and bicycle access due to a new connection between Oakdale and Woodbury; improve air quality by relieving congestion at heavily trafficked CSAH 13; and encourage new TOD development, to include new business, housing, and recreation options for current and future residents and employees in a rapidly growing part of the east metro.

(Limit 2,800 characters; approximately 400 words)

Upload Map 1531507761453_Socio Economic Conditions.pdf

Measure B: Affordable Housing

City	Segment Length (For stand-alone projects, enter population from Regional Economy map) within each City/Township	Segment Length/Total Project Length	Score	Housing Score Multiplied by Segment percent
Oakdale	4856.0	0.36	91.0	32.816
Woodbury	8369.0	0.62	87.0	54.07
Lake Elmo	241.0	0.02	21.0	0.376

Total Project Length

Total Project Length (as entered in the "Project Information" form)	0

Affordable Housing Scoring

Total Project Length (Miles) or Population	13466.0
Total Housing Score	87.262

Affordable Housing Scoring

Measure A: Infrastructure Age

Year of Original Roadway Construction or Most Recent Reconstruction	Segment Length	Calculation	Calculation 2
1983.0	0.33	654.39	1983.0
	0	**654**	**1983**

Average Construction Year

Weighted Year	1983.0

Total Segment Length (Miles)

Total Segment Length	0.33

Measure A: Congestion Reduction/Air Quality

Total Peak Hour Delay Per Vehicle Without The Project (Seconds/Vehicle)	Total Peak Hour Delay Per Vehicle With The Project (Seconds/Vehicle)	Total Peak Hour Delay Per Vehicle Reduced by Project (Seconds/Vehicle)	Volume (Vehicles per hour)	Total Peak Hour Delay Reduced by the Project:	EXPLANATION of methodology used to calculate railroad crossing delay, if applicable.	Synchro or HCM Reports

36.8	31.3	5.5	11400	62700.0	NA	1531500396281_Existing_HCM 2010.pdf

Vehicle Delay Reduced

Total Peak Hour Delay Reduced	62700.0

Measure B:Roadway projects that do not include new roadway segments or railroad grade-separation elements

Total (CO, NOX, and VOC) Peak Hour Emissions without the Project (Kilograms):	Total (CO, NOX, and VOC) Peak Hour Emissions with the Project (Kilograms):	Total (CO, NOX, and VOC) Peak Hour Emissions Reduced by the Project (Kilograms):
0	**0**	**0**

Total

Total Emissions Reduced:	0
Upload Synchro Report	

Please upload attachment in PDF form. (Save Form, then click 'Edit' in top right to upload file.)

Measure B: Roadway projects that are constructing new roadway segments, but do not include railroad grade-separation elements (for Roadway Expansion applications only):

Total (CO, NOX, and VOC) Peak Hour Emissions without the Project (Kilograms):	Total (CO, NOX, and VOC) Peak Hour Emissions with the Project (Kilograms):	Total (CO, NOX, and VOC) Peak Hour Emissions Reduced by the Project (Kilograms):
21.38	19.44	1.94
21	**19**	**2**

Total Parallel Roadway

Emissions Reduced on Parallel Roadways	1.94
Upload Synchro Report	1531501221265_Existing_Emission.pdf

Please upload attachment in PDF form. (Save Form, then click 'Edit' in top right to upload file.)

New Roadway Portion:

Cruise speed in miles per hour with the project:	35.0
Vehicle miles traveled with the project:	613200.0
Total delay in hours with the project:	0
Total stops in vehicles per hour with the project:	0
Fuel consumption in gallons:	23373.252
Total (CO, NOX, and VOC) Peak Hour Emissions Reduced or Produced on New Roadway (Kilograms):	2330.313
EXPLANATION of methodology and assumptions used:(Limit 1,400 characters; approximately 200 words)	A cruise speed of 35 mph was used on the new roadway. This is consistent with the speed limit on Helmo Avenue north of I-94. To calculate the gallons of fuel consumed, the fuel emission equation from Chapter 18 of the Synchro User guide was used, this equation is consistent with the methodology outlined in the application. The 6.35 gallons is based on 10% of the ADT using the new bridge within the peak hour. The calculation assumes no delay and no stops on the new roadway as there is no traffic control on the new roadway that would cause NB/SB vehicles to stop. The total travel used for the fuel calculation was calculated by multiplying 1,050 vehicles per hour by the segment length of 0.16 miles and the speed assume in K4 and K5 was equal to the cruising speed.
Total (CO, NOX, and VOC) Peak Hour Emissions Reduced by the Project (Kilograms):	-2328.373

Measure B:Roadway projects that include railroad grade-separation elements

Cruise speed in miles per hour without the project:	0
Vehicle miles traveled without the project:	0
Total delay in hours without the project:	0
Total stops in vehicles per hour without the project:	0
Cruise speed in miles per hour with the project:	0
Vehicle miles traveled with the project:	0
Total delay in hours with the project:	0
Total stops in vehicles per hour with the project:	0

Fuel consumption in gallons (F1)	0
Fuel consumption in gallons (F2)	0
Fuel consumption in gallons (F3)	0
Total (CO, NOX, and VOC) Peak Hour Emissions Reduced by the Project (Kilograms):	0
EXPLANATION of methodology and assumptions used:(Limit 1,400 characters; approximately 200 words)	

Measure A: Benefit of Crash Reduction

Crash Modification Factor Used: *(Limit 700 Characters; approximately 100 words)*	1. a)91 Radio Drive/Inwood Avenue 2. a)0.98 3. a)3000 ADT 4. a)3.2 crashes
Rationale for Crash Modification Selected: *(Limit 1400 Characters; approximately 200 words)*	5.New roadway will be a 2-lane Urban high-volume roadway with a crash rate of 0.67. Using this rate and an ADT of 3000, approximately 0.35 crashes are anticipated on the new roadway due to the relocated traffic. 6.There will be an estimated 3.2 crashes reduced, however 0.35 new crashes are anticipated on the new roadway, thus there is a net change of 2.85 crashes. This value divided by a total of 30 crashes (2.85/32) equals a crash reduction of 0.089 or 9%.
Project Benefit ($) from B/C Ratio:	627655.0
Worksheet Attachment *Please upload attachment in PDF form.*	1531504357328_Radio_Inwood_Non_INT_Crashes.pdf

Roadway projects that include railroad grade-separation elements:

Current AADT volume:	0
Average daily trains:	0
Crash Risk Exposure eliminated:	0

Measure A: Multimodal Elements and Existing Connections

Response:

The project proposes adding a multi-use bike and pedestrian trail and roadway lanes -the improvements- to a proposed bus rapid transit (BRT) exclusive bridge. The improvements will positively impact the regional and local transportation systems by connecting existing and proposed neighborhoods and infrastructure as well as remove a physical barrier for cyclists, pedestrians and autos. The project will improve the accessibility, safety, and travel experience of users by establishing new a multi-modal connection over I-94, connecting neighborhoods and employment areas in Oakdale to employment and retail areas in Woodbury.

The multi-use trail is an essential component of a multi-modal corridor through Helmo Station, Oakdale's first planned transit oriented development. The Helmo Station BRTOD plan includes the addition of 1.2 miles of multi-use trails and 1.6 miles of sidewalks that will connect adjacent neighborhoods to Helmo Station and the multi-use trail on the bridge.

The multi-use trail, connecting Oakdale to Woodbury, is a crucial element necessary for creating a continuous multi-use trail along the BRT line from St. Paul to Woodbury. In addition, the multi-purpose trail will connect the Regional Bicycle Transportation Network Tier 2 corridor and alignment on Stillwater Boulevard and 10th Street North in Oakdale with the Tier 1 alignment on Valley Creek Road in Woodbury.

The new bridge will remove the significant physical barrier of I-94 for all users of the transportation system. Specifically, without roadway expansion there will not be a direct route for cars, pedestrians and cyclists between the two communities. In addition, this connection will relieve congestion on CSAH 13 three-quarters of a mile to the east. Users of the roadway lanes and multi-use trail will be safely integrated with a dedicated route to areas with multiple resources including transit stations, housing, trails, employment opportunities, and retail.

The proposed infrastructure aligns with the 2040 Transportation Policy Plan in several aspects. The project meets the criteria for Critical Bicycle Transportation Links because continuity and connections will be improved between jurisdictions and provide an alternative crossing over a barrier. The proposed multi-use trail also applies to Other Key Investment Prioritization Factors outlined in the Plan through its location along a high frequency bus route and BRTOD at the Helmo transit station.

(Limit 2,800 characters; approximately 400 words)

Transit Projects Not Requiring Construction

If the applicant is completing a transit application that is operations only, check the box and do not complete the remainder of the form. These projects will receive full points for the Risk Assessment.

Park-and-Ride and other transit construction projects require completion of the Risk Assessment below.

Check Here if Your Transit Project Does Not Require Construction

Measure A: Risk Assessment - Construction Projects

1)Layout (30 Percent of Points)

Layout should include proposed geometrics and existing and proposed right-of-way boundaries.

Layout approved by the applicant and all impacted jurisdictions (i.e., cities/counties that the project goes through or agencies that maintain the roadway(s)). A PDF of the layout must be attached along with letters from each jurisdiction to receive points.

100%

Attach Layout

Please upload attachment in PDF form.

Layout completed but not approved by all jurisdictions. A PDF of the layout must be attached to receive points. Yes

50%

Attach Layout 1531504807015_HelmoBielenbergBridgeCostParticipation-20180628.pdf

Please upload attachment in PDF form.

Layout has not been started

0%

Anticipated date or date of completion

2)Review of Section 106 Historic Resources (20 Percent of Points)

No known historic properties eligible for or listed in the National Register of Historic Places are located in the project area, and project is not located on an identified historic bridge	

100%

There are historical/archeological properties present but determination of no historic properties affected is anticipated.

100%

Historic/archeological property impacted; determination of no adverse effect anticipated	Yes

80%

Historic/archeological property impacted; determination of adverse effect anticipated

40%

Unsure if there are any historic/archaeological properties in the project area.

0%

Project is located on an identified historic bridge

3)Right-of-Way (30 Percent of Points)

Right-of-way, permanent or temporary easements either not required or all have been acquired

100%

Right-of-way, permanent or temporary easements required, plat, legal descriptions, or official map complete	Yes

50%

Right-of-way, permanent or temporary easements required, parcels identified

25%

Right-of-way, permanent or temporary easements required, parcels not all identified

0%

Anticipated date or date of acquisition

4)Railroad Involvement (20 Percent of Points)

No railroad involvement on project or railroad Right-of-Way agreement is executed (include signature page, if applicable)	Yes

100%

Signature Page

Please upload attachment in PDF form.

Railroad Right-of-Way Agreement required; negotiations have begun

50%

Railroad Right-of-Way Agreement required; negotiations have not begun.

0%

Anticipated date or date of executed Agreement

Measure A: Cost Effectiveness

Total Project Cost (entered in Project Cost Form):	$5,500,000.00
Enter Amount of the Noise Walls:	$0.00
Total Project Cost subtract the amount of the noise walls:	$5,500,000.00
Points Awarded in Previous Criteria	
Cost Effectiveness	$0.00

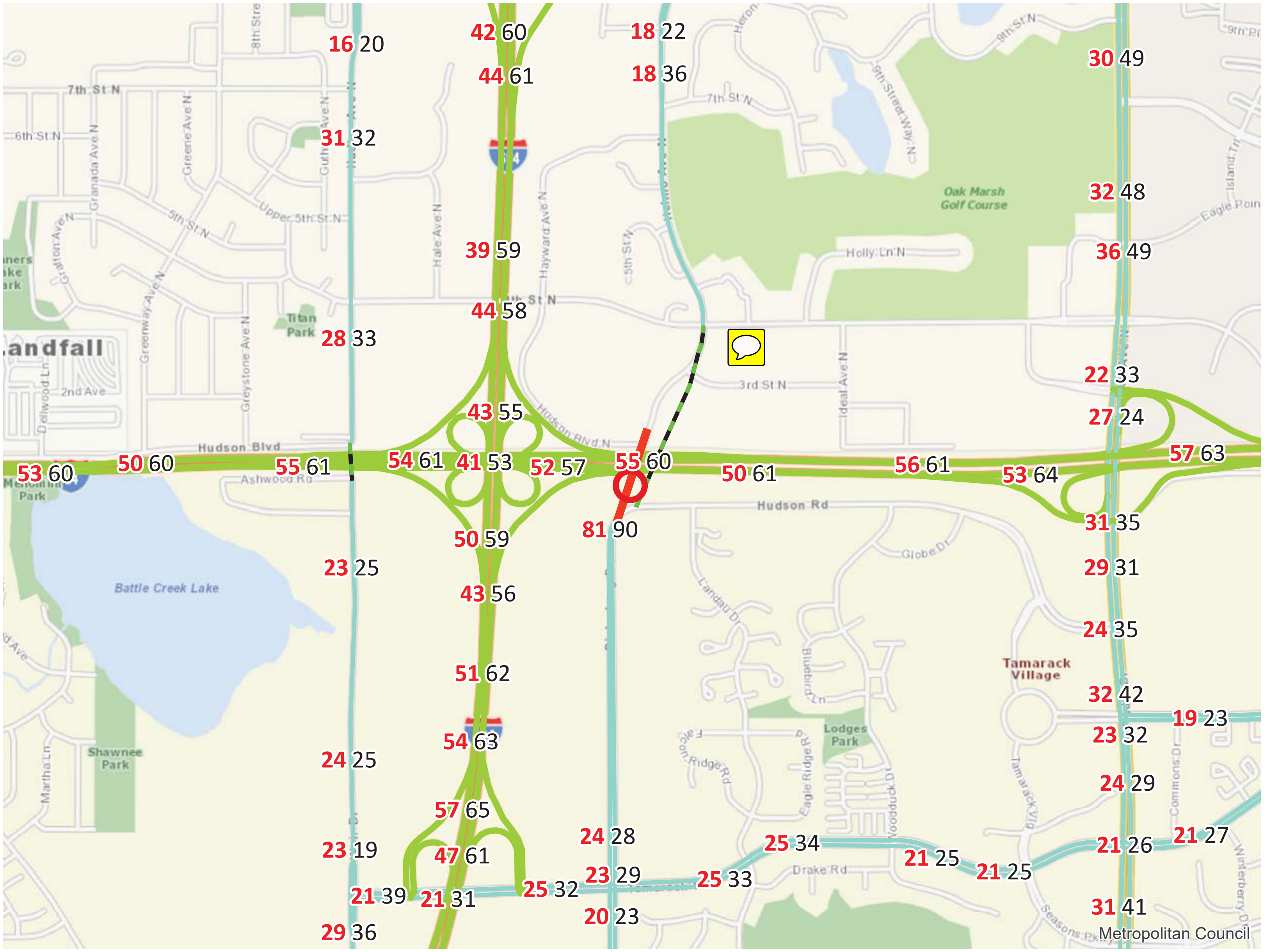
Other Attachments

File Name	Description	File Size
11001_RE_Washington_Attach_LocalPlanningDocs_HelmoBielenbergBridge_PDF.pdf	Local Planning Documents	218 KB
2016-06-01-Health Impact Assessment_FINAL.pdf	Gold Line BRT Health Impact Assessment (HIA)	2.9 MB
2018-062 Regional Solicitation.pdf	Washington County Board of Commissioners Resolution	28 KB
2018-07-05 Helmo Bielenberg Bridge Letter of Support_Woodbury.pdf	Woodbury Letter of Support	144 KB
20180711Oakdale Council Signed Resolution.pdf	Oakdale City Council Resolution of Support	1.7 MB
2030 Comprehensive Plan Amendment_Helmo Station Area.pdf	City of Oakdale - 2030 Comprehensive Plan, Appendix F Helmo Station BRTOD Plan	579 KB
5 Congestion Reduction_Air Quality Explanation Methodology.pdf	Congestion Reduction and Air Quality: Explanation of Methodology and Assumptions Used	331 KB
City of Oakdale 2030 Comprehensive Plan.pdf	City of Oakdale 2030 Comprehensive Plan	162 KB
City of Woodbury 2030 Comprehensive Plan.pdf	City of Woodbury 2030 Comprehensive Plan	162 KB
Existing_Emission.pdf	Measures of Effectiveness Existing Emission	4 KB
Existing_HCM 2010.pdf	HCM 2010 Signalized Intersection Summary	23 KB
Helmo BRTOD Plan_FINAL for web.pdf	Helmo Station BRTOD Plan (Station Area Planning)	12.1 MB
Helmo Station Planned Unit Development_Appendix B.pdf	Helmo Station Planned Unit Development (PUD)	2.4 MB
Local Planning Docs_Helmo Bielenberg Bridge.docx	Local Planning Documents - Helmo/Bielenberg Bridge	21 KB
MnDOT Letter - Helmo-Bielenberg Bridge 2018.pdf	MnDOT Letter of Support	472 KB
New Roadway Emission Calculations.pdf	New Roadway Emission Calculations	409 KB
Oakdale PUD Overview.pdf	Oakdale Helmo Station PUD Overview Rendering	87 KB
Oakdale PUD Side View Rendering.pdf	Oakdale Helmo Station PUD Side View Rendering	129 KB
Oakdale_Helmo Station Traffic Study_Addendum June 2018.pdf	Helmo Station Traffic Study Addendum June 2018	2.1 MB

Project Summary_Helmo Bielenberg Bridge.pdf	Project Summary - Helmo/Bielenberg Bridge	525 KB
Radio_Inwood_Non_INT_Crashes.pdf	Radio/Inwood Non INT Crashes	4 KB
Relocated Traffic_Emission.pdf	Measures of Effectiveness Relocated Traffic	4 KB
Relocated Traffic_HCM 2010.pdf	Relocated Traffic - HCM 2010	23 KB

Level of Congestion

Roadway Expansion Project: Helmo Bielenberg Bridge, METRO Gold Line | Map ID: 1528827153825



Project Points Principal Arterials Principal Arterials Planned

Project A Minor Arterials A Minor Arterials Planned

0 0.175 0.35 0.7 1.05 1.4 Miles

Created: 6/12/2018
LandscapeRSA1

For complete disclaimer of accuracy, please visit http://giswebsite.metc.state.mn.us/gissitenew/notice.aspx

METROPOLITAN COUNCIL

Regional Economy

Roadway Expansion Project: Helmo Bielenberg Bridge, METRO Gold Line | Map ID: 1528827153825

Results

WITHIN ONE MI of project:
Postsecondary Students: 547

Totals by City:

Lake Elmo
Population: 241
Employment: 698
Mfg and Dist Employment: 12

Oakdale
Population: 4856
Employment: 4069
Mfg and Dist Employment: 731

Woodbury
Population: 8369
Employment: 9207
Mfg and Dist Employment: 264

Project Points
Project
Manfacturing/Distribution Centers
Job Concentration Centers

0 0.0375 0.075 0.15 0.225 0.3 Miles

Created: 6/12/2018
LandscapeRSA5

For complete disclaimer of accuracy, please visit
http://giswebsite.metc.state.mn.us/gissitenew/notice.aspx

METROPOLITAN COUNCIL

Transit Connections

Roadway Expansion Project: Helmo Bielenberg Bridge, METRO Gold Line | Map ID: 1528827153825

Results

Transit with a Direct Connection to project:
351 375
*Gold Line
*Gold Line

indicates Planned Alignments

Project Points **Planned Transitway Stations** **Planned Transitway Alignments**

Project — Gold Line — Gold Line

Active Stop — Transit Routes

0 0.05 0.1 0.2 0.3 0.4 Miles

Created: 6/12/2018
LandscapeRSA3

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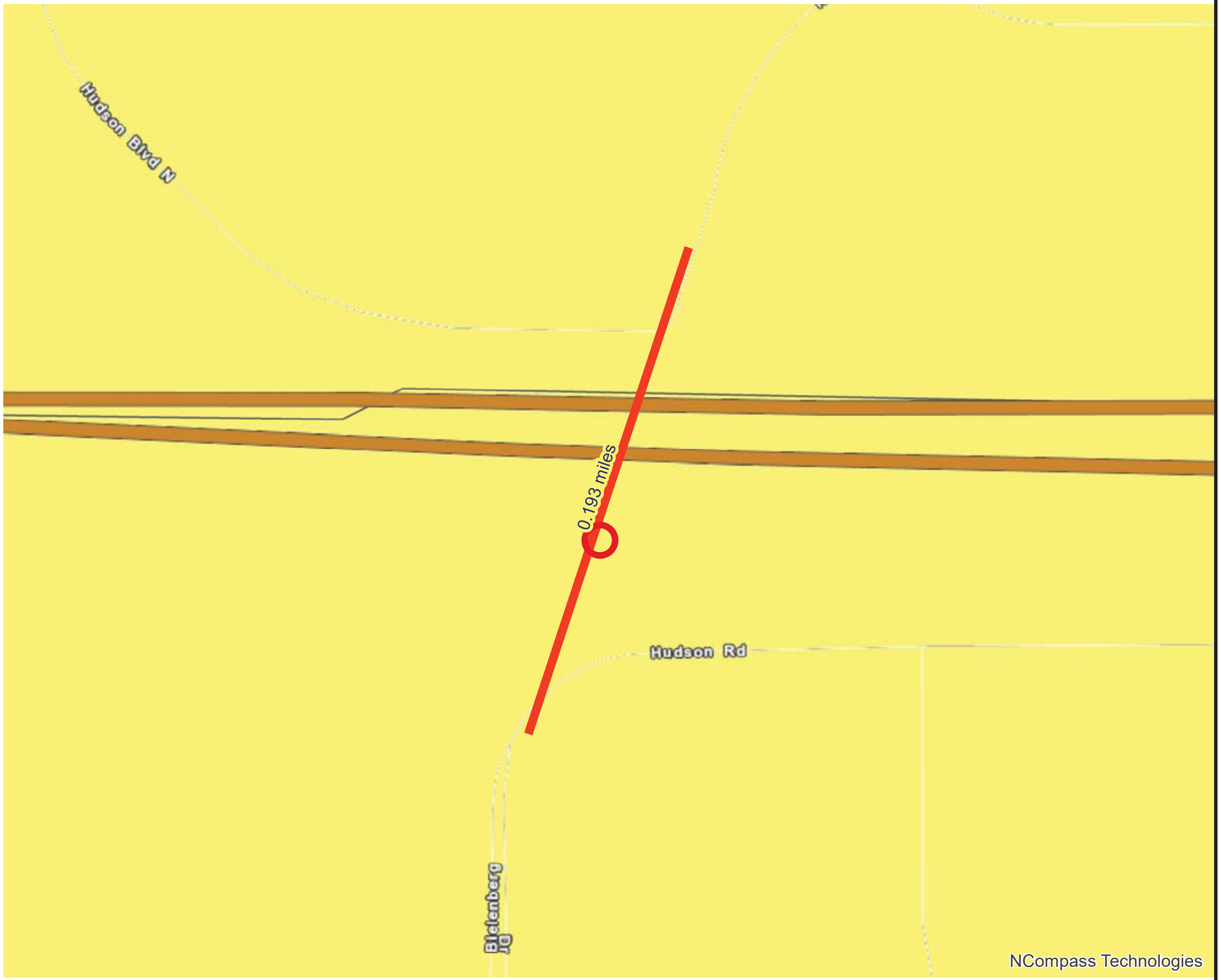
METROPOLITAN COUNCIL

Socio-Economic Conditions

Roadway Expansion Project: Helmo Bielenberg Bridge, METRO Gold Line | Map ID: 1528827153825

Results

Project census tracts are above the regional average for population in poverty or population of color: (0 to 18 Points)



Project Points

Project

Area of Concentrated Povertry > 50% residents of color

Area of Concentrated Poverty

Above reg'l avg conc of race/poverty

0 0.0375 0.075 0.15 0.225 0.3 Miles

Created: 6/12/2018
LandscapeRSA2

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METROPOLITAN COUNCIL

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	120	370	265	55	65	185	880	95	20	755	50
Future Volume (veh/h)	80	120	370	265	55	65	185	880	95	20	755	50
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	82	124	381	273	57	67	191	907	98	21	778	52
Adj No. of Lanes	1	1	1	2	1	1	2	2	1	1	2	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	192	369	313	453	412	350	446	1225	548	84	933	418
Arrive On Green	0.11	0.20	0.20	0.13	0.22	0.22	0.13	0.35	0.35	0.05	0.26	0.26
Sat Flow, veh/h	1774	1863	1583	3442	1863	1583	3442	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	82	124	381	273	57	67	191	907	98	21	778	52
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1721	1863	1583	1721	1770	1583	1774	1770	1583
Q Serve(g_s), s	3.3	4.3	15.0	5.7	1.9	2.6	3.9	17.1	3.3	0.9	15.7	1.9
Cycle Q Clear(g_c), s	3.3	4.3	15.0	5.7	1.9	2.6	3.9	17.1	3.3	0.9	15.7	1.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	192	369	313	453	412	350	446	1225	548	84	933	418
V/C Ratio(X)	0.43	0.34	1.22	0.60	0.14	0.19	0.43	0.74	0.18	0.25	0.83	0.12
Avail Cap(c_a), veh/h	234	369	313	454	412	350	454	1225	548	234	1121	501
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.6	26.1	30.4	31.0	23.7	24.0	30.4	21.8	17.3	34.8	26.3	21.2
Incr Delay (d2), s/veh	1.5	0.5	122.6	2.2	0.2	0.3	0.7	2.4	0.2	1.6	4.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	2.3	17.2	2.8	1.0	1.2	1.9	8.7	1.5	0.5	8.3	0.8
LnGrp Delay(d),s/veh	33.1	26.6	153.0	33.3	23.9	24.3	31.0	24.2	17.4	36.4	31.0	21.4
LnGrp LOS	C	C	F	C	C	C	C	C	B	D	C	C
Approach Vol, veh/h		587			397			1196			851	
Approach Delay, s/veh		109.6			30.4			24.7			30.6	
Approach LOS		F			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.1	31.7	14.5	20.5	15.3	25.5	12.7	22.2
Change Period (Y+Rc), s	5.5	5.5	4.5	5.5	5.5	5.5	4.5	5.5
Max Green Setting (Gmax), s	10.0	24.0	10.0	15.0	10.0	24.0	10.0	15.0
Max Q Clear Time (g_c+I1), s	2.9	19.1	7.7	17.0	5.9	17.7	5.3	4.6
Green Ext Time (p_c), s	0.0	4.0	0.2	0.0	0.2	2.3	0.1	2.0

Intersection Summary	
HCM 2010 Ctrl Delay	43.6
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	70	275	255	50	85	255	1060	695	205	1125	60
Future Volume (veh/h)	60	70	275	255	50	85	255	1060	695	205	1125	60
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	62	72	284	263	52	88	263	1093	0	211	1160	62
Adj No. of Lanes	1	1	1	2	1	1	2	2	1	1	2	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	156	311	265	383	355	302	383	1198	536	245	1292	578
Arrive On Green	0.09	0.17	0.17	0.11	0.19	0.19	0.11	0.34	0.00	0.14	0.37	0.37
Sat Flow, veh/h	1774	1863	1583	3442	1863	1583	3442	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	62	72	284	263	52	88	263	1093	0	211	1160	62
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1721	1863	1583	1721	1770	1583	1774	1770	1583
Q Serve(g_s), s	3.0	3.0	15.0	6.6	2.1	4.3	6.6	26.5	0.0	10.4	27.8	2.3
Cycle Q Clear(g_c), s	3.0	3.0	15.0	6.6	2.1	4.3	6.6	26.5	0.0	10.4	27.8	2.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	156	311	265	383	355	302	383	1198	536	245	1292	578
V/C Ratio(X)	0.40	0.23	1.07	0.69	0.15	0.29	0.69	0.91	0.00	0.86	0.90	0.11
Avail Cap(c_a), veh/h	198	311	265	384	355	302	384	1203	538	247	1301	582
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.7	32.4	37.4	38.4	30.2	31.1	38.4	28.4	0.0	37.8	26.9	18.8
Incr Delay (d2), s/veh	1.6	0.4	76.1	5.0	0.2	0.5	5.0	10.6	0.0	25.2	8.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	1.6	12.1	3.4	1.1	1.9	3.4	14.7	0.0	6.8	15.1	1.0
LnGrp Delay(d),s/veh	40.3	32.7	113.4	43.4	30.4	31.6	43.4	39.0	0.0	63.0	35.4	18.9
LnGrp LOS	D	C	F	D	C	C	D	D		E	D	B
Approach Vol, veh/h		418			403			1356			1433	
Approach Delay, s/veh		88.7			39.2			39.9			38.8	
Approach LOS		F			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.9	35.9	15.5	20.5	15.5	38.3	13.4	22.6
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Max Green Setting (Gmax), s	12.5	30.5	10.0	15.0	10.0	33.0	10.0	15.0
Max Q Clear Time (g_c+I1), s	12.4	28.5	8.6	17.0	8.6	29.8	5.0	6.3
Green Ext Time (p_c), s	0.0	1.8	0.1	0.0	0.1	3.0	0.0	1.4

Intersection Summary	
HCM 2010 Ctrl Delay	45.0
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	235	150	805	0	0	0	0	1775	525	100	1330	225
Future Volume (veh/h)	235	150	805	0	0	0	0	1775	525	100	1330	225
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	198	216	830				0	1830	541	103	1371	0
Adj No. of Lanes	1	1	2				0	3	1	2	2	1
Peak Hour Factor	0.97	0.97	0.97				0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	2
Cap, veh/h	514	540	918				0	2128	663	359	2071	927
Arrive On Green	0.29	0.29	0.29				0.00	0.42	0.42	0.10	0.59	0.00
Sat Flow, veh/h	1774	1863	3167				0	5253	1583	3442	3539	1583
Grp Volume(v), veh/h	198	216	830				0	1830	541	103	1371	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583				0	1695	1583	1721	1770	1583
Q Serve(g_s), s	7.9	8.2	22.2				0.0	28.8	26.6	2.4	23.1	0.0
Cycle Q Clear(g_c), s	7.9	8.2	22.2				0.0	28.8	26.6	2.4	23.1	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	514	540	918				0	2128	663	359	2071	927
V/C Ratio(X)	0.38	0.40	0.90				0.00	0.86	0.82	0.29	0.66	0.00
Avail Cap(c_a), veh/h	533	560	952				0	2135	665	390	2108	943
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	25.0	25.1	30.1				0.0	23.3	22.6	36.4	12.4	0.0
Incr Delay (d2), s/veh	0.5	0.5	11.6				0.0	3.8	7.8	0.4	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	4.3	11.2				0.0	14.1	13.0	1.2	11.5	0.0
LnGrp Delay(d),s/veh	25.5	25.6	41.7				0.0	27.1	30.5	36.9	13.1	0.0
LnGrp LOS	C	C	D					C	C	D	B	
Approach Vol, veh/h		1244						2371			1474	
Approach Delay, s/veh		36.3						27.8			14.8	
Approach LOS		D						C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	14.7	42.4		31.1		57.1		
Change Period (Y+Rc), s	5.5	5.5		5.5		5.5		
Max Green Setting (Gmax), s	10.0	37.0		26.5		52.5		
Max Q Clear Time (g_c+I1), s	4.4	30.8		24.2		25.1		
Green Ext Time (p_c), s	0.1	6.1		1.3		25.7		

Intersection Summary	
HCM 2010 Ctrl Delay	26.1
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	705	50	205	40	25	185	90	1435	50	180	1415	520
Future Volume (veh/h)	705	50	205	40	25	185	90	1435	50	180	1415	520
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	764	0	211	41	26	191	93	1479	52	186	1459	536
Adj No. of Lanes	3	0	1	1	1	1	2	3	1	2	3	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	888	0	414	127	310	263	348	1565	487	384	1617	503
Arrive On Green	0.17	0.00	0.26	0.07	0.17	0.17	0.10	0.31	0.31	0.11	0.32	0.32
Sat Flow, veh/h	5322	0	1583	1774	1863	1583	3442	5085	1583	3442	5085	1583
Grp Volume(v), veh/h	764	0	211	41	26	191	93	1479	52	186	1459	536
Grp Sat Flow(s),veh/h/ln	1774	0	1583	1774	1863	1583	1721	1695	1583	1721	1695	1583
Q Serve(g_s), s	12.4	0.0	10.1	2.0	1.0	10.2	2.2	25.2	2.1	4.5	24.4	28.2
Cycle Q Clear(g_c), s	12.4	0.0	10.1	2.0	1.0	10.2	2.2	25.2	2.1	4.5	24.4	28.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	888	0	414	127	310	263	348	1565	487	384	1617	503
V/C Ratio(X)	0.86	0.00	0.51	0.32	0.08	0.73	0.27	0.94	0.11	0.48	0.90	1.06
Avail Cap(c_a), veh/h	929	0	414	200	315	267	387	1574	490	387	1617	503
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.0	0.0	27.9	39.2	31.3	35.1	36.9	30.0	22.0	37.1	29.0	30.3
Incr Delay (d2), s/veh	8.0	0.0	1.0	1.5	0.1	9.3	0.4	12.0	0.1	1.0	7.4	58.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.7	0.0	4.5	1.0	0.6	5.1	1.1	13.5	0.9	2.2	12.5	20.4
LnGrp Delay(d),s/veh	44.0	0.0	29.0	40.6	31.4	44.4	37.3	42.0	22.1	38.0	36.4	88.7
LnGrp LOS	D		C	D	C	D	D	D	C	D	D	F
Approach Vol, veh/h		975			258			1624			2181	
Approach Delay, s/veh		40.7			42.5			41.1			49.4	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.4	32.8	11.9	28.7	14.5	33.7	20.3	20.3
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Max Green Setting (Gmax), s	10.0	27.5	10.0	20.5	10.0	27.5	15.5	15.0
Max Q Clear Time (g_c+I1), s	6.5	27.2	4.0	12.1	4.2	30.2	14.4	12.2
Green Ext Time (p_c), s	0.2	0.1	0.0	1.0	0.1	0.0	0.4	0.2

Intersection Summary	
HCM 2010 Ctrl Delay	44.7
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.

1: Inwood Ave N & 4th Street N/Hudson Blvd N

Direction	All
Future Volume (vph)	2725
CO Emissions (kg)	3.39
NOx Emissions (kg)	0.66
VOC Emissions (kg)	0.78

2: Inwood Ave/Inwood Ave N & 3rd Street N/I-94 WB Ramps

Direction	All
Future Volume (vph)	4195
CO Emissions (kg)	5.43
NOx Emissions (kg)	1.06
VOC Emissions (kg)	1.26

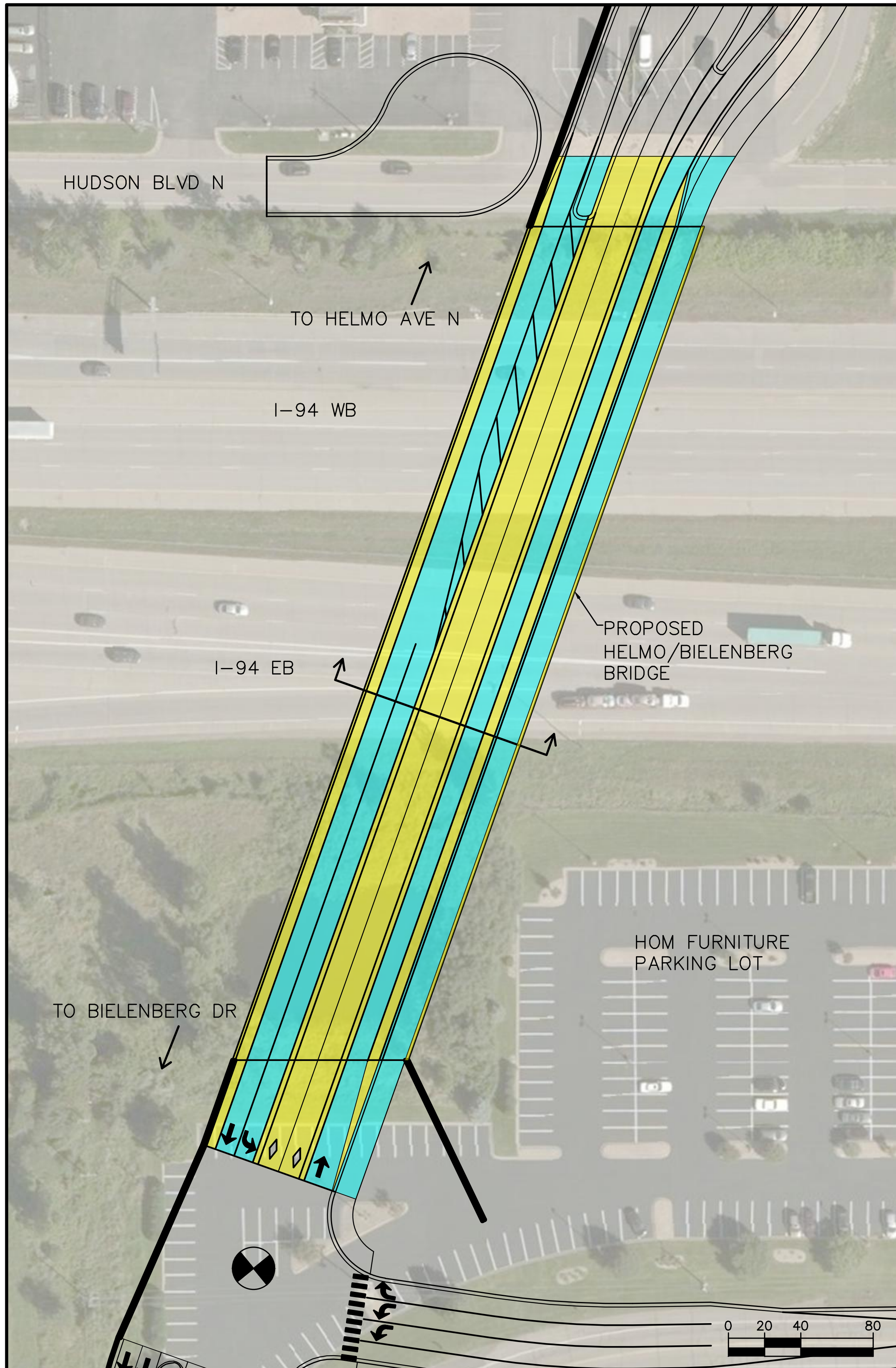
3: Radio Drive/Inwood Ave & EB I-94 Ramp/Woodbury Lakes Road

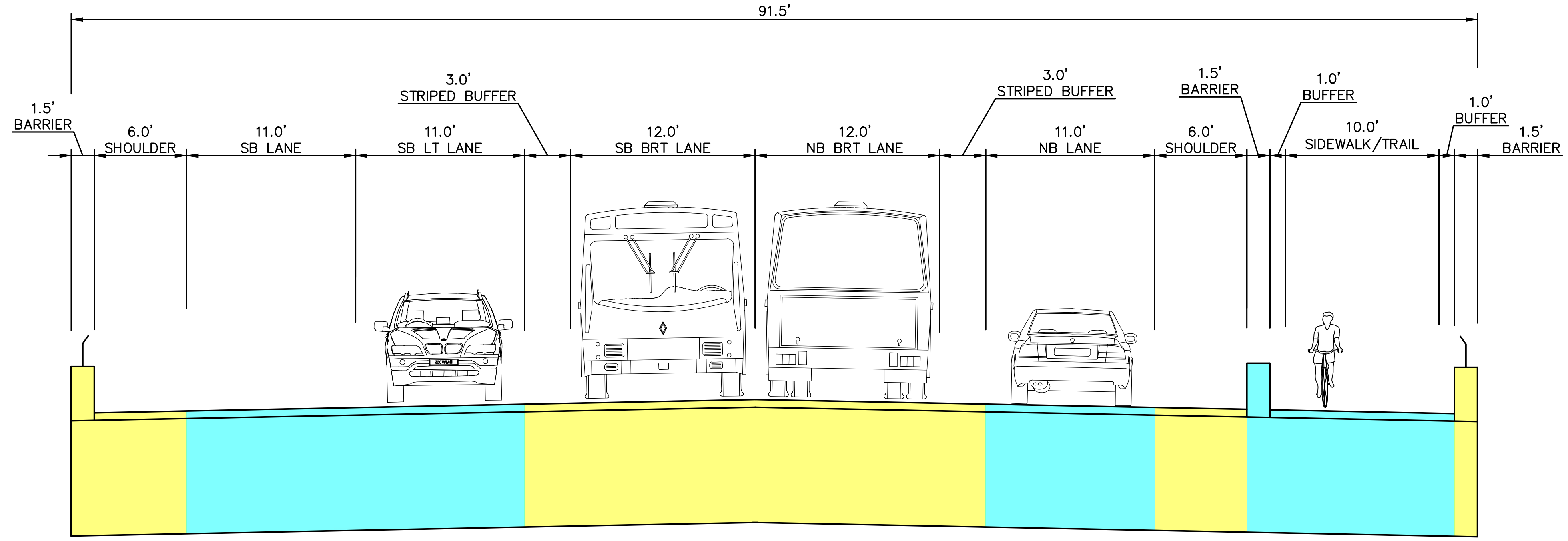
Direction	All
Future Volume (vph)	5145
CO Emissions (kg)	6.17
NOx Emissions (kg)	1.20
VOC Emissions (kg)	1.43

4: Radio Drive & Hudson Road/City Place Blvd

Direction	All
Future Volume (vph)	4901
CO Emissions (kg)	6.56
NOx Emissions (kg)	1.28
VOC Emissions (kg)	1.52

FID	Sys	Route	Ref_Point	Co	City	Month	Day	Year	DyWk	Time	Sev	Diag	Junc	SL	Type	True_Mile:	Route_Coc	UTM_X	UTM_Y	Longitude	Latitude	POINT_X	POINT_Y
29	05-MSAS	41730102	001+00.542	82	4173	1	10	2013	THU	1738	C	1	1	50	1	1.542	5.42E+08	505204.1	4976039	-92.934	44.93776	505204.1	4976039
31	04-CSAH	82000013	007+00.190	82	2100	3	18	2013	MON	1011	N	4	1	45	25	7.19	4.82E+08	505192.8	4977298	-92.9342	44.9491	505192.8	4977298
0	04-CSAH	82000013	007+00.137	82	4173	4	18	2013	THU	1301	N	4	1	30	35	7.137	4.82E+08	505189	4977217	-92.9342	44.94837	505189	4977217
6	04-CSAH	82000013	006+00.937	82	4173	10	16	2013	WED	1330	N	1	1	30	1	6.937	4.82E+08	505199.3	4976726	-92.9341	44.94395	505199.3	4976726
22	04-CSAH	82000013	006+00.406	82	4173	11	2	2013	SAT	1113	N	1	1	20	1	6.406	4.82E+08	505231.1	4976058	-92.9337	44.93794	505231.1	4976058
21	04-CSAH	82000013	006+00.995	82	4173	11	15	2013	FRI	545	N	8	1	45	8	6.995	4.82E+08	505187	4976907	-92.9343	44.94557	505187	4976907
38	04-CSAH	82000013	006+00.965	82	4173	11	19	2013	TUE	1740	C	1	1	45	1	6.965	4.82E+08	505191.3	4976808	-92.9342	44.94469	505191.3	4976808
8	04-CSAH	82000013	007+00.030	82	4173	4	30	2014	WED	1200	N	1	1	45	1	7.03	4.82E+08	505189.6	4977022	-92.9342	44.94661	505189.6	4977022
24	04-CSAH	82000013	007+00.042	82	4173	8	4	2014	MON	1805	N	1	1	50	1	7.042	4.82E+08	505190.6	4977062	-92.9342	44.94697	505190.6	4977062
18	04-CSAH	82000013	006+00.946	82	4173	11	21	2014	FRI	1730	N	90	1	45	1	6.946	4.82E+08	505196.6	4976746	-92.9341	44.94412	505196.6	4976746
2	05-MSAS	41730117	001+00.100	82	4173	11	28	2014	FRI	1438	C	1	1	50	1	1.1	5.42E+08	505199.3	4976726	-92.9341	44.94395	505199.3	4976726
34	04-CSAH	82000013	006+00.975	82	4173	12	5	2014	FRI	1700	N	1	1	45	1	6.975	4.82E+08	505189.9	4976841	-92.9342	44.94498	505189.9	4976841
37	04-CSAH	82000013	006+00.994	82	4173	12	14	2014	SUN	1410	C	1	1	50	1	6.994	4.82E+08	505187.1	4976903	-92.9342	44.94554	505187.1	4976903
26	04-CSAH	82000013	007+00.142	82	4173	12	20	2014	SAT	1718	N	1	1	50	1	7.142	4.82E+08	505189.4	4977225	-92.9342	44.94844	505189.4	4977225
23	04-CSAH	82000013	007+00.299	82	2100	12	22	2014	MON	1742	N	1	1	45	1	7.299	4.82E+08	505201.5	4977460	-92.9341	44.95056	505201.5	4977460
28	04-CSAH	82000013	007+00.142	82	4173	12	23	2014	TUE	1507	N	1	1	50	1	7.142	4.82E+08	505189.4	4977225	-92.9342	44.94844	505189.4	4977225
19	04-CSAH	82000013	007+00.266	82	2100	12	20	2014	SAT	1328	N	1	1	45	1	7.266	4.82E+08	505199	4977413	-92.9341	44.95013	505199	4977413
40	04-CSAH	82000013	007+00.147	82	4173	1	5	2015	MON	1724	N	4	1	50	32	7.147	4.82E+08	505189.7	4977232	-92.9342	44.94851	505189.7	4977232
7	04-CSAH	82000013	007+00.145	82	4173	4	10	2015	FRI	708	N	99	1	50	32	7.145	4.82E+08	505189.6	4977229	-92.9342	44.94848	505189.6	4977229
25	04-CSAH	82000013	007+00.042	82	4173	4	21	2015	TUE	1745	C	1	1	50	1	7.042	4.82E+08	505190.6	4977062	-92.9342	44.94697	505190.6	4977062
10	04-CSAH	82000013	006+00.674	82	4173	5	4	2015	MON	1557	N	1	1	50	1	6.674	4.82E+08	505215	4976487	-92.9339	44.9418	505215	4976487
39	04-CSAH	82000013	007+00.139	82	4173	6	2	2015	TUE	1318	N	4	1	50	26	7.139	4.82E+08	505189.1	4977220	-92.9342	44.9484	505189.1	4977220
15	10-M	28880501	000+00.000	82	2888	6	4	2015	THU	1722	N	1	1	45	1	0	1.03E+09	505173.4	4977479	-92.9344	44.95073	505173.4	4977479
9	04-CSAH	82000013	006+00.937	82	4173	6	13	2015	SAT	2130	N	1	1	45	1	6.937	4.82E+08	505199.3	4976726	-92.9341	44.94395	505199.3	4976726
35	04-CSAH	82000013	007+00.071	82	2100	7	14	2015	TUE	1704	N	1	1	45	1	7.071	4.82E+08	505189.9	4977117	-92.9342	44.94747	505189.9	4977117
13	04-CSAH	82000013	007+00.172	82	4173	8	20	2015	THU	1319	N	1	1	30	1	7.172	4.82E+08	505191.4	4977270	-92.9342	44.94885	505191.4	4977270
1	04-CSAH	82000013	007+00.137	82	4173	10	16	2015	FRI	1240	N	1	1	45	1	7.137	4.82E+08	505189	4977217	-92.9342	44.94837	505189	4977217
20	04-CSAH	82000013	006+00.637	82	4173	10	19	2015	MON	2135	C	1	1	50	1	6.637	4.82E+08	505219.3	4976440	-92.9338	44.94137	505219.3	4976440
32	04-CSAH	82000013	006+00.647	82	4173	11	19	2015	THU	1745	N	1	1	45	1	6.647	4.82E+08	505216.8	4976462	-92.9339	44.94157	505216.8	4976462
27	04-CSAH	82000013	007+00.142	82	4173	11	17	2015	TUE	1059	C	7	1	40	24	7.142	4.82E+08	505189.4	4977225	-92.9342	44.94844	505189.4	4977225
33	04-CSAH	82000013	006+00.647	82	4173	12	18	2015	FRI	1731	N	1	1	45	1	6.647	4.82E+08	505216.8	4976462	-92.9339	44.94157	505216.8	4976462
30	04-CSAH	82000013	006+00.407	82	4173	12	20	2015	SUN	1928	N	2	1	40	1	6.407	4.82E+08	505231	4976060	-92.9337	44.93795	505231	4976060





PROPOSED TYPICAL SECTION
HELMO - BIELENBERG BRIDGE

LEGEND

GOLD LINE PROJECT	(yellow)
OTHER	(cyan)

NOTE: GRAPHIC DEPICTS FINAL BRIDGE COMPONENTS. THE CONFIGURATION OF LANES MAY BE REARRANGED BUT BRIDGE WIDTH AND COSTS WILL NOT CHANGE.

0 5 10

DRAFT-WORK IN PROCESS

METRO Gold Line

GOLD LINE BRT

HELMO/BIELENBERG BRIDGE COST PARTICIPATION

Rev 0
6/28/2018

NORTH

METROPOLITAN COUNCIL

Kimley»Horn

Metropolitan Council’s 2040 Transportation Policy Plan

Goal: Transportation System Stewardship, pg 58

Sustainable investments in the transportation system are protected by strategically preserving, maintaining, and operating system assets.

Objectives: A. Efficiently preserve and maintain the regional transportation system in a state of good repair.

B. Operate the regional transportation system to efficiently and cost-effectively connect people and freight to destinations.

Strategies:

- Regional transportation partners will place the highest priority for transportation investments on strategically preserving, maintaining, and operating the transportation system.

Goal: Safety and Security, pg 60

The regional transportation system is safe and secure for all users.

Objectives: A. Reduce crashes and improve safety and security for all modes of passenger travel and freight transport.

Strategies:

- Regional transportation partners will incorporate safety and security considerations for all modes and users throughout the processes of planning, funding, construction, operation.
- Regional transportation partners will use best practices to provide and improve facilities for safe walking and bicycling, since pedestrians and bicyclists are the most vulnerable users of the transportation system.

Goal: Access to Destinations, pg 62

People and businesses prosper by using a reliable, affordable, and efficient multimodal transportation system that connects them to destinations throughout the region and beyond.

Objectives: A. Increase the availability of multimodal travel options, especially in congested highway corridors.

E. Improve multimodal travel options for people of all ages and abilities to connect to jobs and other opportunities, particularly for historically underrepresented populations.

Strategies:

- Regional transportation partners will continue to work together to plan and implement transportation systems that are multimodal and provide connections between modes. The

Council will prioritize regional projects that are multimodal and cost-effective and encourage investments to include appropriate provisions for bicycle and pedestrian travel.

- Local units of government should provide a system of interconnected arterial roads, streets, bicycle facilities, and pedestrian facilities to meet local travel needs using Complete Streets principles.
- Regional transportation partners will promote multimodal travel options and alternatives to single-occupant vehicle travel and highway congestion through a variety of travel demand management initiatives, with a focus on major job, activity, and industrial and manufacturing concentrations on congested highway corridors and corridors served by regional transit service.
- Regional transportation partners should focus investments on completing Priority Regional Bicycle Transportation Corridors and on improving the larger Regional Bicycle Transportation Network.
- Regional transportation partners will provide or encourage reliable, cost-effective, and accessible transportation choices that provide and enhance access to employment, housing, education, and social connections for pedestrians and people with disabilities.

Goal: Competitive Economy, pg 64

The regional transportation system supports the economic competitiveness, vitality, and prosperity of the region and state.

Objectives: B. Invest in a multimodal transportation system to attract and retain businesses and residents.

Strategies:

- The Council and its partners will invest in regional transit and bicycle systems that improve connections to jobs and opportunity, promote economic development, and attract and retain businesses and workers in the region on the established transit corridors.

Goal: Healthy Environment, pg 66

The regional transportation system advances equity and contributes to communities' livability and sustainability while protecting the natural, cultural, and developed environments.

Objectives: A. Reduce transportation-related air emissions.

B. Reduce impacts of transportation construction, operations, and use on the natural, cultural, and developed environments.

C. Increase the availability and attractiveness of transit, bicycling, and walking to encourage healthy communities and active car-free lifestyles.

D. Provide a transportation system that promotes community cohesion and connectivity for people of all ages and abilities, particularly for historically under represented populations.

Strategies:

- Regional transportation partners will plan and implement a transportation system that considers the needs of all potential users, including children, senior citizens, and persons with disabilities, and that promotes active lifestyles and cohesive communities. A special emphasis should be placed on promoting the environmental and health benefits of alternatives to single-occupancy vehicle travel.
- Transportation partners will protect, enhance and mitigate impacts on the cultural and built environments when planning, constructing, and operating transportation systems.
- Regional transportation partners will use a variety of communication methods and eliminate barriers to foster public engagement in transportation planning that will include special efforts to engage members of historically underrepresented communities, including communities of color, low-income communities, and those with disabilities to ensure that their concerns and issues are considered in regional and local transportation decision making.
- Regional transportation partners will avoid, minimize and mitigate disproportionately high and adverse impacts of transportation projects to the region's historically underrepresented communities, including communities of color, low-income communities, and those with disabilities.

Goal: Leveraging Transportation Investment to Guide Land Use, pg 70

The region leverages transportation investments to guide land use and development patterns that advance the regional vision of stewardship, prosperity, livability, equity, and sustainability.

Objectives: C. Encourage local land use design that integrates highways, streets, transit, walking, and bicycling.

Strategies:

- Local governments within the seven county metropolitan area must prepare comprehensive plans that conform to the Transportation Policy Plan and should recognize the land use and transportation opportunities and challenges that correspond to Thrive MSP 2040 planning areas.
- Local governments should plan for increased density and a diversification of uses in job concentrations, nodes along corridors, and local centers to maximize the effectiveness of the transportation system

Washington County 2040 Comprehensive Plan (draft)

Goal: Support the growth of attractive urban communities while preserving rural functions and appearances. Pg 3-5

Policies:

- Promote land uses throughout the county that encourage active and sustainable living.
- Encourage transit-oriented development (TOD), pedestrian-oriented, neotraditional, suburban-style growth that uses land in an efficient manner in locations that connect to transportation and transit systems.

Strategies:

- Encourage communities to adopt higher densities and mixed land uses within the Metropolitan Urban Service Area that support multimodal transportation, transit-oriented development.
- Encourage communities to approve developments that have a pedestrian orientation, civic focus, and preserve historic structures and districts.
- Encourage communities to keep local streets interconnected and relatively narrow so as to disperse and slow traffic.
- Encourage communities to efficiently reuse land through infill development, rehabilitation, and selective redevelopment.

Goal: Promote land uses throughout the county that encourage active and sustainable living. Pg 3-5

- Encourage cities and developers to create development patterns, including mixed land uses that provide good pedestrian and non-motorized circulation to provide the opportunities for residents to be more physically active.

Goal: Design the land use plan to support economic development. Pg 3-6

Policies:

- Support land use patterns that efficiently connect housing, jobs, transportation, transit, and retail and commercial centers.

Strategies:

- Support development that accommodates non-motorized travel and provides connections to housing, services, jobs, and open space.

Goal: Plan, build, and maintain an interconnected and accessible transportation system that considers all users and modes of travel. Pg 3-8

Policies:

- Coordinate transportation mobility and choice to meet a diversity of needs while considering appropriate system levels of service.

- Work with partners to identify and coordinate transportation system improvements to accommodate new growth and development.
- Ensure broad participation in transportation planning and decision making.
- Pursue federal, state, regional, and local funding opportunities to preserve, maintain, expand, and modernize the transportation network.
- Coordinate with partners to achieve the goals included in the other chapters of the Washington County 2040 Comprehensive Plan.
- Plan, build, and maintain roadways to accommodate existing and future traffic growth.
- Advocate and promote long-term investments in transit including METRO Gold Line, Red Rock Corridor, Rush Line Corridor Extension, and TH 36 Corridor to provide reliable and efficient transit services.

Strategies:

- Support levels and types of transit service that match specific needs of the community based on ridership forecasts, development patterns, and mobility needs.
- Integrate non-motorized accommodations into the design of roadway and transit facilities to increase access to destinations.
- Balance existing and planned land uses with county goals through transportation planning.
- Strategically apply for funding to offset county investment needed for transportation system.
- Identify opportunities to collaborate with intra-county and local partners to achieve Washington County 2040 Comprehensive Plan goals through investments in the transportation system.
- Identify gaps in trail network and prioritize investments to improve non-motorized access to destinations
- Coordinate with Metropolitan Council, MnDOT, and municipalities through project development, engineering, and construction of METRO Gold Line to improve transit access and multimodal networks.
- Collaborate with local communities on station planning, park and rides, land use, streetscape, and other transit-related amenities.
- Implement recommendations from county-led transportation and transit studies.

Goal: Improve safety and efficient for all users. Pg 3-10

Policies:

- Support ongoing safety review process that promotes both proactive and reactive treatments to reduce crashes.
- Use traffic management techniques to improve operations, safety, and useful life of the roadways.

Strategies:

- Develop roadway crossings and trail facilities within county roadway corridors to promote safety for all users.
- Promote access from local roadways to develop and implement corridor-specific access management plans for county roadways to minimize access points on county roadways.

- Coordinate with partners to improve safety and usability of county roadways when developing safe, effective, and implementable strategies in key locations like near schools and at non-motorized crossings.

Goal: Promote positive environmental and health outcome. Pg 3-11

Policies:

- Explore opportunities to improve the environment and encourage physical activity.
- Include strategies and best management practices related to the environment when planning, building, and maintaining transportation facilities.
- Prevent, minimize, or mitigate impacts to natural, cultural, and historic features.

Strategies:

- Identify trail connections to provide links to key destinations.
- Use community-based design to ensure board participation in transportation planning.

City of Oakdale 2030 Comprehensive Plan

Transportation Goals

Goal 1: Collaborate with federal, state, regional agencies, and local jurisdictions on transportation issues to increase connectivity and achieve alternative forms of transportation.

a. Maintain and implement the park and trail plan to ensure the provision of pedestrian and bicycle facilities.

Goal 2: Develop and maintain a safe, efficient and environmentally sensitive transportation system.

Goal 3: Promote a multi-modal transportation plan that is fully integrated with land use planning.

Operational Concerns

<u>2. Helmo Avenue Extension over I-94</u> (page 8-7)

Helmo Avenue is similar to Hadley Avenue, with both roads flanking I-694. It is an important north-south collector between and parallel to I-694 and County Road 13. The City of Woodbury again has a companion route in Bielenberg Drive from Hudson Road south to Valley Creek Drive. The connection of Helmo Avenue and Bielenberg Drive would also provide continuity between the two communities and provide an alternate route to I-694 and 494 or County Road 13.

Appendix F: Gold Line Bus Rapid Transit – Transit-oriented Development (BRTOD) Helmo Station Area Plan

City of Woodbury 2030 Comprehensive Plan

Transportation Goals and Objectives (page 9-3)

Sustainable transportation provides and important framework for the overall transportation goals and objectives as outlined below.

Goals

1. Provide safe and efficient movement of people and goods in and through the City, using a multi-modal approach.
2. Support alternative modes of travel, including transit, pedestrian and bicycle travel.
3. Support transit service for Woodbury residents accessing jobs outside the City, for non-residents accessing jobs within Woodbury and for more local trips within the City and the area.
4. Plan and design transportation facilities to maintain good operational and safety characteristics for the projected travel demand.
5. Use effective transportation planning to help address livability issues such as social, environmental and economic impacts associated with the transportation system.
6. Coordinate transportation planning and land use planning such that transportation facilities efficiently match land use requirements and vice versa.
7. Perform transportation planning as a collaborative effort between the City of Woodbury, its citizens, businesses and other government organizations.

Objectives – Transit

- Coordinate with the Metropolitan Council, Washington County, MnDOT and adjacent communities to promotes and implement enhanced transit in the East Metro area, including express service to the primary downtown areas (St. Paul and Minneapolis) as well as local and suburb-to-suburb service.
- Promote/require site design that accommodates transit access and facilities.

Figure 9-10 Committed and Planned 2030 Roadway Improvement Projects (page 9-29)

Shows planned Bielenberg to Helmo Avenue connection.

Gateway Gold Line Bus Rapid Transit: A Closer Look at Health and Land Use

Technical Report
May 2016

Acknowledgements

Project Partners

A number of community partners contributed expertise and time to this study. The project team is grateful to our partners for their generous and honest feedback throughout the process.

- African American Leadership Forum-Health & Wellness Work Group
- Gateway Corridor Commission
- Gateway Corridor Community Advisory Committee
- Gateway Corridor Policy Advisory Committee
- Gateway Corridor Technical Advisory Committee
- Living Healthy in Washington County
- Metropolitan Council
- Minnesota HIA Coalition and Multimodal Transportation Committee
- Oregon Public Health Institute
- Ramsey County Housing and Redevelopment Authority
- Saint Paul—Ramsey County Community Health Services Advisory Committee
- Washington County Housing and Redevelopment Authority

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Project Team

The Gateway Gold Line Bus Rapid Transit Health Impact Assessment was completed by a project team, comprising staff from Washington County Public Works, Washington County Public Health and Environment, and Saint Paul—Ramsey County Public Health.

Public Works

Public Health and Environment

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About This Document

This document is intended to serve as a resource to those seeking to protect and promote health through evidence-based land use decisions. The complex interaction between health and these conditions means healthcare alone cannot improve our health. In fact, health begins where we spend the most time—at home, at work, and in our communities. For this reason, how we design our communities matters. While this report focuses on Gateway Gold Line Bus Rapid Transit (Gold Line BRT) communities, the document can serve as a reference for planners and public health advocates working to promote health through comprehensive plans. The project summary is available as a separate document, *Gateway Gold Line Bus Rapid Transit: A Closer Look at Health and Land Use Project Summary,* at TheGatewayCorridor.com.

Project Summary

BACKGROUND

Our Environment Shapes Our Health

The places in which we live, work, and play affect our health. Man-made (or built) environments can support or limit healthy behaviors and the ability to get to basic needs and services. Our health begins with decisions on where to place resources such as grocery stores, schools, parks, and health care facilities within our cities and what methods of travel we are able to use. Communities should consider health as early as possible in these decisions to ensure all residents can lead healthy lives. Cities play an essential role in the design of our environments and as a result yield great power in creating healthy communities.

A Local Vision for Health

Cities regularly develop plans for their vision of the future and map how to reach that vision. These plans (called “comprehensive plans”) help guide how cities will develop, where resources like jobs, housing, and trails will be located, and how we will travel throughout our communities. Individual and community health is certainly affected by these planning processes as cities aim to create livable communities. However, health is often missing from comprehensive plans and cities’ mission and vision.

Certain comprehensive plan elements required by the Metropolitan Council—the metropolitan planning organization for the Twin Cities Metropolitan Area—provide opportunities to incorporate health. This study focuses on including health in land use decisions around the Gateway Gold Line Bus Rapid Transit (Gold Line BRT) project. The project team conducted outreach as part of this study and many community members provided feedback about the connection between health and where they live, work, and play. As a result, as cities work to update their comprehensive plans, they should consider health early and often, and engage community members to further define what health means to each community.

The Gold Line BRT is an Opportunity

The Gold Line BRT is a proposed transitway in the East Metro that will connect urban and suburban communities, jobs, retail, education, and recreation destinations. All-day transit service will be provided at the stations and will tie into the growing regional transit system. The route could open for service by 2023 and will provide new economic development opportunities as the region grows. This study (called a health impact assessment) is a part of broad planning efforts for the Gold Line BRT, and focuses on how health can be integrated into the comprehensive plans for the five cities along the corridor: Saint Paul, Maplewood, Landfall, Oakdale, and Woodbury. Because the eastern end of the route and station locations have yet to be determined, this report does not include specific details for some Oakdale and all Woodbury station locations. As part of each city's comprehensive plan, they will need to include the Gold Line BRT station areas and consider improvements around these stations that will work with the new transit line. These station areas present a unique opportunity for each city to implement their vision for a livable and healthy community.

Community Driven Process

The Gold Line BRT project has an extensive technical, policy, and community committee structure. These committees, along with other community groups, determined the factors considered most important to health when it comes to the built environment. Community representatives selected four elements important to health and influenced by land use decisions. These four elements are:

- Connectivity
- Housing
- Jobs
- Safety

Criteria for selecting the elements included:

- Availability of data,
- Interest from a wide range of stakeholders, and
- Ability to influence land use decisions.

Given these criteria, some items—such as air quality and childcare access—discussed by community representatives at outreach meetings were not included in the assessment.

What We Found Out

Community Health Profile

The project team collected information on health outcomes for the Gold Line BRT communities. As land use changes over time, we may see a change in health outcomes. The information collected serves as a baseline for the two counties and five cities along the corridor. For the purpose of this study, the best available data about health conditions are reported at a county level.

The overall health of people in the corridor is generally good by comparison to state and national benchmarks. Health conditions across the corridor demonstrate the impacts that income and education can have on our health. The western portion of the corridor, which is located in Saint Paul and Ramsey County, is characterized by lower median household income and lower high school graduation rates than the state average. Ramsey County also has higher portions of the population experiencing poverty (25% of children) and lacking health insurance compared to statewide numbers. By contrast, in the eastern portion of the corridor, median household income is 40% higher than the state average, but the average wage is well below what would be needed to afford most homes in the area. Outcomes such as high school graduation and low birth weight are also noticeably better than the statewide average.

Social and financial stress for households limits the ability to be healthy. The portion of households that are over-burdened by housing and transportation costs illustrates this struggle. For Ramsey County communities, the portion of income paid toward housing costs is relatively high; in more suburban communities, the combined cost of transportation and housing is significantly high. Additionally, racial and ethnic disparities exist when it comes to homeownership and other factors that influence the ability to be healthy. These disparities place populations of color at a notable disadvantage in achieving healthy outcomes as individuals and families.

How the Elements Influence Health

The following summaries for each health element—connectivity, housing, jobs, and safety—include a vision statement, what we heard from the community, highlights from the *Gold Line BRT Bus Rapid Transit HIA Technical Report* , and opportunities for action.

Connectivity

Vision Statement

Provide convenient and reliable ways to walk or bicycle to basic needs and services.

Why Connectivity Matters to Health

A 2005 article in the American Journal of Preventative Medicine[1] reported that 29% of people using transit to get to work met their daily requirements for physical activity by walking to work.

WHAT THE COMMUNITY IS SAYING

Community members want safe places to walk and bicycle between the station areas, businesses, and neighborhoods. Many respondents selected the presence of sidewalks as being crucial to a healthy community. Providing better pedestrian and bicycle connections will help people get to basic needs and services, while also providing opportunities to be physically active.

BETTER CONNECTIONS IMPROVE HEALTH

The ability to easily get to basic needs and services influence a person's social, economic, physical, and mental well-being. How we design connections (e.g., roads, sidewalks, paths, transit) to basic goods and services determines how easily people can benefit from the availability of these resources. Safe walking and bicycling routes help more people get to public transportation and are crucial connections to healthy foods, schools, jobs, and health services. In addition, safe connections encourage people to be physically active. Improving connections help community members live healthy and productive lives.

Not all people want to or can travel by car. Over 1/5 of the seven-county area's zero vehicle households live in Gold Line BRT communities. Public transportation cannot connect all riders with door-to-door service, and taking transit typically involves walking or bicycling at the beginning and end of the trip. Development patterns in the Gold Line BRT communities vary from one city to another. For example, it is challenging to walk or bicycle near the proposed White Bear Avenue and Sun Ray Stations because the areas include large parking lots and buildings that are located far away from streets and sidewalks. This type of design encourages people to drive to these locations and creates a demand for parking. These areas also discourage walking and bicycling.

What Cities Can Do

Community representatives want cities to ensure that community members have the choice to walk or bicycle to basic needs and services including public transportation. Streets are important for better connections and a grid network provides the best opportunity for travel between destinations. As new businesses and homes are built along the Gold Line BRT, cities can consider opportunities to provide a street network that includes sidewalks and bicycle routes. Developers and property owners are important partners in designing these connections.

In the more developed sections of the Gold Line BRT, pedestrian and bicycle connections are missing and need to be completed. Bicycle lanes on streets leading to station areas can help people travel safely to these areas. If a station area is missing sidewalks, cities need to seek ways to include new sidewalks and trails to support walking and bicycling.

Cities need to consider the safety of pedestrians and bicyclists when completing a network of roads, sidewalks, and bicycle routes. Cities will have the opportunity to determine the safest routes to the station areas and the appropriate design measures (e.g., intersection crossings and lighting) that promote safe environments.

Building placement and design play an important role in creating areas where people can walk and bicycle. Cities can help decrease the demand for parking by developing a mix of land uses (e.g., housing, retail, and offices) near the station areas that support transit, while also building better pedestrian and bicycle networks. These actions provide convenient and reliable ways to walk or bicycle to basic needs and services and allow residents to live active and healthy lives.

Housing

Vision Statement

Increase housing options for all ages, incomes, and lifestyles.

Why Housing Matters to Health

Between now and 2040, the region will add 374,000 households. Roughly 40% of these households will earn less than 80% of area median income ($65,800 for a family of four).

WHAT THE COMMUNITY IS SAYING

Community members noted that affordable housing for all ages and income levels is important to have in the Gold Line BRT station areas. Individuals who selected “access to affordable housing” as an important issue in their community noted a strong relationship between housing and health. One respondent said simply “Access to affordable housing is a top social determinant of health.”

Social determinants of health include the physical and economic environments in which we live, work, and play. Housing, as an example, is the foundation for our daily lives. Where we live is where we sleep, store valuables, recover from illness, and raise of families. Our home and neighborhood conditions influence our ability to make healthy choices.

AFFORDABLE HOUSING IS IMPORTANT FOR PHYSICAL AND MENTAL HEALTH

People unable to afford housing costs are likely to struggle to pay for other basic needs. As a result, these individuals may drop medical insurance, skip meals, or go without proper health care. In addition, fewer affordable housing options may lead to unstable housing conditions including frequent moves, eviction, foreclosure, and even homelessness. Unstable housing can result in a poor quality of life and high levels of stress and depression. When housing is affordable, people have more resources to spend on other basic needs and services, which help support their overall health and well-being.

Transportation costs are the second-largest budget item for most families. When households spend more than 45% of their income on housing and transportation combined, they live in an area that is not affordable. There is a wide range of household spending on housing and transportation along the Gold Line BRT. For example, residents in Saint Paul, an area typically better served by transit, spend 39% of their household income on housing and transportation, while residents in Woodbury spend 53% of their income on housing and transportation. Living near a transit station can help reduce transportation costs for residents or at a minimum provide travel options for those who need them.

What Cities Can Do

Cities evaluate affordable housing needs as part of the comprehensive planning process. An important first step to ensure affordable housing is to plan for a range of housing options. Cities should consider modifying land use plans and other planning tools to ensure support for and to promote a range of housing options at the Gold Line BRT stations. Cities can also explore innovative ways to attract developers to build housing options that fit the needs of their community based on a housing assessment.

Placing housing near grocery stores, jobs, health care, and other services provides opportunities to get to basic needs and services without having to drive or take transit long distances. These services help support overall health and well-being, and having a variety of businesses and land uses near transit stations can help minimize transportations costs and improve the affordability of the area. See the "Connectivity" section for more information on land use at Gold Line station areas.

Jobs

Vision Statement

Increase the number and variety of jobs available along the Gold Line BRT.

Why Jobs Matter to Health

Unemployment and low-paying jobs have been linked with stress and depression. According to research conducted for the Washington County Community Health Assessment, obesity rates among people living in poverty are double the rate of their higher-income peers. This suggests that the ability to get to jobs that provide a living wage is an important factor of health.

WHAT THE COMMUNITY IS SAYING

Community representatives said that having jobs available near the Gold Line BRT stations would encourage people to use transit services. They also stated that it is important to have jobs for a variety of people and skills located near stations because it allows people who do not own a vehicle to get to work.

STABLE, WELL-PAYING JOBS SUPPORT HEALTH

Financial challenges for individuals without a job have serious impacts on individual and family health. A job can mean the difference between struggling to pay for basic needs (e.g., healthy food and health services) and having the choice to lead a healthy, thriving life. People with stable, well-paying jobs tend to live longer and have better physical and mental health.

While cities typically cannot offer a job for every individual living in their community, transit helps connect individuals with employment opportunities. In addition, the ability to get to a job via transit increases the number of potential applicants for positions connected by the regional transit system. In other words, companies can hire from a larger labor pool.

A living wage is the amount needed for a worker to afford the cost of living in their community. This amount varies by location. Living wage jobs increase a person's ability to participate in the economy and to share in its benefits, according to Minnesota Compass. Transit connections improve a person's ability to get to stable, well-paying jobs.

What Cities Can Do

Jobs are spread throughout the region, making it difficult, expensive, and time consuming for workers without a car to reach potential places of employment. Increasing transit connections to jobs is important, as it provides workers with an affordable and reliable way to get to work. It also allows employers to attract and retain employees, regardless of whether the employees have a car. Currently, there are limited transit options along the Gold Line BRT.

Cities could seek opportunities to support new jobs and businesses at the Gold Line BRT station areas. For example, cities can evaluate their economic development plans, land use plans, and planning tools to ensure they support and promote job creation at the Gold Line BRT station areas. Cities can also explore innovative ways to attract new businesses to the station area. Cities should connect jobs to station areas with safe sidewalks and bicycle routes. These elements allow transit riders to travel safely from the station to their place of employment. Please see the “Safety” and “Connectivity” sections for more information on safely connecting communities.

Safety

Vision Statement

Create safe places for walking and bicycling, while reducing crime.

Why Safety Matters to Health

The likelihood of fatalities in crashes involving a vehicle and a pedestrian or person on a bicycle decreases substantially as vehicle speed decreases[2].

WHAT THE COMMUNITY IS SAYING

In addition to personal safety, community representatives commented on the importance of being able to travel to and from stations and other local destinations without fear of getting hit by a car. For example, these stakeholders highlighted the need for complete and well-maintained sidewalks and well-lit streets. They also overwhelmingly selected the presence of sidewalks as being fundamental to a healthy community.

SAFE SPACES CONTRIBUTE TO HEALTHY COMMUNITIES

Crash rates and accident levels have shown that the design of our built environment has not done enough to protect pedestrians and bicyclists. Historically we built our streets (including sidewalks) and intersections to help cars travel quickly between destinations with little focus on walkers and bicyclists. As a result, walking and bicycling have become less safe over time. Often the most frequent users of sidewalks and bicycle routes are individuals with no other transportation options.

Providing a built environment with pedestrian- and bicycle-friendly design is important to safety. The same elements (e.g., street lighting and landscaping) that create welcoming spaces help promote safety both from accidents and from crime. Research has also shown that having more people present in an area helps to deter crime. In addition, these spaces, when designed for both people and cars, can help create a sense of belonging and promote healthy behaviors like physical activity. When designed well, spaces can help meet diverse needs of the population.

In Gold Line BRT communities, personal safety and crime prevention were among the elements perceived as having the greatest influence on creating healthier environments. Community members commented that if they do not feel safe, they are far less likely to use transit. Community members also listed the importance of having good lighting and a variety of services available at the station areas to create more activity on the street.

What Cities Can Do

Cities can create safer places for pedestrians by implementing good design. Good design takes into consideration the built environment including buildings, roads, and sidewalks and how it influences safety. For example, people feel safer when there are many people walking on the street and business entrances are visible from the street. A good design policy that incorporates safety is called “Crime Prevention Through Environmental Design (CPTED),” which focuses on building design, landscaping, and street design to invite more people to public areas and reduce spaces where crime could occur.

Another example of good design is the use of lighting along sidewalks. Sidewalk and street lighting creates a more inviting space and encourages people to be out after dark. Lighting also enables people to observe what is going on around them. The ability to observe surroundings is referred to as natural surveillance. Natural surveillance allows people to easily see their surroundings without any obstructions (e.g., tall fences and hidden alleys) and increases perception of safety in an area. The types and placement of fencing, doors, and windows increases natural surveillance. Cities can work with stakeholders and developers to use good design to achieve safer places.

A safe pedestrian place also includes a connected sidewalk network and safe crossings. Sidewalks on both sides of the street allow pedestrians to get to destinations without walking in traffic. Pedestrian and bicycle connections are more thoroughly discussed in the “Connectivity” section.

Suggested Recommendations

Similar to the way the elements were selected, suggested recommendations were included if positive health outcomes could result from land-use decisions. Suggested recommendations were determined through a review of available research and an analysis of current practices in each city. Since health results from complex interactions between people and their communities, cities have the opportunity to implement solutions they feel best serve their residents. The suggested recommendations listed below can be implemented in any combination to help build healthy, livable communities.

Equity

Because equity regularly came up in conversations with community representatives, is included as part of community health assessments conducted in both Ramsey and Washington Counties, and is one of five outcomes included in ThriveMSP 2040—the regional vision for the Twin Cities Metropolitan Area—it is important cities to consider this topic as part of the comprehensive planning process.

- Link equity to all health elements. Each city should go through their own process to define what equity means to them while considering the Metropolitan Council's definition.

Suggested Actions for City Governments

- Determine what health means to your city and provide health specific questions as you collect input from community representatives for the comprehensive plan.
- Invite diverse individuals to participate in decision-making discussions, including the comprehensive plan.
- Ensure that residents have the choice to walk or bicycle to basic needs and services, not just for recreation. A pedestrian and bicycle assessment could be done to determine gaps and areas of opportunity in the existing network.
- Provide a range of housing options for all incomes, ages, and lifestyles based on the assessment of needs for your own community.
- Plan a mix of land uses at station areas that meet market demand, input from stakeholders, and densities that support transit.
- Assess your plan review policies to ensure that development supports safe communities.

Suggested Actions for Other Stakeholders

- Use the results of this study to talk with city staff and elected officials about the importance of health in your community and in comprehensive plans.
- Participate in local planning and zoning commissions. These committees have an ongoing role in planning. Look for opportunities to attend meetings, provide feedback, and join the committees.
- Educate others on the connections between the built environment, land use, and health.
- Build partnerships between public health advocates and city planners to advance health in city planning processes.

Conclusion

Visions for Health

Each city has an opportunity to create a vision for health as part of the comprehensive planning process. The Gold Line BRT cities—Saint Paul, Maplewood, Landfall, Oakdale, and Woodbury—should strive to understand the power of the built environment in creating healthy spaces and their role in creating more livable communities. The Gold Line BRT station areas can become models for healthy design in each community as cities work to support health through land-use changes.

Technical Report

Introduction

Gateway Gold Line Bus Rapid Transit

Gateway Gold Line Bus Rapid Transit (Gold Line BRT) is a proposed transitway in the Twin Cities Metropolitan Area that will connect urban and suburban communities, corporate campuses, educational and commercial centers, and recreational destinations. The line will run next to Interstate 94 (I-94) in an exclusive lane. The exclusive bus lanes would be part of a separate bus-only system, not added to I-94 and will not take away a lane from the interstate. The Gold Line BRT would be Minnesota's first bus rapid transit (BRT) line in an exclusive lane.

Bus rapid transit (BRT) is a high-quality bus system that delivers fast, comfortable and cost-effective services. Because BRT contains features similar to a light rail system, it is much more reliable, convenient and faster than regular bus services. The system would include the following features:

1. **Bus-only lanes** make for faster travel and ensure that traffic congestion will not delay the buses.
2. **Fare payment at the station**, instead of on the bus, eliminates the delay caused by passengers waiting to pay on board.
3. BRT vehicles receive **signal priority** at intersections.
4. A **station platform level with the bus** allows for quick and easy boarding. This also makes it fully accessible for wheelchairs, disabled passengers, strollers, and carts with minimal delays.

The proposed route for the Gold Line BRT (Figure 1) will serve several different communities with diverse characteristics and needs. A wide range of stakeholders—large and small businesses, neighborhood and community organizations, human service providers, educational institutions, residents, and city governments—have an interest in the proposed station locations and the changes around these station locations. The station areas will influence how people are able to move through their communities and how they connect with essential resources like jobs, education opportunities, and social activities. These connections to basic needs and services shape the decisions we are able to make, including the choices we have to lead healthy lives.

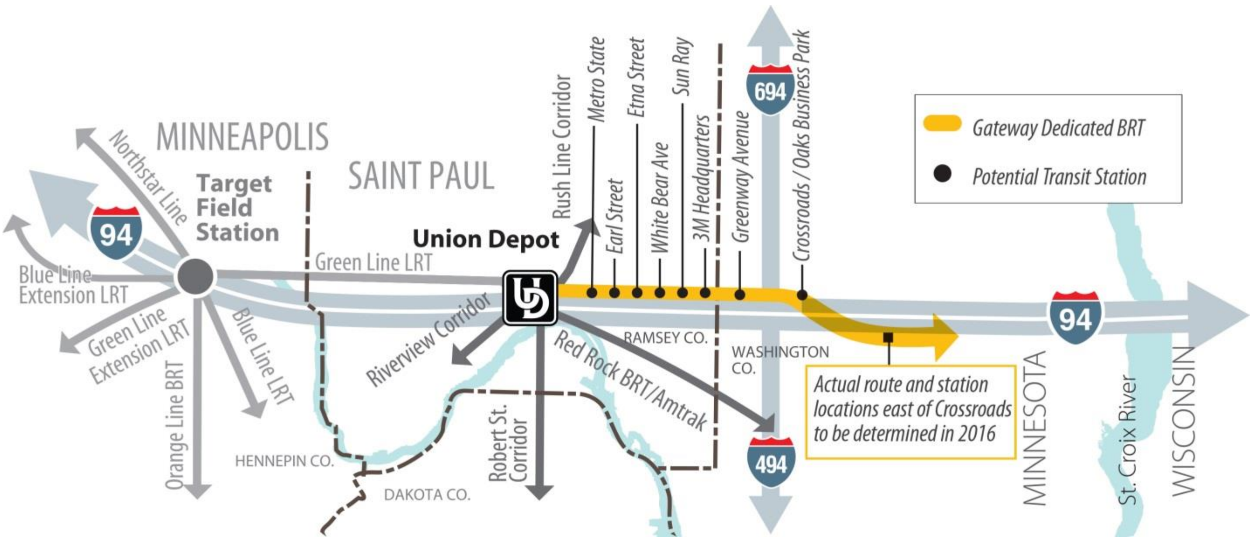


Figure 1: Gateway Gold Line Bus Rapid Transit Map

Transportation, Land Use, and Health

Our health is shaped by the conditions in which we live, work, and play. The complex interaction between health and these conditions means healthcare alone cannot improve our health. In fact, health begins where we spend the most time—at home, at work, and in our communities. For this reason, how we design our community matters. Planners hold great power in building communities where all people have the opportunity to lead healthy lives.

Transportation plays a central role in how we interact in our communities, and these interactions shape our health. Historically, planning decisions have not considered the link between health and transportation. Many of the choices we can make for our health are determined by where we live relative to jobs, schools, grocery stores, parks, and other amenities, as well as our ability to get to those resources. Accordingly, transportation is the critical link to how we can get to basic goods and services, and is a key component to health.

Land use planning means making choices on how land, water, and resources are used, and is a crucial first step in the decisions that design our communities. These decisions determine how people access jobs, education, recreation, commercial, and cultural opportunities in their communities. Cities' land use decisions start with their vision for their community as captured in the comprehensive plans.

Comprehensive Planning

Cities regularly develop comprehensive (or comp) plans to illustrate their vision of the future, map how to reach that vision, and include details on appropriate uses for land in a community. These plans help guide how cities will develop, where resources like jobs, housing, and trails will be located, and how we will travel throughout our communities.

A comprehensive plan is a framework and policy document for changes affecting many aspects in a community, especially changes affecting health. However, health is often missing from comprehensive plans and a city's mission and vision. Considering health early on and often through the comprehensive planning process ensures health becomes central to a city's vision for the future.

The Metropolitan Council—the metropolitan planning organization for the Twin Cities Metropolitan Area—requires the comprehensive plan to address transportation, including details on changes expected from transitway projects like Gold Line BRT. This requirement provides an opportunity to incorporate transit-related health considerations in the plans.

Consequently, comprehensive plans are important policy documents that drive change in a community for years to come, and are valuable tools to support health in a community. The Gold Line BRT is expected to open by 2023, although development and re-development around stations may begin before the route is operational and could occur for many years afterwards. It is important to consider health early and often in these decisions.

Equity

Equity is an important goal of comprehensive planning processes. The plans serve as a record for community consensus on the future actions cities will take, including decisions on the distribution of positive and negative impacts of policies and actions. Variations in these impacts limit people's choices and can lead to avoidable and unfair differences in health. The choices individuals have determine the choices they are able to make. When all people have the opportunity to be healthy, communities are more equitable.

The Metropolitan Council has included equity as an outcome in its vision for the region for the next 20 years. The vision, called Thrive MSP 2040, describes equity as connecting "all residents to opportunity.[3]" Thrive MSP 2040 does not specifically focus on health equity. This broader view of equity focuses on making changes that allow everyone to participate fully in all aspects of society.

While Gold Line BRT HIA participants frequently noted equity as an important issue, they did not select it as one of the final four elements to be studied. Because equity regularly came up in conversations with community representatives, is included as part of community health assessments conducted in both Ramsey and Washington Counties, and is one of five outcomes included in ThriveMSP 2040—the regional vision for the Twin Cities Metropolitan Area—it is important cities consider this topic as part of the comprehensive planning process.

There is no one-size-fits-all approach to equity. Cities can work collaboratively with community members to develop and achieve the plan's vision for an equitable, healthy community. Details included in this report may serve as a resource for conversations on both health and equity.

Why a Health Impact Assessment

The complex interaction between health and these conditions means healthcare alone cannot improve our health. In fact, health begins where we spend the most time—at home, at work, and in our communities. This HIA process provided a framework for reviewing health benefits and impacts of possible land-use changes around Gold Line BRT stations. This study resulted in suggested recommendations on how to incorporate health into comprehensive plans. Since many of the land-use decisions that impact health will be discussed as part of the comprehensive planning process, an HIA allowed project staff to review health benefits and impacts and propose a set of recommendations to Gold Line BRT communities. These recommendations, if adopted, will move health to the center of a community's vision for the future.

The six-step framework provides a systematic process to analyze a proposed policy (e.g., comprehensive plans) for potential benefits and impacts prior to implementation. The six steps are:

- Screening: Identify plans, projects or policies for which an HIA would be useful
- Scoping: Determine which health effects to consider
- Assessment: Analyze risks and benefits and identifying which people may be affected and how
- Recommendations: Suggest changes to promote positive health outcomes or to minimize adverse health effects
- Reporting: Present the results to decision makers and stakeholders
- Monitoring: Track the effect of the HIA on the decision

The HIA process typically includes a broad definition of health, involvement from both decision makers and stakeholders, and explicit consideration of equity. Input for stakeholders, particularly vulnerable populations, should be incorporated in each of the six steps. More information about the HIA is available at http://www.humanimpact.org/new-to-hia/.

This report focuses on three of the steps: Scoping, Assessment, and Recommendations.

What We Studied

HIA Step: Scoping

Stakeholder input guided the development of the project scope. Project participants attended a stakeholder engagement workshop and completed a worksheet to assist project staff in prioritizing the study topics (called elements). See the Acknowledgements section on page ii for more information about project contributors.

The project team finalized the list of elements to be studied in this HIA based on:

- Availability of data
- Interest from a wide range of stakeholders, and
- Ability to influence land use decisions.

Given these criteria, some items—such as air quality and childcare access--discussed by community representative at outreach meetings were not included in the assessment.

Elements to be Studied

Community representatives identified a wide range of health concerns in their communities. Staff sorted the feedback into four broad categories to study in further detail. Because the four elements represent such broad topics, a vision statement was drafted for each element to help focus the assessment on the specific concerns identified by stakeholders. Community groups reviewed the following four elements and supporting vision statements to ensure staff incorporated public input into the project scope. The vision statements are intended to reflect the corridor as a whole, and not individual station areas.

- **Connectivity**: Provide convenient and reliable ways to walk or bicycle to basic needs and services
- **Housing**: Increase housing options for all ages, incomes, and lifestyles
- **Jobs**: Increase the number and variety of jobs available along the Gold Line BRT
- **Safety**: Create safe places from walking and bicycling, while reducing crime

What We Learned

HIA Step: Assessment

The purpose of the assessment was to evaluate the extent to which the existing connectivity, housing, jobs, and safety conditions in the corridor meet the vision statement for each element.

- Connectivity: Do each of the Gold Line BRT communities provide convenient and reliable ways to walk or bicycle to basic needs and services?
- Housing: Do each of the Gold Line BRT communities provide housing options for all ages, incomes, and lifestyles?
- Jobs: Does the Gold Line BRT provide a high number and wide variety of jobs near station locations?
- Safety: Are the Gold Line BRT communities safe places for walking and bicycling? Do they feel safe from crime?

The performance of each city and the corridor as a whole was evaluated using existing data, comprehensive plans, and zoning codes.

Study methodology is available in Appendix A.

Health in the Corridor

The project team collected information on health outcomes for the Gold Line BRT communities. As land use changes over time, we may see a change in health outcomes. The information collected serves as a baseline for the two counties and five cities along the corridor. For the purpose of this study, the best available data about health conditions are reported at a county level. See Table 1 for more information on health conditions in Ramsey and Washington Counties.

The overall health of people in the corridor is generally good in comparison to state and national benchmarks. Health conditions across the corridor demonstrate the impacts to health that income and education can have on our communities. The western portion of the corridor, which is located in Saint Paul and Ramsey County, is characterized by lower median household income and lower high school graduation rates than the state average. Ramsey County also has higher portions of the population experiencing poverty (25% of children) and lacking health insurance compared to statewide numbers. By contrast, in the eastern portion of the corridor, median household income is 40% higher than the state average, but the average wage is well below that needed to afford most homes in the area. Outcomes such as high school graduation and low birth weight are also noticeably better than the statewide average.

Social and financial stress for households limits the ability to be healthy. The portion of house- holds that are over-burdened by housing and transportation costs illustrates this struggle. For Ramsey County communities, the portion of income paid toward housing costs is relatively high; in more suburban communities, the combined cost of transportation and housing is significantly high. Additionally, racial and ethnic disparities exist when it comes to homeownership and other factors that influence the ability to be healthy. These disparities place populations of color at a notable disadvantage in achieving healthy outcomes as individuals and families.

Table 1: Overview Health Data for Gold Line BRT Counties and Minnesota

OVERVIEW DATA	Ramsey	Washington	Minnesota	Years(s)
Population Characteristics				
Median household income	$51,719	$77,069	$56,944	2011
Children in poverty	25.60%	7.10%	15.30%	2011
Morbidity and Mortality				
Reproductive & birth outcomes				
Infant mortality (per 1000 live births)	5.6	4	4.8	2009-2013
% Low birth weight (≤ 5.5 lbs)	2.4	1.6	1.8	2009-2013
% Premature births (< 37 wks gestation)	7.8	6.9	7.4	2009-2013
Hospitalizations (per 100,000)				
Asthma emergency department visit	61.3	25.2	40.1	2011-2013
Asthma hospitalization	8.2	3.6	6.1	2011-2013

COPD hospitalizations	26.7	19.4	29.3	2011-2013
Heart attack hospitalizations	26.2	26.2	26.7	2011-2013
OVERVIEW DATA	**Ramsey**	**Washington**	**Minnesota**	**Year(s)**
Cancer incidence (per 100,000)				
All cancer types combined	469.9	495.9	466.2	2008-2012
Breast	129.5	144.7	130.3	2008-2012
Lung and bronchus	57.6	56	55.4	2008-2012
Colorectal	36.7	40.1	41	2008-2012
Melanoma	23.9	31.2	27.1	2008-2012
Non-Hodgkin lymphoma	24.2	23.7	23	2008-2012
Bladder	22.8	24.2	22.8	2008-2012
Leukemia	16.3	17.1	16	2008-2012
Kidney	13.6	15.8	15.6	2008-2012
Access to Health Services				
Uninsured				
% People ≤ age 65 without insurance	11.2	6.4	9.2	2012
Childhood immunizations				
Children who receive full series	51.2	53.8	62.9	2013
Primary Care Physicians				
Population to Primary Care Physicians ratio	953:1	884:1	1113:1	2012
Dentists				
Population to Dental Care Provider ratio	1272:1	1451:1	1529:1	2013
Mental Health Providers				
Population to Mental Health Provider ratio	298:1	544:1	529:1	2014
CONNECTIVITY	**Ramsey**	**Washington**	**Minnesota**	**Years(s)**
Healthy Eating				
Food environment index score (0 to 10)	7.7	9.0	8.3	2012
% Eating ≥ 5 servings/day fruits & vegetables	34.3	34.4	**	2014
Physical Activity				
% Adults meeting physical activity guidelines	52.4	57.4	52.7	2013-2014
Disease Burden				
% Adult obesity (BMI ≥ 30)	26.7	23.5	25.5	2013-2014
% Adults ever diagnosed with Diabetes	7.7	6.6	7.4	2013-2014
High Blood Pressure Prevalence	22.3	22.9	27.0	2013-2014
HOUSING	**Ramsey**	**Washington**	**Minnesota**	**Years(s)**
Mental Health				
% Householders ≤ 65 years old living alone	10.3	7.8	10.1	2010-2014
SAFETY	**Ramsey**	**Washington**	**Minnesota**	**Years(s)**
Injury and Death due to Falls, Age 65+ (per 100,000)				
Fall injury emergency department visits	2763.4	3617.0	2850.5	2008-2012

Fall injury hospitalizations	1842	1875	1502	2008-2012
Fall deaths	9.0	9.8	11.8	2008-2012

Many of the conditions in Table 1 are considered social determinants of health, the physical and economic environments in which we live, work, and play. These determinants have direct impacts on individual health and the health of a community. Differences between the counties and the region may highlight particular opportunities to improve health. More information on community health is available in the Ramsey County[4] and Washington County[5] community health assessments.

Need for Transit

Approximately 64,600 people live within a one-mile radius of the Gold Line BRT with a projected growth of nearly 30% by 2040[6]. Approximately 32,000 people without a vehicle live near the proposed transitway representing over 20% of the "zero-vehicle" population in the Twin Cities, and this percentage is greater than the regional average due in part to significantly higher than average numbers in Saint Paul, Maplewood, and Oakdale. The current transit system has a limited number of options available to connect people in the east metro with employment, retail, education, and social activities.

Poverty in Gold Line BRT Communities

Gold Line BRT communities experience differences along racial and ethnic lines that limit opportunities for people of color to lead healthy lives. To illustrate, several Gold Line BRT stations are located in Saint Paul's East Side, where 55% of residents live in poverty, dramatically higher than the metro area poverty rate of 10.3%. Additionally, the East Side saw a decrease of more than half its white population between 1990 and 2010. By 2010, 26% of the area's residents were foreign-born, with Asians becoming the largest community of color. The Asian community in Saint Paul's East Side accounts for 28% of the Asian population in the metro area.

Racial and ethnic disparities in the metro region are a challenge to future economic vitality, and transit projects like Gold Line BRT can help connect residents to the opportunities necessary to lead healthy, prosperous, and equitable lives. Cities should understand the differences experienced by people of color and other vulnerable populations in their communities. Since equity is an important goal in comprehensive planning processes, cities can work collaboratively with community members to develop and achieve the plan's vision for an equitable, healthy community.

Results by Element

Connectivity

Vision Statement

Provide convenient and reliable ways to walk or bicycle to basic needs and services.

Relationship to Health

Connectivity refers to the ability to get to basic needs, services, activities, and destinations. Examples of these basic needs and services include schools, grocery stores, and health care providers. Being able to reach these types of destinations is essential for healthy communities. A Federal Highway Administration (FHWA) study completed in 2013[7] reported fewer transportation options could lead to increased transportation costs and inequitable access to employment, housing, and healthy foods.

In relation to transportation, this element also covers physical connectivity of all types of transportation including travel by car, transit, bicycle, and foot. Adequate pedestrian, bicycle, and transit infrastructure is necessary to create safe connections for all users, including people who do not own a vehicle. These transportation types also allow people to increase their physical activity. For example, American Journal of Preventative Medicine (2005) found 29% of people using transit to get to work met their daily requirements for physical activity from walking to work[8].

Community Input

Walking and Bicycling to Destinations

Design decisions influence how people perceive distances to destinations, their willingness and ability to get to a location, and their safety when traveling. When asked about health in their communities, Gold Line BRT community members noted the need for complete and well-maintained sidewalks, good lighting, and easy access between housing, retail, services, and jobs. Respondents overwhelmingly selected sidewalks as an essential factor in healthy communities. Community members also commented that bicycle trails (both on and off the street) could help increase the safety and convenience of bicycling.

Parking

During the HIA process, community members commented on the need for parking for people who do not live within walking distance of the stations. Parking is challenging for many communities seeking to change from suburban-style developments of the 1970s-2000s to transit-oriented development in station areas. Parking is convenient for drivers, and most businesses outside of downtown Minneapolis and downtown Saint Paul report that parking is essential to their continued prosperity. However, parking requires a lot of space, is visually unappealing, is often underused, creates longer distances between buildings, and impairs the ability to walk between destinations.

Parking is being planned for certain stations (e.g., Sun Ray station area) and is currently available at others (e.g., Union Depot). For stations without parking, and even for those stations with, many riders will walk or bicycle to the stations. Everyone arriving to the Gold Line BRT stations will ultimately use pedestrian amenities, namely sidewalks, during their trip. For example, people arriving by car will use sidewalks to get to the stations and other destinations. As a result, the placement of parking near the stations will influence how all transit users will be able to get to the station.

Existing Conditions

Walking and Bicycling to Destinations

This section includes maps (Figures 2 through 7) of resources like churches, grocery stores, schools, libraries, etc. located within one-half mile of proposed Gold Line BRT stations. The maps are located at the end of this section for easier readability.

In Saint Paul, the sidewalk network is mostly developed at the Union Depot, Mounds Boulevard, and Earl Street station areas. The area near Union Depot (Figure 2) is densely developed and well connected. As such, people can access many destinations by walking or bicycling. The other station locations in Saint Paul (Figure 3) share many characteristics. The locations have incomplete sidewalk networks and lack basic goods and services such as grocery stores or public services near the station areas. For the White Bear Avenue and Sun Ray Stations (Figure 4), destinations are difficult to get to because of the size of the parking lots, location of the buildings on the property (i.e., building setbacks), and the uses allowed in the buildings (i.e., auto-oriented uses such as big-box retail and gas stations). The City of Saint Paul is planning to expand its bicycle network, which will help improve travel options over time.

In Maplewood, the 3M station area (Figure 5) includes buildings that are further apart and have large parking lots. Landfall (Figure 6) has some sidewalks within the community. However, Landfall does not connect with nearby neighborhoods in Oakdale because its streets and sidewalks are internal to the city. Oakdale station areas (Figure 6), like Maplewood, have environments that would be difficult for pedestrians and bicyclists to navigate when trying to get to the Gold Line BRT. Sidewalks are incomplete and not well connected, though certain streets have off-street walking and bicycling paths.

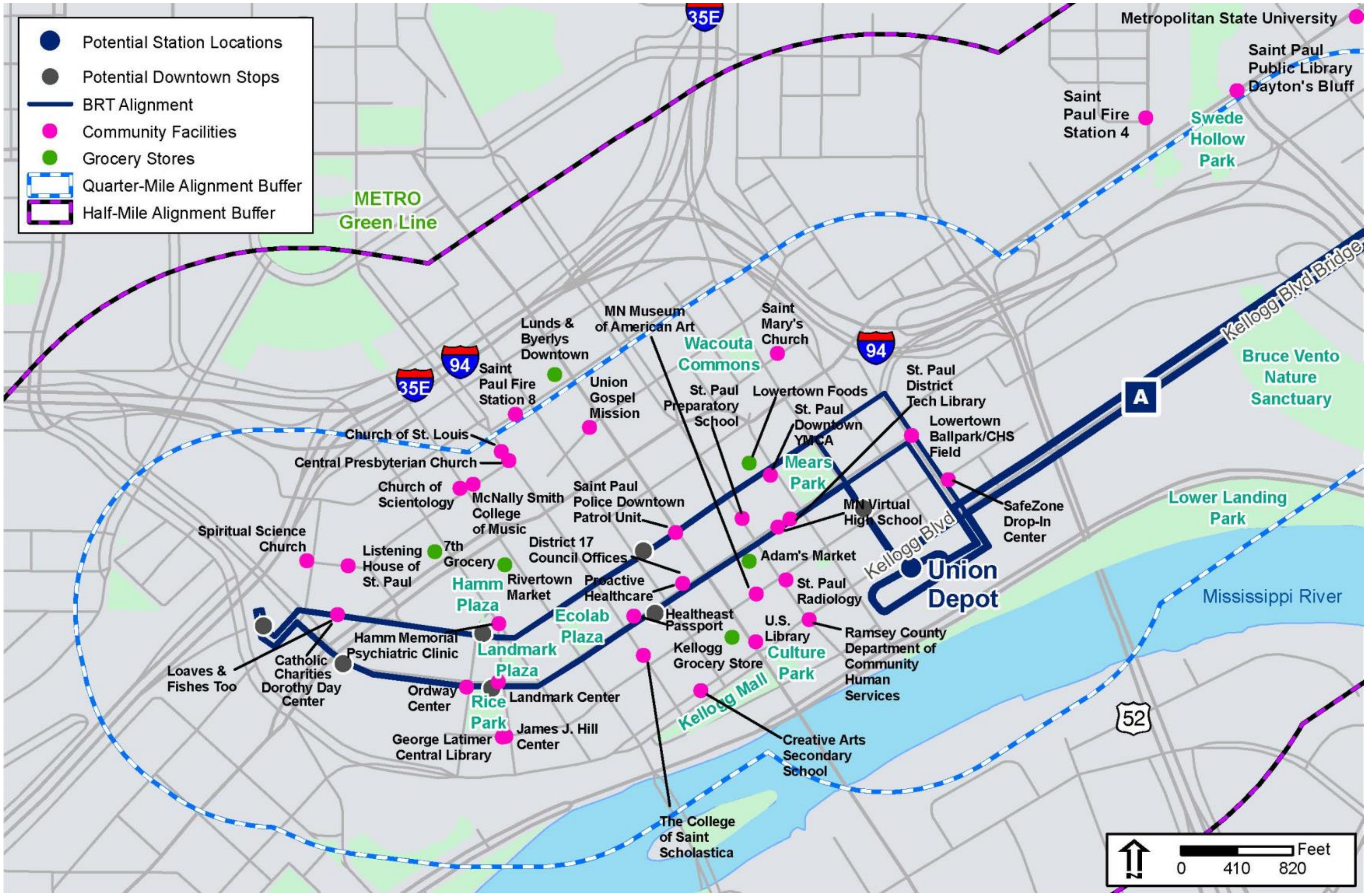


Figure 2: Gold Line BRT - Saint Paul Union Depot Station Area

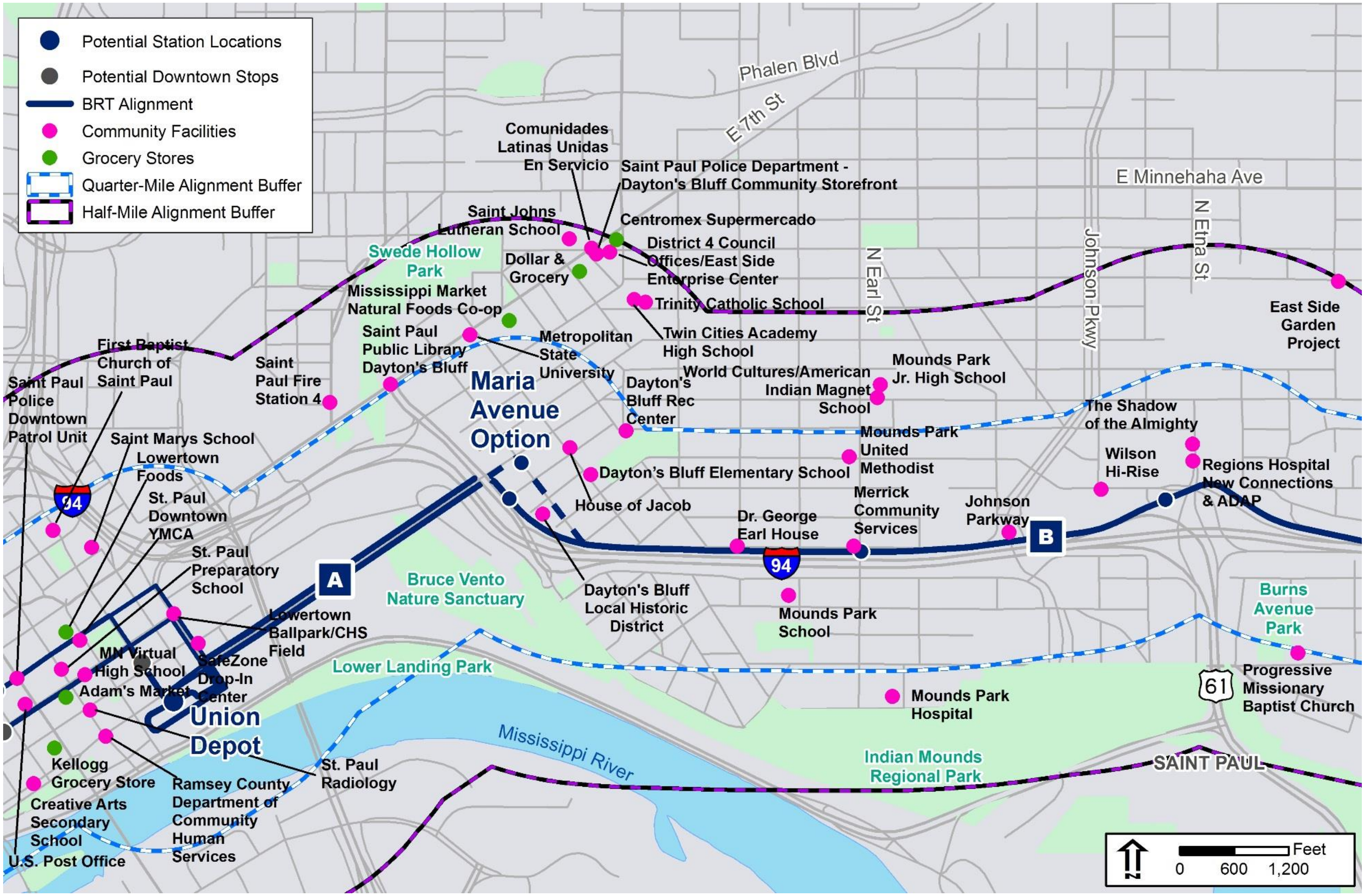


Figure 3: Gold Line BRT - Saint Paul Dayton's Bluff Station Area

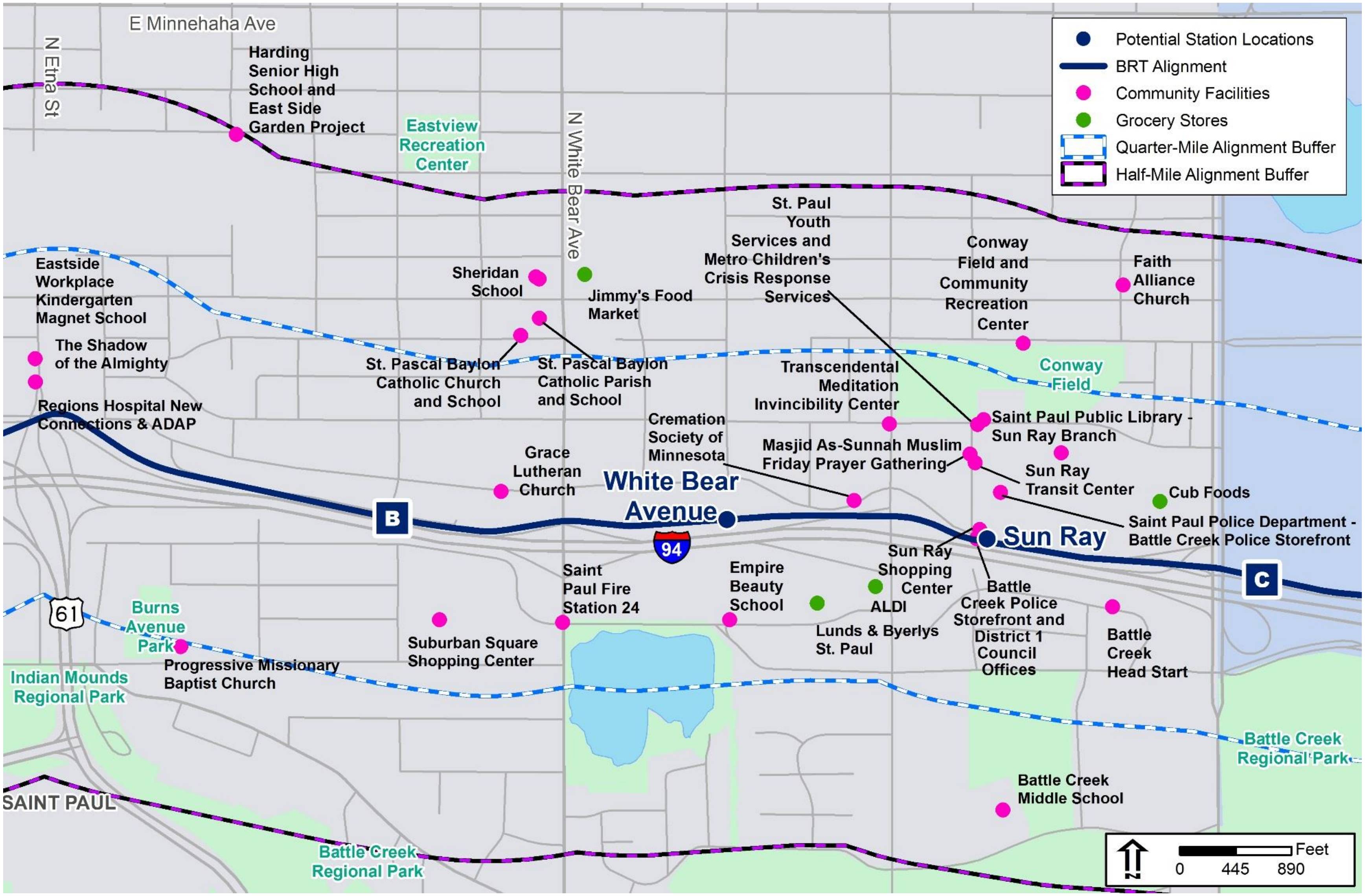


Figure 4: Gold Line BRT - Saint Paul White Bear Avenue and Sun Ray Station Areas

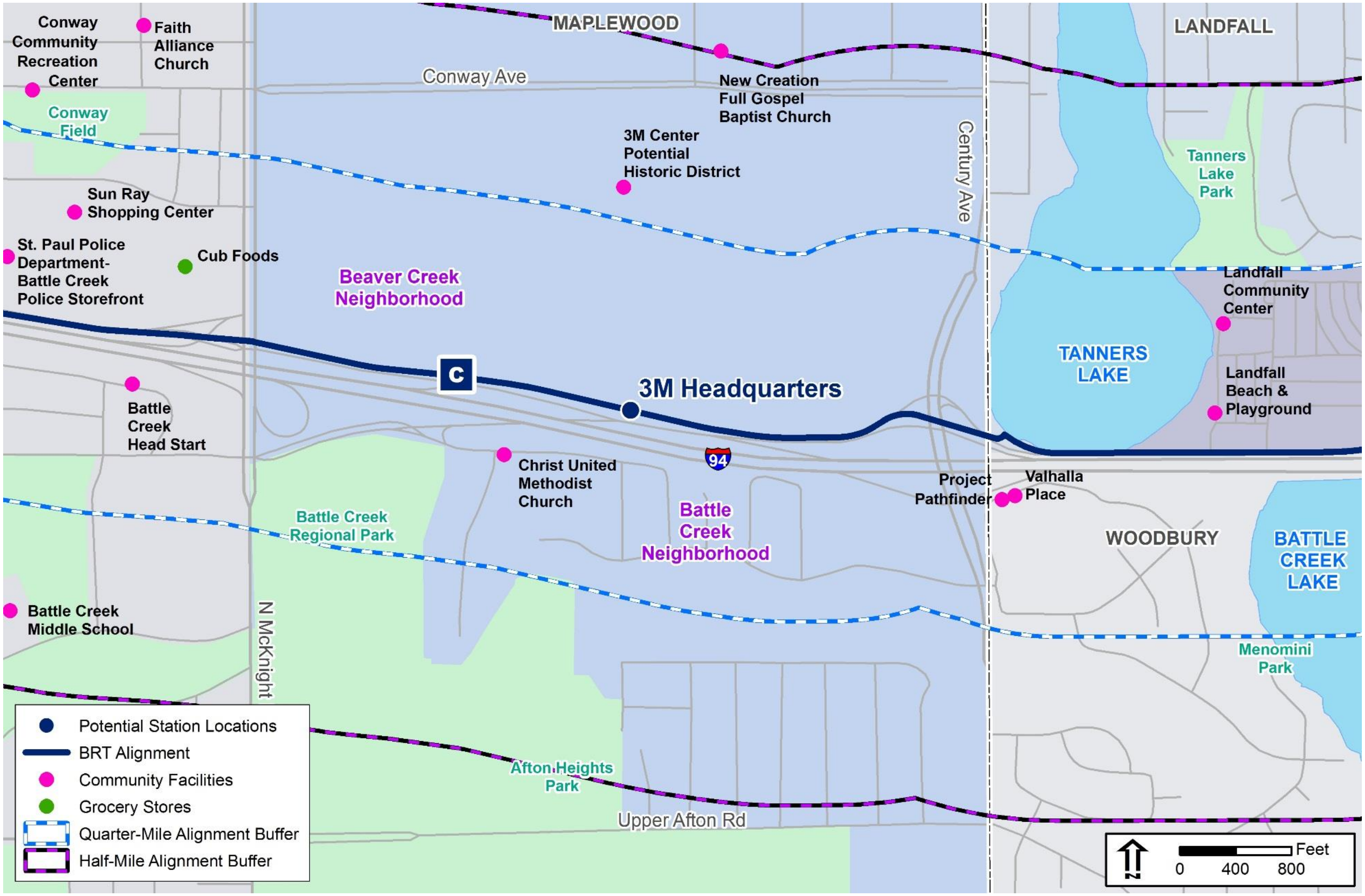


Figure 5: Gold Line BRT - Maplewood (3M) Station Area

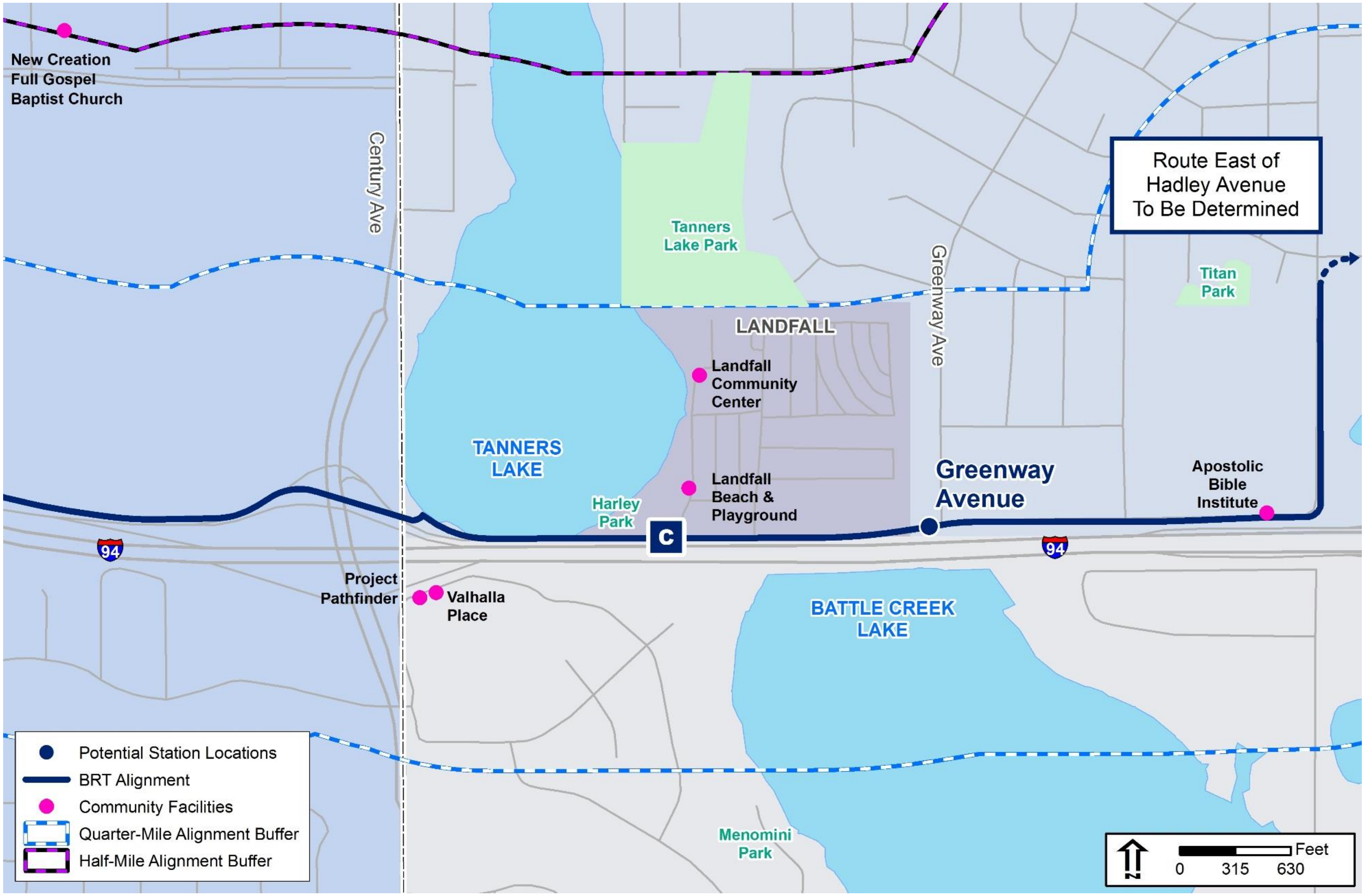


Figure 6: Gold Line BRT - Landfall/Oakdale Station Area

Parking

Free parking is provided throughout the corridor, and parking lots and street parking are common. Union Depot is unique as it is the only station area with parking meters and structured parking requiring people to pay. An inventory of the parking supply in the corridor is not available for this HIA. However, a high-level summary of parking characteristics is listed below.

- Street parking is available near most of the Saint Paul stations.
- Businesses near the Etna Street, White Bear Avenue, and Sun Ray Stations are surrounded by parking lots.
- Parking is generally located near retail, commercial, office, and multi-family housing in Maplewood, Landfall, and Oakdale.
- Oakdale and Maplewood have similar development patterns designed for travel by car. These patterns include locating large parking lots next to buildings that are set back from sidewalks.

Connectivity Results

Walking and Bicycling to Destinations

Walk Score and Bike Score are tools that evaluate the ability to walk and bicycle in a community. A higher score indicates more destinations are available within a reasonable distance and infrastructure is available to help people travel between locations. More details on Walk Score and Bike Score are available in Appendix A. Walk Scores and Bike Scores are presented in Table 2 for each Gold Line BRT station and the city in which the station is located. Because a Bike Score is calculated using bicycle infrastructure data provided by individual local governments, it is not available for all cities.

Table 3 explains the meaning of each score type.

Table 2: Walk Score and Bike Score for Gold Line BRT Stations and Communities

Station	Walk Score	Bike Score	City	Walk Score	Bike Score
Union Depot	82	72	**Saint Paul**	56	62
Mounds Boulevard	59	67	**Saint Paul**	56	62
Earl Street	59	61	**Saint Paul**	56	62
Etna Street	41	63	**Saint Paul**	56	62
White Bear Avenue	57	52	**Saint Paul**	56	62
Sun Ray	59	75	**Saint Paul**	56	62
3M	29	N/A	**Maplewood**	21	N/A
Greenway Avenue	18	N/A N/A	**Landfall** **Oakdale**	N/A 17	N/A N/A
To be determined	N/A	N/A	**Woodbury**	16	N/A

Table 3: Walk Score and Bike Score Ranges and Meanings

Score	Meaning of Walk Score
90-100	Walker's Paradise: Daily errands do not require a car
70-89	Very Walkable: Most errands can be accomplished on foot
50-69	Somewhat Walkable: Some errands can be accomplished on foot
25-49	Car Dependent: Most errands require a car
0-24	Car Dependent: Almost all errands require a car

Score	Meaning of Bike Score
90-100	Biker's Paradise: Daily errands can be accomplished on a bike
70-89	Very Bikeable: Biking is convenient for most trips
50-69	Bikeable: Some bike infrastructure
0-49	Somewhat Bikeable: Minimal bike infrastructure

Highlights of cities' Walk Scores and Bike Scores include:

- Saint Paul receives a higher Walk Score than Maplewood, Landfall, Oakdale, and Woodbury due in part to a sidewalk grid that allows people to easily get to more destinations.
- Increasing the number of destinations such as grocery, pharmacy, or other retail stores near the stations would allow more daily trips to be completed on foot. This would in turn increase a city's Walk Score.
- Because there are many destinations accessible on foot, Union Depot receives the highest score of the Saint Paul stations.
- The bicycle network in Saint Paul is better developed than other corridor communities and its Bike Score is supported by the presence of some on-street bicycle lanes and relative flat landscape.
- Saint Paul's scores could be improved with the build out of a full sidewalk and bicycle network and additional destinations near the stations.
- Maplewood, Oakdale, and Woodbury receive lower Walk Scores as they have fewer sidewalks and fewer destinations within station areas.

Parking

For this HIA, parking is evaluated based on several assumptions about the impact of the physical form of a station area, which in turn affects whether walking or biking to destinations is an attractive option. The study methodology (Appendix A) explains these assumptions in detail.

Table 4 summarizes parking rules included in city comprehensive plans and zoning codes. This information helps to illustrate city policies that could affect the physical form of a station area, which could also limit the ability to walk or bicycle to destinations.

Table 4: Parking Policies for Gold Line BRT Cities (Page 1 of 2)

Assessment Criteria	Saint Paul	Maplewood	Landfall	Oakdale	Woodbury
Does the zoning code specify parking minimums?	Yes	Yes	Zoning code is not available	Yes	Yes
Does the zoning code specify parking maximums?	Surface lots with more than 15 spaces cannot exceed their parking minimum by more than 200% for restaurants and by 70% for other uses	Zoning for mixed-use districts specifies parking shall not exceed the specified minimum by more than 10%, or two spaces, whichever is greater	Zoning code is not available	No	No
Does the zoning code allow for the potential for no new parking at developer's discretion?	Discussed in the comprehensive plan, but not explicitly allowed in the zoning code	No	Zoning code is not available	No	No
Does the zoning code allow for reduced parking within a transit station area?	Yes, by 25% in Traditional Neighborhood (TN) districts. T3 and T4 districts (TN districts with highest intensity uses) may use on-street parking to meet requirements	For retail, medical, service and office uses, if a transit shelter is provided on site or in front of the building, then the minimum required number of parking spaces may be reduced by five percent but not to exceed five parking spaces total	Zoning code is not available	No	No
Does the zoning code allow for reduced parking with provision of bicycle parking or on-site car sharing?	Yes	No	Zoning code is not available	Reduction in parking requirements for employers with car pools is discussed in the comprehensive plan, but is not in the zoning code	Reduction in parking footprints through bicycle parking, shared parking, and structures is discussed in the comprehensive plan, but is not in the zoning code
Does the zoning code allow for shared parking between compatible uses?	Yes	Yes	Zoning code is not available	Yes	Shared parking is discussed in the comprehensive plan, but is not in the zoning code

Table 4: Parking Policies for Gold Line BRT Cities (Page 2 of 2)

Assessment Criteria	Saint Paul	Maplewood	Landfall	Oakdale	Woodbury
Does the city own municipal parking lots used for shared/district parking?	No	No	No	No	No
Does the city charge for street parking in any location within a Gold Line BRT station area?	Yes, in the Union Depot Station area only	No, though 3M charges employees for parking in certain facilities on their campus.	No	No	No
Does the comprehensive plan discuss design and location of parking lots with regard to visual impacts or pedestrian environment?	Yes	Yes, for mixed-use districts	No	Yes, in the mixed use area along 10th Street and in the Tanners Lake redevelopment site	Yes, in areas designated mixed-use underground or decked parking is encouraged to enhance pedestrian areas
Does the city allow on-street parking on local streets in its station areas?	Yes	Yes, on some streets	Yes	On-street parking is not explicitly prohibited, but it is not used. The comprehensive plan calls for encouraging off-street parking and prohibiting parking on arterial and collector streets	Yes, on-street parking is welcome in areas designated as neighborhood shopping centers
Does the city practice Travel Demand Management and use any tools to reduce single-occupancy-vehicle travel?	Yes	Yes	No	No	No

The follow is a summary of parking policies by city.

Saint Paul

- The City of Saint Paul sets parking minimums for all uses in its zoning code. The minimums are reduced by 100% for parcels within a quarter mile of the Central Corridor (METRO Green Line) Light Rail Transit on University Avenue. Minimums can be reduced when bicycle parking is available or parking is shared among uses.
- The zoning code specifies parking maximums that apply to developments where parking minimums are exceeded. The code specifies parking maximums by type of use.
- The zoning code also requires bicycle parking to be provided, and allows bicycle parking to replace up to 10% of off-street car parking.
- The City of Saint Paul requires large developments to provide set of strategies aimed at reducing the demand for roadway travel. These plans are called Travel Demand Management Plans (TDMPs).
- In the Union Depot station area, the city provides metered street parking, and off-street parking is provided in private facilities and priced by demand. There is no metered parking in the other Saint Paul Gold Line BRT station areas.
- In general, Saint Paul has put in place some measures to make better use of existing parking, though there are several actions the city could take to strengthen their position on parking outside of downtown, as discussed in the Connectivity Recommendations section.

Maplewood

- Maplewood is unique because the 3M campus makes up most of the station area. Accordingly, city parking policies, combined with any actions taken by 3M to further develop their campus, will shape the physical form of the station area before and after the station opens.
- 3M stated to the Gold Line BRT project team that they are have a shortage of parking available and have begun charging employees for parking in some locations on the campus in order to manage demand.
- 3M has long had a ridesharing program and maintains 24 employee-operated vans for carpooling. The company recently conducted a bicycle and pedestrian plan for its campus in effort to respond to staff interest to commute by those methods.
- Metro Transit's Employer Program may be able to provide 3M with resources to educate employees on transportation options and more efficiently use available resources.

Landfall

- The Landfall Comprehensive Plan provides no information on parking.

Oakdale

- The City of Oakdale zoning code sets parking minimums for all uses.
- There are no reductions for developments located in station areas. Currently, the Gold Line BRT project and its station locations are not included in the plan, as it was published before most

Gold Line BRT planning was underway. The upcoming comprehensive planning process provides the opportunity for the City of Oakdale to include the Gold Line BRT in the next plan.

- While a major shift away from driving is not expected in the near future and demand for parking will continue in Oakdale, the city should consider several measures to guide the location and design of new parking lots and explore sharing of existing parking between new and existing uses.

Woodbury

- The City of Woodbury zoning code sets parking minimums for all uses.
- There are no reductions for developments located in station areas. Currently, the Gold Line BRT project and its station locations are not included in the plan, as it was published before most Gold Line BRT planning was underway. The upcoming comprehensive planning process provides the opportunity for the City of Woodbury to include the Gold Line BRT in the next plan.
- While a major shift away from driving is not expected in the near future and demand for parking will continue in Woodbury, the city should consider several measures to guide the location and design of new parking lots and explore sharing of existing parking between new and existing uses.

Housing

Vision Statement

Increase housing options for all ages, incomes, and lifestyles.

Relationship to Health

The availability and affordability of a variety of housing options for people of all ages, levels of income, and lifestyles supports healthy communities. Households paying a larger portion of their income for housing often do not have enough money remaining to meet other essential needs. These households may be forced to decide between paying their mortgage or rent and buying food, medical insurance, and health care. Lacking resources to afford housing can lead to unstable conditions, including frequent moves, living in shared-spaces, eviction, foreclosure, and even homelessness. This sort of unstable housing situation can lead to high levels of stress and depression.

An area can also be unaffordable if getting to goods and services requires high transportation costs. According to the Center for Neighborhood Technology (CNT), planners, lenders, and most consumers consider housing affordable if the cost is 30% or less of household income. Research done by CNT across metro areas of varying sizes has found that spending 15% of income or less on transportation is affordable. Therefore, locations where combined housing and transportation costs are less than 45% of median household income are considered affordable to the typical household. This amount, known as Housing + Transportation Affordability Index (H+T Index), shows housing and transportation costs as a percentage of area median income—the median divides income distribution into equal parts with half falling below the median and half above the median—for the census blocks located near a location.

More information on the H+T Index is located in the section below (see Table 10 for more information on the H+T Index).

Research has shown that new transit investments can lead to increased land values and greater housing demand around the stations. As a result, individuals may pay more to live near transit. This increased demand pushes builders to provide new development and new types of housing such as apartments, condominiums, etc., often bringing in new residents to the area. As more people move into an area, existing residents, including those who are low-income or elderly, may not be able to afford housing in the area.

Community Input

Gold Line BRT community members commented that it is important to have affordable housing for all ages, income levels, and lifestyles in station areas. One community member said simply, "Access to affordable housing is a top social determinant of health." Social determinants of health are the physical and economic environments in which we live, work, and play. Housing, as an example, is the foundation for our daily lives. Where we live is where we sleep, store valuables, recover from illness, and raise our families. Our home and neighborhood conditions influence our ability to make healthy choices.

Existing Conditions

Affordable Housing in the Region

The importance of affordable housing in a healthy region is well-documented in the Twin Cities' regional planning and policy documents. The Metropolitan Council has prioritized creating "housing options that give people in all life stages and of all economic means viable choices for safe, stable, and affordable homes.[9]" The *2040 Housing Policy Plan* documents a growing need for more affordable housing in the region:

- **Demand for housing is growing**: Between now and 2040, the region will add 374,000 households. Roughly 40% of the households will earn less than 80% of area median income ($65,800 for a family of four).
- **People are paying too much for housing:** Households that pay more than 30% of their income on rent or mortgage are considered "housing cost burdened." This means that even with the existing supply of affordable housing, more than one-third or 265,000 low- and moderate-income households in the region are paying more than 30% of their household income on housing costs. Nearly 140,000 of those are paying more than half their income on housing.
- **More people will need affordable housing options**: The Metropolitan Council forecasts that between 2020 and 2030, our region will add 49,500 low- and moderate-income households who will need affordable housing. For comparison, in the first three years of this decade, the region added slightly fewer than 3,000 new affordable units; this is insufficient to meet the need.

Affordable Housing in Gold Line BRT Cities

The following section includes a brief summary of the affordable housing conditions in each Gold Line BRT community, as documented in their comprehensive plans. Percentages of affordable units at 80% area median income are presented by city in Table 5.

Table 5: Percentage of Affordable Units by Gold Line BRT City

City	Percentage of Housing Units Affordable to Low-Income Households*
Saint Paul	85.1% **
Maplewood	82.8%
Landfall	100.0%
Oakdale	71.8%
Woodbury	39.7%

*Low-income households are those with income at or below 80% of area median income.
**Regional Average = 65.9% Affordability[10]

Saint Paul

The *Saint Paul Comprehensive Plan* states that the number of households paying more than 30% of their incomes on housing expenses has increased sharply among both renters and owners from 1990 to 2005. Furthermore, American Community Survey data suggests that a majority of Saint Paul households would qualify for affordable housing, with more than 70% of residents earning incomes at or below the area median income. The area median income is the midpoint of a region's income distribution with half of households earning more than and half of household earning less than the median. As shown in Table 6, housing affordability has declined throughout Saint Paul, including Gold Line BRT communities.

Table 6: Percent of Saint Paul Households Spending More Than 30% of Income on Housing

	1990	2000	2005
Owner-occupied households paying at least 30% of their income on housing	18.3%	19.6%	33.9%
Renter-occupied households paying at least 30% of their income on housing	45.8%	41.9%	54.5%

Maplewood

The *2030 Maplewood Comprehensive Plan* notes that housing costs continue to rise throughout the region and commits the city, through its Housing and Redevelopment Authority, to explore all possibilities for financing affordable housing.

Landfall

The *Landfall Comprehensive Plan* notes the city contains approximately 300 lots for manufactured homes, with 98% of the lots leased by owner-occupied units. Residential density—a measure of the intensity with which land is occupied by either development or population—in Landfall is approximately nine units per acre. Prices of manufactured housing units range from $10,000 to $60,000, and lot rentals in Landfall are $273 to $336 per month. Housing costs meet the Metropolitan Council's definition of affordable home ownership and affordable rental housing at 50% of the area median income. Landfall's policy is to preserve the affordable housing in the community.

Oakdale

The *2030 Oakdale Comprehensive Plan* notes that the Metropolitan Council allocated 184 additional units of new affordable housing to be constructed in the city between 2011 and 2020. This represents approximately 26% of growth, which is similar to the historic affordable housing ratio in Oakdale. The plan identifies plenty of capacity for housing on vacant land in the city.

Woodbury

Woodbury's affordable housing goal for the period 1996 to 2010 was 1,784 units (1,584 ownership and 200 rental units). A total of 2,174 affordable housing units (1,947 ownership and 229 rental) were built in Woodbury between 1996 and 2008. Almost one of every five housing units (19.4%) built during this period was affordable. To encourage affordable housing development, Woodbury used density bonuses in single-family and multifamily developments, financial incentives for developers, partnerships with organizations such as Twin Cities Habitat for Humanity, public purchase of land, tax exempt bonds, tax increment financing, waiving city fees, Housing and Redevelopment Authority loans, and federal Housing and Urban Development (HUD) funding.

Housing Assessment

Affordable New Housing Units

Affordable new housing units in each Gold Line BRT city are shown below in Table 7.

Table 7: Affordable New Housing Units

City	New Housing Units Affordable to Households Earning 60% of Area Median Income or Less							
	2010		2011		2012		2013	
	Owner	Rental	Owner	Rental	Owner	Rental	Owner	Rental
Saint Paul	18	252	23	189	12	88	8	50
Maplewood	21	0	0	0	0	0	0	0
Landfall	0	0	0	0	0	0	0	0
Oakdale	8	29	2	39	1	0	1	0
Woodbury	57	28	9	0	0	45	10	0
Total	**413 units**		**262 units**		**146 units**		**69 units**	

Source: Metropolitan Council

Existing Affordable Housing Units

Affordable existing housing units in each Gold Line BRT city are shown below in Table 8.

Table 8: Affordable Existing Housing Units

Percentage of Existing Housing Stock Affordable to Households Earning:						
City	**30% of AMI* or Less**		**50% of AMI or Less**		**80% of AMI or Less**	
	2010	**2014**	**2010**	**2014**	**2010**	**2014**
Saint Paul	14	13	55	48	86	82
Maplewood	12	8	36	23	83	74
Landfall	100	100	100	100	100	100
Oakdale	6	4	38	20	88	66
Woodbury	1	1	18	6	51	37

Source: Metropolitan Council
* AMI is area median income

In general, the percentage of units affordable to households earning 30, 50, and 80% of area median income is declining in all of the Gold Line BRT communities, indicating that fewer homes are affordable to low-income households. Landfall is unique as 100% of its housing is affordable to households earning less than 30% of area median income. Within the last five years in Woodbury, only 2% of housing is affordable compared to households with less than 30% of area median income.

Housing Performance Scores

The Housing Performance Score is calculated on an annual basis for each of the region's cities and townships. It assesses local efforts to develop and maintain affordable housing and support low- and moderate-income households through a variety of programs and services. The Metropolitan Council uses the scores to prioritize funding to communities that are maintaining or expanding their supply of affordable housing and using fiscal, planning, and regulatory tools to promote affordable and mixed-income housing. The Housing Performance Score is calculated out of 100 available points from four main areas:

- Recent or new construction projects completed in the last 10 years (0-35 points)
- Recent preservation projects in last 10 years or substantial rehabilitation in last 3 years (15-50 points)
- Housing programs and policies in place and in use in the last 5 years (0-25 points) and
- Characteristics of the existing housing stock (0-25 points)

A score of 0 indicates a lack of any housing activity and 100 reflects outstanding performance in meeting affordable housing goals, providing housing-related services, and approving and contributing to housing development, redevelopment, rehabilitation, and preservation.

Housing performance scores for the last five years are shown below in Table 9. The Metropolitan Council uses housing performance scores to prioritize funding to communities maintaining or expanding affordable housing and using monetary, planning, and regulatory tools to promote affordable housing. The Metropolitan Council uses the score in two of its three Livable Community Act programs to reward high-scoring communities demonstrating a commitment to providing affordable housing. Local housing performance scores are also used to score transportation funding applications through a competitive application process with the Metropolitan Council (called the Regional Solicitation program).

Table 9: Housing Performance Scores for Each Gold Line BRT City

City	Housing Performance Score					
	2010	**2011**	**2012**	**2013**	**2014**	**2015**
Saint Paul	96	96	95	98	98	100
Maplewood	89	70	62	58	55	81
Landfall	20	23	18	23	24	25
Oakdale	70	79	77	76	74	89
Woodbury	79	83	84	80	78	88

Saint Paul consistently has the highest housing performance score of the Gold Line BRT communities. Oakdale and Woodbury also score well.

Housing Cost Burden

The H+T Index for each Gold Line BRT community is presented below in Table 10. The H+T Index for each station is also included. The index was obtained for the census block group in which the station would be located. Census block group is the smallest unit in which the information is available.

Table 10: Housing + Transportation Costs as a Percentage of Income

City and Station Location	Housing	Transportation	Total
Saint Paul	**22%**	**20%**	**42%**
▪ Union Depot	19%	14%	33%
▪ Mounds Boulevard	15%	16%	31%
▪ Earl Street	14%	17%	31%
▪ Etna Street	21%	18%	39%
▪ White Bear Avenue	19%	17%	36%
▪ Sun Ray	19%	18%	37%
Maplewood	**26%**	**20%**	**46%**
▪ 3M	22%	20%	42%
Landfall/Oakdale	**26%**	**19%**	**45%**
▪ Greenway Avenue	26%	19%	45%
Oakdale	**25%**	**19%**	**44%**
Woodbury	**33%**	**20%**	**53%**

Using the H+T index, the combined costs of housing and transportation are less than 45% of household income in the station areas for Saint Paul, Maplewood, and Landfall. The Center for Neighborhood Technology considers locations where combined housing and transportation costs constitute less than 45% of median household income to be affordable for the typical household.

Overall, the Saint Paul station areas are the most affordable places to live in the corridor, based on current conditions. However, as Saint Paul states in their comprehensive plan, the city as a whole is becoming less affordable to residents. Housing costs and transportation costs are higher in the suburban communities than in the east side neighborhoods of Saint Paul. Landfall's results likely under-estimate the number of cost-burdened households due to inclusion of two higher-income census tracts to the north.

Jobs

Vision Statement

Increase the number and variety of jobs available along the Gold Line BRT.

Relationship to Health

Steady employment has a direct positive impact on health. A well-paying job makes it easier for workers to live in healthier neighborhoods, provide quality education for their children, secure child care services, and buy food that is more nutritious. Stable employment leads to higher income, and people with higher incomes are less likely to be in fair or poor health. In contrast, those who are unemployed are more likely to develop stress-related conditions such as stroke, heart attack, heart disease, or arthritis. Similar links are present for mental health conditions. Moreover, the unemployed and underemployed are more likely to delay seeking medical care, including preventive care, thus prolonging health conditions[11]. Those who are employed but classified as "working poor" have similar health challenges.

Transportation is one of many factors affecting a person's employment and the type of job they hold. Because jobs are located throughout the region, workers with limited car access may find it difficult and expensive to reach potential jobs. Increasing transit connections to jobs throughout the region expands employment options. Locating jobs near transit stations creates job opportunities for workers, particularly transit-dependent individuals, and opens a larger labor pool for employers. As the Gold Line BRT is built, it is possible to improve employment for area residents and improve health outcomes.

Community Input

Job Access

Gold Line BRT community members commented that jobs in the station area can benefit residents, employees, and the transit service. They further commented that it is important to have entry-level and living wage jobs. A living wage is the amount needed for a worker to afford the cost of living in their community. Well-paying jobs support better health as workers can afford healthier neighborhoods, quality education for their children and themselves, childcare services, and more[12]. Since jobs are spread throughout the metro area, transit connections improve a person's ability to get to stable, well-paying jobs.

Existing Conditions

Unemployment and Underemployment

Table 11 compares the employment rate in each municipality to the regional average. Saint Paul has the highest unemployment rate among the corridor communities. Today, Woodbury has the lowest unemployment rate among the corridor communities, and is the only city whose rate is lower than the regional average. All other Gold Line BRT cities have rates higher than the regional average of 3.6%.

Table 11: Unemployment Rates in Gold Line BRT Cities

City	Municipal Unemployment Rate (2015)	Regional Unemployment Rate	Status
Saint Paul	4.0%	3.6%	City performs poorer than regional average
Maplewood	3.9%	3.6%	City performs poorer than regional average
Landfall	Not Available	3.6%	City performs poorer than regional average
Oakdale	3.7%	3.6%	City performs slightly poorer than regional average
Woodbury	2.8%	3.6%	City performs better than regional average

Source: MN DEED Local Area Unemployment Statistics

While employment status provides a snapshot of the workforce in the Gold Line BRT area, wages and hours worked also affect an individual's quality of life and the overall economic health. The unemployment rate in the seven-county region is among the lowest in the United States, but the rate does not show problems with underemployment. Slow income growth coupled with lower unemployment rates is indicative of underemployment. Earnings growth is used as a substitute for underemployment. Table shows earning trends for Gold Line BRT communities.

Table 12: Earnings Trends (2014 Dollars)

City	2010 Median Household Income	2013 Median Household Income	Percent Change	Status
Saint Paul	$48,095	$47,864	- 0.5%	Performs better than regional average
Maplewood	$56,020	$61,583	+ 10.0%	Performs better than regional average
Landfall	$35,284	$32,724	- 7.2%	Performs below regional average
Oakdale	$71,980	$68,890	- 4.2%	Performs below regional average
Woodbury	$96,949	$98,370	+1.5%	Performs better than regional average
Metro Area	***$69,374***	***$67,578***	***- 2.6%***	

Source: American Community Survey 3-Year Estimates 2010-2013 adjusted for inflation to 2014 dollars

Overall, median household income trends for the seven-county metro area indicate a 2.6% decline in purchasing power, the financial ability to purchase goods and services. This finding suggests that even as unemployment rates dropped and more people were working, wages were stagnant or declining or people were working fewer hours. Three communities along the Gold Line BRT performed better than the regional average (i.e., Saint Paul, Maplewood, and Woodbury), with Maplewood performing considerably better than the region as a whole with 10% growth in household income. Oakdale performed marginally below the regional average, and Landfall had the greatest decline (7.2%) in median household income.

Industrial Diversity

A diverse economy is better at bouncing back in tough economic times and has the ability to meet the needs of people with a variety of skills and capabilities. Having more economic sectors (e.g., manufacturing, agriculture, service, etc.) represented in a geographic area can increase the likelihood of employment for individuals entering the labor force. Data from the Metropolitan Council's community profile[13] was used to compare the industrial diversity (see Table 13) for each Gold Line BRT community.

Table 13: Industry Diversity in Gold Line BRT Communities

City[14]	Total Jobs (2014)	Top 3 Industries	Industrial Diversity*
Saint Paul	177,010	Health Care/Social Assistance (23%) Public Administration (13%) Educational Services (10%)	18
Maplewood	29,041	Other Industries (41%) Health Care/Social Assistance (17%) Retail Trade (15%)	13
Landfall	25	Not Available	Not Available
Oakdale	9,975	Retail Trade (14%) Accommodation/Food Services (13%) Health Care/Social Assistance (10%)	17
Woodbury	21,278	Retail Trade (23%) Health Care/Social Assistance (20%) Accommodation/Food Services (12%)	16

*Industrial diversity is measured by the number of industries that hold a 1% or greater share of that city's workforce. A greater number indicates more industrial diversity, as the workforce is distributed across more industries.
**Economic sectors that individually make up less than 1%of the jobs in the city.

In general, the Gold Line BRT communities are comprised of health care, social assistance, retail, accommodation, and food service jobs. Economies between Gold Line BRT cities are diverse. For example, the City of Saint Paul has the greatest diversity of industries whereas Maplewood has the least.

Poverty Status

In addition to weighing down the regional economy, poverty status affects health in a variety of ways. Those in poverty and the working poor experience challenges finding work and obtaining health care and insurance benefits, and are affected by stress-related illnesses. Table 14 compares households in poverty within a half-mile of the Gold Line BRT station areas to overall poverty levels at the city, county, and regional level.

Generally, the population around Gold Line BRT station areas has higher rates of poverty compared to their surrounding communities, counties, and region. Saint Paul station areas have the highest share of populations with incomes below poverty level, followed by Woodbury and Landfall.

Table 14: Households in Poverty by Station Area

City and Station Location	Percent Below Poverty	Status
Seven-County Region	**11%**	
Gold Line BRT	**17%**	
Ramsey County	**17%**	
Saint Paul	**23%**	
Union Depot	18%	Station area has a lower share in poverty than the city as a whole, and a higher share than Ramsey County and the seven-county region
Mounds Boulevard	35%	Station area has a higher share in poverty than the city, Ramsey County, and the seven-county region
Earl Street	29%	Station area has a higher share in poverty than the city, Ramsey County, and the seven-county region
Etna Street	30%	Station area has a higher share in poverty than the city, Ramsey County, and the seven-county region
White Bear Avenue	15%	Station area has a lower share in poverty than the city, Ramsey County and the seven-county region
Sun Ray	15%	Station area has a slightly lower share in poverty than the city, Ramsey County, and the seven-county region
Maplewood	**6%**	
3M	21%	Station area has a higher share in poverty than the city, Ramsey County and the seven-county region
Washington County	**6%**	
Landfall	**8%**	
Greenway Avenue	14%	Station area has a higher share in poverty than the city, Washington County, and the seven-county region
Oakdale	**3%**	
Woodbury	**10%**	

Source: American Community Survey 5-Year Estimates 2010-2014

Jobs Assessment

Projected Employment Growth

The Metropolitan Council's *Transportation Policy Plan* (TPP)[15] outlines regional policies that link transportation decisions to land use and local planning. It provides specific guidance for local plans, calls for coordination between land development and transportation, and describes the benefits of locating job concentrations along major transportation corridors. These actions contribute to regional objectives for reducing air pollution, mitigating congestion, and reducing the costs for operating, maintaining, or improving infrastructure. The TPP indicates that a combination of 7,000 residents, jobs, students, or people going to retail or entertainment destinations should be located within a ten-minute walk or half-mile of a transitway station. Table 15 compares only the job and residential populations across the stations to the regional standard of 7,000. These calculations do not take into account other types of activities in station areas, like students or retail customers, because that information is not readily available by station type.

Table 15: Existing and Forecasted Population and Employment by Station Areas

	Station Area Population		Station Area Employment		Station Area Activity (Jobs + Population)		
Station	**Existing**	**2040**	**Existing**	**2040**	**Existing**	**2040**	**Assessment (based on residential and employment numbers only)**
Union Depot	4,274	14,591	27,119	31,568	31,393	46,159	Current and future station area activity **meets regional threshold**
Mounds Boulevard	3,813	3,932	1,170	5,623	4,983	9,555	Future station area activity **meets regional threshold**
Earl Street	5,772	5,555	446	5,788	6,218	11,343	Future station area activity **meets regional threshold**
Etna Street	4,992	4,864	573	4,998	5,565	9,862	Future station area activity **meets regional threshold**
White Bear Avenue	4,856	5,891	1,766	6,457	6,622	12,348	Future station area activity **meets regional threshold**
Sun Ray	5,506	7,193	2,666	7,565	8,172	14,758	Current and future station area activity **meets regional threshold**
3M	747	1,150	8,284	9,279	9,031	10,429	Current and future station area activity **meets regional threshold**
Greenway Avenue	2249	2,413	350	1,857	2,599	4,270	Current and future station area activity **does not meet regional threshold**

Based on 2040 Metropolitan Council forecasts, Union Depot, Sun Ray, and the 3M Stations currently meet the regional activity thresholds, and will continue to do so in the future. The next strongest performing stations for residential and employment activity units are those anticipated to meet the threshold in the future including the remainder of the Saint Paul station areas (i.e., Mounds Boulevard, Earl Street, Etna Street, and White Bear Avenue). The Greenway Avenue Station is the only station that does not meet the 7,000 activity unit threshold by using just residential and employment data.

Employment Density

Accessibility to jobs via transit is an important measure of the benefit of a transit service. Employment densities (see Table 16) within a half-mile of each station consist of a wide range of densities per acre.

Union Depot has the strongest concentration of jobs, followed by 3M. The remaining station areas average approximately 12 jobs per acre.

Table 16: Employment Density in Gold Line BRT Station Areas

Station	Jobs per Acre (2010)
Union Depot	90.7
3M	33.3
Sun Ray	19.1
Mounds Boulevard	16.1
White Bear Avenue	15.5
Earl Street	14.8
Etna Street	11.5
Greenway Avenue	7.7

Transit Access to Jobs

An inventory of current transit service (Table 17) at each station helps determine how effectively people can travel by transit. The level of accessibility at each station can be established by considering the availability of transit at each station. Stations with more transit service are more likely to have connections to regional job centers.

Table 17: Existing Transit Connections to Gold Line BRT Station Areas

Station	CBD * Connection	Transit Connection to Gold Line	Hi-Frequency Network	Express Service	Urban Local Service	Sub. Local Service	Peak Service	Midday Service	Night Service
Union Depot	*Minneapolis & Saint Paul*	*Yes*	*Yes*	*Yes*	*Yes*	*N/A*	*Yes*	*Yes*	*Yes*
Mounds Boulevard	*Minneapolis & Saint Paul*	*Yes*	*No*	*No*	*Yes*	*N/A*	*Yes*	*Yes*	*Yes*
Earl Street	*Saint Paul*	*Yes*	*No*	*No*	*Yes*	*N/A*	*Yes*	*Yes*	*Yes*
Etna Street	*Saint Paul*	*Yes*	*No*	*No*	*Yes*	*N/A*	*Yes*	*Yes*	*Yes*
White Bear Avenue	*Saint Paul*	*Yes*	*No*	*No*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Sun Ray	*Saint Paul*	*Yes*	*No*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
3M	*Saint Paul*	*Yes*	*No*	*Yes*	*No*	*Yes*	*Yes*	*Yes*	*Yes*
Greenway Avenue	*No*	*No*	*No*	*No*	*No*	*Yes*	*Yes*	*Yes*	*Yes*

*CBD=Central Business District

Station areas in and near Saint Paul benefit from the greatest degree of regional transit access; Union Depot and Sun Ray are major transit transfer points served by multiple local, express, and transitway routes. The majority of transit routes in the region serve downtown Minneapolis and downtown Saint

Paul, the region's largest employment centers. A direct link to these locations is critical for job access and connectivity to the greater region.

Other stations outside Saint Paul have a mix of local and express transit services, typically with connections to downtown Saint Paul. The 3M and Greenway Avenue Stations are served by one suburban local route 219 that has service frequencies around 20 minutes during the peak periods and up to 60 minutes in the mid-day and evening.

Economic Development Initiatives

The 2030 comprehensive plans were reviewed to identify each city's policies or guidance regarding economic development initiatives at station areas. However, it is important to recognize the comprehensive plans were updated in 2008 before Gold Line BRT planning had begun. In that respect, the comprehensive plans were also assessed to determine their support for job creation through economic development initiatives.

In addition to the comprehensive plans, a Gold Line BRT real estate market analysis[16] was conducted in 2014. The market analysis also provided insight regarding near-term (one to five year) real estate development prospects in each station area. Results of this analysis are included in each city's assessment below. High-level results of the market analysis include:

- **There is growing and unmet demand for walkable, mixed-use communities.** More than half of Minnesotans prefer to live in a mixed-use neighborhood with diverse housing, retail, and amenities within walking distance. Within the Twin Cities, there is unmet demand for small-lot single-family homes and attached housing combined with an oversupply of 22,000 for all other homes, including traditional large-lot homes.[17]
- **There is unmet demand for new housing, particularly in the form of single-family attached townhomes.** Townhomes and small-lot single-family homes provide many of the same benefits as mid-rise multifamily housing, and are cheaper to build than mid-rise multifamily housing. Mid-rise multifamily development is not yet feasible outside of downtown Saint Paul without incentives in the near-term. In addition, current sales prices can support new construction as evident by the growing presence of townhomes.
- **Regional employers recognize the importance of transit for employee recruitment and retention.** Employers in the Twin Cities report that transit access is good for recruiting new talent, particularly skilled young professionals.[18] Firms often consider transit access when considering a new location and prioritize sites that provide both auto and transit access. 3M, the largest employer in the corridor, has indicated that the Gold Line BRT will be beneficial for recruiting and retaining new talent and envisions a convenient and attractive walking and bicycling environment from their campus buildings to the transitway.

Lastly, the City of Saint Paul conducted a station area planning process between May 2014 and June 2015 in tandem with the Gold Line BRT Draft Environmental Impact Statement (EIS). The station area plans were adopted by the Saint Paul Planning Commission and City Council in October 2015, and serve as an update to the city's comprehensive plan. The plans take the place of the Sun Ray-Suburban Small

Area Plan. Because of this relationship with existing plans, the station area plans were the primary document reviewed for Saint Paul.

The Maplewood, Landfall, and Oakdale station area plans are high-level preliminary planning documents. Planning commissions or city councils have not acted on the plans, which were created as informational documents for future planning efforts. Thus, the review of these cities' economic development efforts is based only on the contents of their comprehensive plans.

Saint Paul

The station area planning process included the formation of the Gold Line Station Area Planning Task Force, which consisted of ten members, including nearby business owners, residents, and two Saint Paul Planning Commissioners. The Task Force focused on land use, development, open space, walking and bicycle connections, and access to five potential Saint Paul stations on the Gold Line BRT (i.e., Mounds Boulevard, Earl Street, Etna Street, White Bear Avenue, and Sun Ray).

The adopted station area plans integrated two primary goals related to job growth on the Gold Line BRT. These goals are:

- Create opportunities for new development and redevelopment for residents attracted by the BRT service, and build destinations and community resources.
- Create opportunities for existing businesses to benefit from transit.

Find more information on the Saint Paul *Gold Line Station Area Plans* document at http://www.stpaul.gov/GoldLineSAP.

UNION DEPOT

Future land use near Union Depot presents moderate opportunities to support job growth in the area. Planned land uses near Union Depot are similar to existing uses including industrial, high-density residential, and mixed-use. Primary redevelopment opportunities to support job growth in the station area are located north of Kellogg Boulevard between 4th and 5th Streets.

MOUNDS BOULEVARD STATION

Mounds Boulevard Station has limited opportunities to support job growth in the area due to the existing development and the commitment to historic preservation. The market analysis for this station area noted that potential may exist for convenience retail or redevelopment in the medium- or long-term, leveraging the station's proximity to Metro State University and downtown Saint Paul. There is also the potential for infill residential development, the process of developing vacant or underused lots in mostly developed areas. Over the next five years, there is limited market potential and physical feasibility for new development.

EARL STREET STATION

The market analysis noted that over the next five years, there might be opportunities for adaptive reuse of buildings along Hudson Road. In the medium- to long-term, there is potential for infill residential and convenience retail development, which may require public- and private-sector collaboration due to the relatively high cost of redevelopment.

Earl Street Station has moderately limited opportunities to support job growth in the area. The station area plan recommended investing in the area to preserve the integrity and character of the residential neighborhood, rehabilitating the existing commercial buildings, and filling in the gaps within the commercial area with mixed-use buildings and residential uses.

ETNA STREET STATION

The market analysis for this station area noted near-term development is limited by current uses, but may be feasible on vacant lots near the proposed station. Redevelopment will likely be challenging in the medium- to long-term as it will require significantly higher rents to make up for the cost of demolition, lost income during the construction period, and cost of new construction.

The Etna Street Station Area Plan and future land use present moderate opportunities to support job growth in the area. The station area plan recommends land use changes occur immediately around the Etna Street Station through the creation of new developable land because of interchange reconfiguration, and the eventual redevelopment of the business park at the northwest corner of Etna and Wilson.

WHITE BEAR AVENUE STATION

The market analysis for this station area noted the proposed location provides an immediate opportunity for mixed-use development. Redevelopment of existing sites over time may be feasible as residential rents increase supporting redevelopment.

The White Bear Avenue station area plan and future land use presents significant opportunities to support job growth in the area. With the larger vacant lots and underused parking lots, this station area holds some of the East Side’s best opportunities for a new development designed to support businesses and the transit service itself.

SUN RAY STATION

The market analysis for this station area noted that in the near-term, Sun Ray is unlikely to be redeveloped. However, there may be medium- to long-term potential for full or partial redevelopment of the center as tenant leases expire and residential values can justify the cost of redevelopment.

The Sun Ray Station Area Plan and future land use presents significant opportunities to support job growth in the area. Nowhere else along the Gold Line BRT in Saint Paul is there a larger contiguous group of one-story buildings and parking lots than at the Sun Ray Station. The area near the proposed

BRT station and park & ride lot present tremendous potential for large-scale development in the medium- to long-term. In the short-term, the market analysis shows retail demand is high, while multi-family residential demand is medium. Changes to the land uses and intensity of the existing commercial developments will need to be phased, and driven by the private sector. Established residential areas will maintain their existing character.

Maplewood

Maplewood's comprehensive plan supports efforts by other agencies to improve transit service in the city on arterial roadways, which are high capacity urban roads helping move traffic to and from the interstate. The city will encourage higher-density economic development and redevelopment as transitways are added to arterial roads. The comprehensive plan also notes the city should coordinate its sidewalk and trails plan to encourage travel on foot, bicycle, and bus. Furthermore, Goal 3 of the Land Use chapter encourages more intense development and redevelopment along existing transit corridors, which supports job creation.

The market analysis for the 3M station area in Maplewood noted that 3M anchors the local real estate market through its own spending and the spending of its employees and visitors. There could be a market for townhomes near the campus, and new convenience or destination retail on the 3M campus. However, 3M has no immediate plans for additional development or new office space on their campus.

Landfall

The comprehensive plan notes the city will continue to work with Metro Transit providers to increase the variety of transit destinations available to residents, who will be directly served by the Greenway Avenue Station.

The market analysis for the Greenway Avenue Station notes that new development in this station area will be dependent on the availability of suitable lots, and would likely be limited to residential use and retail over the next five years. The uses could benefit from the existing traffic to nearby retailers.

Oakdale

The City of Oakdale's comprehensive plan identifies multiple re-development goals, including Goal 2: **"**Realize high quality redevelopment opportunities that are functionally and aesthetically compatible with their surrounding uses," including transit and transportation land uses.

Woodbury

The City of Woodbury's comprehensive plan is supportive of mixed-use development, both new and infill. Although the 2030 plan does not place these areas near the Gold Line BRT, the plan does include a goal to "use transit-oriented design principles for future development where appropriate." This goal indicates that design should be carefully considered in areas with transit service.

Supportive Resources

A need for social assistance and health outcomes are linked to one's employment status. Therefore, this assessment includes an inventory of centers along the Gold Line BRT that provide food, shelter, and other types of support. This is not intended to be a study of these resources. Rather, it is an acknowledgement that access to these resources by transit is important, as they present potential paths to employment and improved health outcomes for people in need. Overall, resources are much more broadly available to those in poverty in Saint Paul compared to suburban communities in the corridor. Table displays resources for Gold Line BRT communities.

Table 18: Shelter and Food Shelf Resources by Community

Community	Food Shelves	Shelter/Emergency Housing	Notes
Saint Paul	• Saint Paul is home to over 40 community food shelves. • Dorothy Day Center is located downtown	• Union Gospel Mission • Naomi's Family Center • Catholic Charities Dorothy Day Center • Listening House of Saint Paul • Minnesota Assistance Council	All shelters are located within proximity to Gold Line BRT (Union Depot and Mounds Boulevard Stations)
Maplewood	• Salvation Army Lakewood – Maplewood Emergency Food Shelf	• Catholic Charities of Minnesota – Family Service Center, Maplewood	Food shelf located near I-694 and northern border of Maplewood
Landfall	• N/A	• N/A	N/A
Oakdale	• N/A	• N/A	N/A
Woodbury	• HOPE Harbor • New Life Food Shelf	• HOPE Harbor (transitional housing)	N/A

In addition to the food and shelter resources outlined in Table 18, this inventory includes Community Action Partnership (CAP) agencies, affordable housing resources, and other services dedicated to reducing and eliminating poverty. Resources available throughout corridor communities and counties include:

- Community Action Partnership of Ramsey and Washington Counties: The Community Action Partnership (CAP) of Ramsey and Washington Counties, similar to many CAP agencies, was created to help those in need, assist people with paying bills and expenses, provide grants and other emergency short term financial aid, assist individuals with finding jobs, and promote self-sufficiency.
- HousingLink: HousingLink is a web-based non-profit organization and resource available to anyone with internet access. The HousingLink website provides a comprehensive database of affordable housing properties throughout the region, and is a useful, consolidated resource for those looking to locate or relocate in the region.
- Metro Housing and Redevelopment Authority: The Metro Housing and Redevelopment Authority (HRA) is an affordable housing resource and provider for the Twin Cities seven-county metropolitan area, including Gold Line BRT communities in Ramsey County outside of Saint Paul

(i.e., Maplewood). Maplewood residents may use the Metro HRA's services, provided through the Metropolitan Council, to locate and obtain affordable housing assistance.

- Saint Paul Public Housing Authority: The Saint Paul Public Housing Authority provides help with housing costs to individuals and families through a variety of state and federal rental assistance programs in the city of Saint Paul. Income-eligible residents may apply for affordable housing assistance.
- Washington County Housing and Redevelopment Authority: The Washington County HRA provides help with housing costs to 650 families through a variety of state and federal rental assistance programs. Income-eligible residents of Washington County may apply for affordable housing assistance.

Ramsey County and Washington County have WorkForce Centers located in Saint Paul and Woodbury respectively. Operated by the Minnesota Department of Employment and Economic Development, WorkForce Centers offer counseling, computer access, office equipment, library services, assistive technology, and vocational training for those actively engaged in a job search. They also provide placement services for veterans and people with disabilities in partnership with other state and federal agencies. Additionally, WorkForce Centers offer assistance to businesses by linking them with prospective employees, business development consultant services, economic data, and labor market analyses.

Safety Assessment

Vision Statement

Create safe places for walking and bicycling, while reducing crime.

Relationship to Health

Crash rates and accident levels have shown the design of our built environment has not done enough to protect pedestrians and bicyclists. Historically we built our streets (including sidewalks) and intersections to help cars travel quickly between destinations with little focus on walkers and bicyclists. As a result, walking and bicycling have become less safe over time. Often the most frequent users of sidewalks and bicycle routes are individuals without other transportation options.

Providing a built environment with pedestrian- and bicycle-friendly design is important to safety. The same elements (e.g., street lighting and landscaping) that create welcoming spaces help promote safety both from accidents and from crime. Research has also shown having more people present in an area helps to deter crime. In addition, these spaces, when designed for both people and cars, can help create a sense of belonging and promote healthy behaviors, like physical activity. Well-designed spaces can help meet the diverse needs of the population.

In the Gold Line BRT, personal safety and crime prevention were among the elements perceived as having the greatest influence in creating healthier environments. Community members commented that if they do not feel safe, they are far less likely to use transit. Community members also listed the importance of having good lighting and a variety of services available at the station areas to create more activity on the street.

Community Input

This assessment responds to two types of safety issues identified by community members: safety from crime and safety while traveling by foot or bicycle around transit stations.

Safety from Crime

Gold Line BRT community members perceive personal safety and crime prevention as having great influence in creating healthier environments. Community members commented that if they do not feel safe, they are far less likely to use services like transit. Community members also noted the need for good lighting to help people feel safe using sidewalks and other public spaces. Spaces with a lot of activity deter crime.

Safety While Traveling

In addition to personal safety, respondents also commented on the importance of safely traveling to and from stations and other local destinations. The design of the environment shapes actual and perceived safety. For example, respondents noted the need for complete and well-maintained sidewalks, good lighting, and easy access to destinations to help them feel safe. Respondents overwhelmingly selected sidewalks as an essential factor to traveling safely and for healthy communities.

Existing Conditions

Safety from Crime

This HIA concentrates on environments that deter criminal activity and help people feel safe, as opposed the type and amount of crime occurring in a given area along the Gold Line BRT. Spaces that enable crime and feel unsafe exist in every urban, suburban, and rural community, and are a product of visual, audible, or sensory environmental cues.

Safety While Traveling

The number of crashes in a community is one indicator of safety conditions in a given area. In this case, vehicular crashes with pedestrians and bicyclists are present within the corridor (see Table 19). However, the data should be interpreted with caution. Some areas lack adequate walking and bicycle facilities, or have few destinations accessible by foot or bicycle. In these areas, the lack of crashes may indicate an absence of pedestrians and bicyclists rather than a safe walking or biking environment.

Table 19: Vehicular Crashes Involving Pedestrians and Bicyclists in the Gold Line BRT Communities 2009-2013[19]

City	Total Crashes	Severity				
		Fatality	Incapacitating Injury	Non-Incapacitating Injury	Possible Injury	Property Damage
Saint Paul	119	2	10	30	73	4
Maplewood	1	1	0	0	0	0
Landfall	1	0	0	1	0	0
Oakdale	2	0	1	1	0	0
Woodbury	2	0	0	0	2	0

Per-user crash rate can help determine whether certain areas are particularly unsafe. However, few walking and bicycle counts have been conducted in the corridor. In that respect, few data points exist on the number of pedestrians and bicyclists who use streets in the corridor. Additionally, data on crashes between pedestrians and bicycles with cars is determined from police reports. In some cases, these accidents are simply not reported or are reported only as property-damage incidents.

Available bicycle and pedestrian counts for the HIA include totals by Saint Paul in 2013 and 2014. However, the counts were completed in just two locations near the Gold Line BRT, and reflect the number of bicyclists and pedestrians during a two-hour peak period (see Table 20).

Table 20: Bicyclists and Pedestrians Counted in Saint Paul in 2013 and 2014

Location	Bicycles		Pedestrians	
	2013	**2014**	**2013**	**2014**
Johnson Parkway north of East Margaret Street	22	23	15	12
Kellogg Boulevard east of Broadway Avenue	N/A	33 (with off-street path closed)	N/A	156 (with off-street path closed)

Based on available data, crashes in Saint Paul far outnumber those in the other Gold Line BRT communities. There are a couple possible reasons for this finding. First, there are lower rates of automobile ownership in Saint Paul neighborhoods near the Gold Line BRT, which suggest that residents of these neighborhoods are more likely to take trips on foot, bicycle, or transit. In addition, there are likely more bicyclists in Saint Paul compared to other Gold Line BRT communities, due to the greater availability of bicycle facilities.

Safety Assessment

The assessment includes details on the policies presented in each of the city's comprehensive plans that may support crime prevention and pedestrian and bicycle safety. The assessment also evaluates the existing walking and bicycling conditions within the corridor, as well as the policy support for improvements to these networks.

Safety from Crime

Good design takes into consideration the built environment including buildings, roads, and sidewalks and how these elements influences safety. For example, people feel safer when there are many people walking on the street and business entrances are visible from the street. A good design policy called "Crime Prevention Through Environmental Design (CPTED)" incorporates building design, landscaping, and street design to invite more people to use public areas and help eliminate spaces where crime can occur.

Using the following criteria, this section evaluates the extent to which each community has planned for and implements CPTED principles:

1. The comprehensive plan references CPTED or its principles by name.
2. The comprehensive plan references the importance of lighting, landscaping, or fencing to crime reduction or feelings of safety and security.
3. The comprehensive plan references the importance of casual observance from buildings, or a sense of enclosure from the built environment contributing to feelings of safety.

Results of the assessment are shown in Table 21.

Table 21: Safety from Crime Evaluation

City	CPTED by Name	Importance of Lighting, Landscaping, or Fencing	Importance of Buildings' Relationship to the Street
Saint Paul	Yes (Land Use Chapter)	Yes, with regard to general streetscape improvements	Yes (Land Use Chapter)
Maplewood	No	Yes, with regard to building design standards	No
Landfall	No	Yes, with regard to attractive streets and safety	No
Oakdale	No	No	Yes, but only in reference to 10th Street
Woodbury	Yes (Housing Chapter)	Yes, in mixed-use areas	Yes, only in mixed-use and neighborhood shopping center areas

Only Saint Paul and Woodbury mention CPTED specifically in their comprehensive plans. However, most Gold Line BRT cities generally attribute safety to good lighting, attractive landscaping, and the general appeal of the street.

Safety While Traveling

Using the following criteria, this section evaluates each community's policies and plans in support of elements that facilitate safe travel on foot or by bicycle:

1. The comprehensive plan emphasizes the importance of the sidewalk network as a basic function of accessibility and increased pedestrian activity.
2. The community has a well-developed pedestrian network.

3. The community has a well-developed bicycle network planned or in place.
4. The municipality or county has a Complete Streets policy.
5. The comprehensive plan addresses the need for maintenance of these facilities over time and especially in winter.
6. The comprehensive plan recognizes the role of design in addressing vehicular speed and how vehicular speeds translate to safety for non-motorized users of the street.
7. The comprehensive plan calls for pedestrian-scale lighting, especially in transit station areas, downtown retail districts, or other areas where there are many pedestrians.

Results of the assessment are shown in

Table 22, with further detail provided in the following sections.

Table 22: Safety While Traveling Evaluation

City	Importance of Sidewalk Network*	Development of Sidewalk Network	Development of Bicycle Network	Complete Streets Policy	Maintenance of Bicycle and Pedestrian Facilities	Street Safety for All Users	Pedestrian -Scale Lighting
Saint Paul	Yes	Mostly developed	Developing	Yes	Yes	Yes	Yes
Maplewood	Yes	Fragmented	No bicycle network	Yes	Yes	Yes	Yes
Landfall	No	Mostly developed	No bicycle network	No	Yes	No	No
Oakdale	Yes	Fragmented	Developing	No	Yes	Yes, only on design ated bicycle routes	No

*In the areas of the city within approximately one-half mile of the Gold Line BRT transitway.

SAINT PAUL

The City of Saint Paul's pedestrian network is better developed than other Gold Line BRT communities and its bicycle network is growing. The *Gold Line Station Area Plans* call for sidewalks on both sides of the streets within a half-mile of stations, repair of uneven sidewalks, and good lighting for pedestrians in the station areas[20]. The station area plans also call for zoning changes consistent with implementation of high-quality pedestrian and bicycle networks.

MAPLEWOOD

Though Maplewood's pedestrian and bicycle networks are currently incomplete, the city is well-positioned to make positive changes for bicyclists and pedestrians. 3M is currently developing a plan for improving the bicycle and pedestrian networks on their campus. Since 3M is the major landowner near the Gold Line BRT station in Maplewood, implementation of this plan could potentially to have a major impact on bicycling and walking conditions near the station. Furthermore, the city's *Living Streets Policy*[21], adopted in 2013, sets goals to "enhanced walking and biking conditions" and to "improve neighborhood aesthetics" in the function of a street. The *Living Streets Policy* is the standard for all new and reconstructed streets in Maplewood.

LANDFALL

The density and placement of homes and the narrow width of the streets create an environment where car traffic must move slowly, while improving safety. The majority of residential areas have sidewalks, though children often play and people often walk in the streets. However, the connection to the Greenway Avenue Station along Hudson Boulevard is not safe for pedestrians or bicyclists. There are no sidewalks along Hudson Boulevard, and no trees or businesses located near the street. The posted speed limit is 40 miles per hour and traffic moves quickly in the area.

OAKDALE

Oakdale's pedestrian network is incomplete. Pedestrian and bicycle connections are disconnected within the Gold Line BRT station areas in Oakdale. Future development provides opportunities to bring buildings to the lot lines, build pedestrian and bicycle connections, and provide a more pedestrian-friendly environment with multi-story buildings located next to sidewalks.

WOODBURY

Woodbury has experience implementing places, such as City Walk, that prioritize pedestrians and bicyclists, which encourages more people to occupy the spaces helping to create an environment that feels safe. This city also has an extensive off-street trail network that provides safe travel for bicyclists and pedestrians as it is often separated from traffic. Woodbury station areas can benefit from similar designs as City Walk and good connections to the off-street network.

ALL CITIES

There is room for improvement in the bicycle network within and between Gold Line BRT communities. Sidewalks will be necessary in many of the station areas and cities, which are mostly developed but lack sidewalks in many areas. Bicycle networks are similarly incomplete in the suburban communities. Saint Paul's current infrastructure and policy support for developing streets, which work for pedestrians, bicycles, and car traffic, is more thorough than the suburban communities. Gold Line BRT presents an opportunity for all of the corridor communities to improve the quantity and quality of their sidewalks and bicycle lanes and trails, including design elements such as lighting and landscaping.

Cities can move to address CPTED principles within local plans. Some cities who recognized personal safety or CPTED principles were mentioned the policy, but did not provide concrete strategies or implementation measures. Moving forward, communities should recognize the importance of the building environment, which supports personal safety through good design.

Suggested Recommendations

HIA Step: Recommendations

Similar to the way the elements were selected, suggested recommendations were included if positive health outcomes could result from land-use decisions. Suggested recommendations were determined through a review of available research and an analysis of current practices in each city. Since health results from complex interactions between people and their communities, cities have the opportunity to implement solutions they feel best serve their residents. The suggested recommendations listed below can be implemented in any combination to help build healthy, livable communities.

Connectivity

Walking and Bicycling to Destinations

- All Cities: Comprehensive plans should reference the Gold Line BRT project and set walking and bicycling visions for each station area. City council and planning commission members should walk and bicycle around the proposed station areas in today's environment. This practical experience would provide a better understanding of the challenges and barriers users might experience and would help to shape a vision for safe and accessible station areas. Recommendations for physical improvements or ordinance changes should follow from these visions.
- All Cities: Cities with station areas that may be redeveloped (e.g., Sun Ray Station in Saint Paul) should use grid layouts for new streets, with sidewalks on both sides of each street. Cities can also consider new connections in developed areas. Reducing distances between destinations is necessary to connect shopping, commuting, or other trips. A grid layout promotes the most direct connections and the shortest distance between places.
- All Cities: Monitor Walk and Bikes Scores as new infrastructure and new developments are built to understand how the changes are supporting or impairing connections to resources.
- All Cities: Follow transit-oriented development design principles for new development and consider how new development will interact with existing places and how someone could conveniently walk or bicycle.
- All Cities: When Metro Transit conducts its comprehensive study of transit in the corridor, each city should participate and encourage residents, especially transit riders, to participate.
- Maplewood/3M: When Gold Line BRT opens, 3M may consider becoming a Metro Transit employer and subsidize transit benefits for its employees.

Parking

- All Cities: Each city should evaluate the type and amount of parking needed for different land uses in each station area. Consider the visual impact of parking on station areas, as well as the distance it creates between destinations. Use renderings, models, and imagery to understand the impact new parking may have in an area. Seek opportunities to share existing parking with new uses, or to create district parking for multiple new uses.
- All Cities: Review and modify parking requirements to help reduce parking demand and promote more travel by alternative methods, such as walking and bicycling.

- All Cities: Explore shared parking or district-wide parking models for the corridor that support parking availability for all users versus the building of individual parking facilities serving only one development.
- Saint Paul: Consider reducing the minimum number of off-street parking spaces by 100% on all Traditional Neighborhood-designated pieces of land, not just those within a quarter mile of the station areas. This would follow the recent changes to the Saint Paul zoning code per the Central Corridor (METRO Green Line) Light Rail Transit station area plans.
- Maplewood: As 3M adds new buildings to its campus, consolidate parking into structures and place new buildings as close to the Gold Line BRT station as possible.
- Oakdale and Woodbury: Consider requiring parking lots to be placed at the rear of buildings in Gold Line BRT station areas.
- Woodbury: Further explore the idea of reducing parking requirements when bicycle or shared parking is available.
- Woodbury: When possible, apply mixed-use design standards to the Gold Line BRT station areas.

Housing

- All Cities: Gold Line BRT communities should address the importance of connecting affordable housing with the transit stations as part of their 2018 Comprehensive Plan Updates.
- All Cities: Communities should consider locating most or all affordable housing units near the Gold Line BRT station areas. Connecting affordable housing options with the station areas will provide better convenience and opportunities for using transit service. Locating housing near Gold Line BRT stations will also help reduce household transportation costs.
- All Cities: Gold Line BRT communities should place high-density affordable and market-rate housing near station areas.
- All Cities: Residential units should connect to the station areas with a complete network of sidewalks arranged in a grid-like pattern to provide the most direct trips possible.
- All Cities: Gold Line BRT communities should continue to coordinate and collaborate with the Metropolitan Council to meet the region's affordable housing goals, while implementing regional housing policies.
- All Cities: Consider enacting policies to replace any affordable housing lost to redevelopment.

Jobs

Unemployment and Underemployment

- All Cities: Strengthen language in comprehensive plan updates to specifically identify land use policies that support employment growth in Gold Line BRT station areas
- All Cities: Continue station area planning and economic development efforts, consistent with those completed in Saint Paul.
- All Cities: Pursue actions to better connect all communities to economic development initiatives, especially Landfall residents.

Economic Diversity

- All Cities: Acknowledge that transportation systems like the Gold Line BRT promote economic opportunities for workers and employers alike.
- All Cities: Support efforts to fight poverty, including connecting supportive resources and employment opportunities via transit.
- All Cities: Include in local plans the importance of locating jobs for convenient transit access, and enabling high-quality transit links to the corridor's major job centers.
- All Cities: Expand the promotion of local, county, and state programs that provide employment assistance.
- All Cities: Educate both elected leaders and the public on the importance of constructing the Gold Line BRT to coincide with job creation through economic development initiatives.

Employment Growth and Density

- Oakdale and Woodbury: Consider updating local plans to accommodate more activity around the transit stations, and build out roads and the walking environment in a transit-supportive manner.

Safety

Safety from Crime

- All Cities: Reference the impact the built environment has on public safety and public health in the comprehensive plans.
- All Cities: Incorporate CPTED principles into relevant plan sections such as transportation, parks and open space, and land use. This includes guidance for buildings located near the street, good lighting for pedestrians, and pedestrian and bicycle connections throughout the community.
- All Cities: Focus on building orientation as a critical part of maintaining safe environments.
- All Cities: Provide "form-based" guidance that requires sidewalks and design infrastructure that is safe and inviting. Form-based guidance supports predictable physical form rather than a traditional separation of uses. Strategies include signs providing directions, accommodations for individuals with mobility challenges, building orientations supporting good pedestrian environments, etc.

Safety While Traveling

- All Cities: Monitor performance of individuals traveling on foot or bicycle. Performance management strategies include collecting bicycle and pedestrian counts on an annual basis.
- All Cities and Counties: Use signs, infrastructure, and regulations to slow traffic and promote the safe travel of all transportation methods.
- All Cities and Counties: Those responsible for snow removal in public right-of-way should prioritize sidewalks, curb ramps, and trails for safe travel on foot.
- All Cities and Counties: Ensure existing and future development includes good lighting in public right-of-way and certain private areas (e.g., parking facilities, common areas, open space, alleys, and entrances).

Miscellaneous

- Ramsey and Washington Counties: Formalize coordination between departments and community stakeholders to develop and monitor performance measures related to safety and public health. Data over time could help identify priorities for improving the built environment and safety. Measures could relate to use of active transportation, implementation and use of safe routes to school, etc.
- All Cities and Counties: Local plans should incorporate health-related safety elements and align with comprehensive plans, zoning ordinances, and capital improvement plans.
    - If not already included, local comprehensive plans should contain the following elements:
        - Express the importance of a complete sidewalk network and indicate priorities for development and implementation of that network
        - Express the importance of a complete bicycle transportation network and indicate priorities for development and implementation of that network.
        - Include, refer to, and adopt a complete streets or similar policy.
        - Outline responsibilities for the maintenance of bicycle and pedestrian infrastructure.
        - Emphasize street safety for all users
        - Provide lighting guidance for pedestrians (also called pedestrian-scale lighting).
    - Zoning ordinances should address these comprehensive plan elements and indicate how they should be applied to various land uses.
    - If capital investment is necessary to comply with plans and ordinances, these improvements should be listed in local capital improvement plans.
    - Plans should be updated on a regular basis, and progress on safety improvements should be a local performance measure to which stakeholders are accountable.

Next Steps

Transitway projects, including Gold Line BRT, are crucial to improving our regional transportation system, and can increase a community's quality of life by providing convenient access to jobs, housing, recreation, and other daily needs. These projects are planned over time, and this HIA is one step in a transitway development process. Each level of analysis helps build a more comprehensive understanding of the conditions and needs of the communities along the corridor prior to the implementation of the transitway.

Station Area Planning

Federal environmental law requires projects using federal dollars, like Gold Line BRT, to complete an environmental assessment. The Gold Line BRT Draft Environmental Impact Statement is currently underway, and will disclose the impacts and benefits of the various alternatives under consideration. Concurrent with preparation of the Draft EIS, the Gold Line BRT project is also carrying out baseline station area assessments, which will include input from land use planning and real estate development perspectives. In order to better prepare each community for the Gold Line BRT, a more intensive station area planning process will help cities facilitate infrastructure changes and development to encourage pedestrians, bicyclists, and drivers to comfortably use the Gold Line BRT. The station area planning process will be funded largely by a grant from the Federal Transit Administration (FTA) Pilot Program for Transit-Oriented Development (TOD) Planning. Gold Line BRT staff will work with corridor communities to incorporate HIA's suggested recommendations into station area planning scope of work so that each community can better customize the recommendations to their station areas. The HIA process showed a strong correlation between land use and health, and demonstrated that Gold Line BRT community members value healthy communities. As a result, health will be front and center in ongoing Gold Line BRT planning processes. Station planning activities will be ongoing throughout the transitway development process. See Figure 7 for the Gold Line BRT development process schedule.

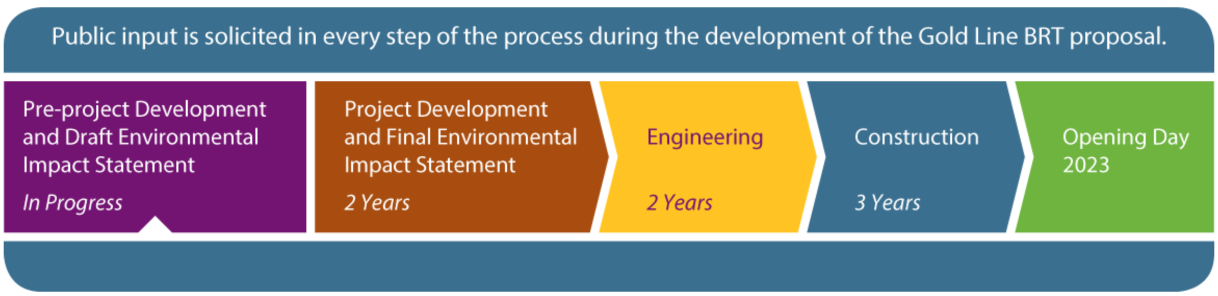


Figure 7: Gold Line BRT Development Schedule

Statewide Health Improvement Program

Saint Paul—Ramsey County Public Health and Washington County Public Health and Environment (PHE) have received funding through the Statewide Health Improvement Program (SHIP). SHIP is a statewide program, led by the Minnesota Department of Health, striving to help Minnesotans lead longer, healthier lives by decreasing tobacco use, poor nutrition, and physical inactivity. Current Ramsey and Washington County SHIP grants focus on working with cities to include health, specifically active living and healthy food access, within comprehensive plans. For example, in Washington County Gold Line BRT staff will collaborate with Washington County PHE for conversations with corridor communities to leverage findings and recommendations from the HIA, along with SHIP funds, to include health in comprehensive plans.

Conclusion

The complex interaction between health and our environment means healthcare alone cannot improve our health. In fact, health begins where we spend the most time—at home, at work, and in our communities. For this reason, how we design our communities matters, and health should be included early and explicitly in decision-making processes, including comprehensive plans. Comprehensive plans are one of the most influential tools a community can use to emphasize healthy and equitable decisions, and the results of this HIA can provide guidance to Gold Line BRT communities for future updates.

The comprehensive planning process is an opportunity for Gold Line BRT cities to reinforce their work towards creating healthy, livable communities. Cities play an essential role in the design of our environments and as a result yield great power in creating healthy communities. Gold Line BRT communities have previously implemented many health-supportive strategies, as indicated by research completed in this HIA. The analysis has also highlighted where opportunities exist for cities to bring health front and center in decision-making processes that will affect communities for years to come.

HIA participants, including representatives from Gold Line BRT communities, noted that the project helped increase their understanding of the relationship between land use decisions and health. Our analysis combined with stakeholder input has helped identify potential opportunities for cities to address in their comprehensive plans. Conversations surrounding community health are ongoing, and comprehensive plans are one of many opportunities to consider health in policy making. Accordingly, the results of this HIA can guide community-wide discussions surrounding health improvement well beyond the Gold Line BRT. The breadth of suggested recommendations in this study allows a city to choose the best strategies to meet its own community-based vision for health. Each Gold Line BRT city can work collaboratively with community members to understand health concerns and to develop and achieve their vision for an equitable, healthy community.

Appendix A: Study Methodology

Introduction

Development of the Gold Line BRT HIA started with in-person and online engagement of residents, established public-health-focused groups, and city staff for corridor communities. Corridor stakeholders identified from a list the topics to study in the HIA through a worksheet, a series of in-person meetings, and a half-day workshop. They selected housing, connectivity, jobs, and safety as four elements of the built environment that determine public and individual health in their communities.

Once the four elements were selected, the HIA team established a vision for each element. The research began with the literature review, then progressed to the assessment, and concluded with development of one-page summaries.

Research Methods

Vision Statements

Because the four elements represent such broad topics, a vision statement for each was set by the HIA project team and reviewed and edited by stakeholders before finalized. The vision statements served to frame up the research.

- Housing: Increase housing options for all ages, incomes, and lifestyles.
- Connectivity: Provide convenient and reliable ways to walk or bicycle to basic needs and services.
- Jobs: Increase the number and variety of jobs near station locations.
- Safety: Create safe places for walking and bicycling while reducing crime.

Literature Review

The literature review demonstrates the link between each of the four elements and public health outcomes using creditable resources such as public health, planning, and transportation journal articles, research, and best practices. The literature review functions as a check on the four elements and confirms that connectivity, housing, jobs, and safety each have a strong and proven relationship to public health.

The following reports formed a foundation for the Gold Line BRT HIA Literature Review:

- **Design for Health (2006-2012)**—Design for Health (DFH) was a collaborative project between the University of Minnesota and Blue Cross and Blue Shield of Minnesota to bridge the gap between the emerging research database on community design, healthy living, and everyday realities of local government planning.

- **Healthy Corridor for All Health Impact Assessment (2011)**—Health Corridor for All was a HIA for transit-oriented development associated with the Central Corridor (METRO Green Line) Light Rail project in Saint Paul, Minnesota. This HIA was chosen as a precedent example for its relevant health research as it applies to the Gold Line BRT.
- **Bottineau Transitway Health Impact Assessment (2013)**—This HIA was completed for the Bottineau Transitway (also known as the METRO Blue Line Extension), a proposed light rail transitway in northwest Twin Cities. This HIA was chosen for its relevant health research as it applies to the Gold Line BRT.

The results of the Literature Review are available in Appendix B.

Assessments

Assessments were completed for each of the four elements.

Connectivity

Walking and Bicycling to Destinations

Bicycling and walking conditions in each station area were evaluated using Walk Score and Bike Score, a source measuring amenities within walking or bicycling distance of a given location. Population density and road measurements such as block length, intersection density, and presence of bicycle infrastructure also contribute to the score.

WALK SCORE

For each address, Walk Score studies hundreds of walking routes to nearby resources such as grocery stores, schools, parks, restaurants, and retail stores. Points are awarded on a 100-point scale based on the distance to these destinations. Amenities within a five-minute walk (.25 miles) are given maximum points, with fewer points awarded to greater distances, and no points awarded for destinations beyond a 30-minute walk. Population density and road metrics such as block length and intersection density also contribute to the score. Data sources include Google, Education.com, Open Street Map, the U.S. Census Bureau, Localeze, and places added by the Walk Score user community.[22] Walk Score data can also be tracked over time to measure historical trends.

BIKE SCORE

Bike Score is created based on the following four criteria: the presence of bicycle infrastructure referred to as a “bike lane score”, the presence of hills, the number of destinations and resources (grocery stores, schools, parks, restaurants, and retail) similar to Walk Score, and the bicycle mode share, which is the percentage of trips in the region that are taken by bicycle.[23]

BIKE LANE SCORE

The Bike Lane Score is based on data provided by city governments. Bike lane infrastructure currently includes all on and off street bike lanes and paths, but does not include infrastructure such as bike parking, bike sharing, etc. To account for the differences in bicycle infrastructure types across cities, bikeways were categorized generally as on-street or off-street lanes. Off-street lanes are considered twice as valuable as on-street lanes.

For a given location, Bike Score adds up the length of all nearby bike lanes, and assigns points based on nearby existing lanes. No value is given to segments further than 1,000 meters from the origin.

HILL SCORE

To calculate the "hilliness" of an area, Bike Score looks at the steepest grade within a 200 meter circle around a given location. Hills with the steepest grade (10% or higher) are given zero points, with greater points awarded to flatter areas. The data source is the National Elevation Data set from the United States Geological Survey.

CONNECTION TO DESTINATIONS

To measure connectivity to destinations, Bike Score uses an adjusted version of Walk Score, which measures the network distances to a diverse set of amenities and calculates connectivity measurements such as average block length and the number of intersections in an area.

BICYCLE MODE SHARE

This factor accounts for the social aspects of bicycling and “safety in numbers” research. When more people bicycle, drivers are more likely to have had experience bicycling and are more aware of other users on the road. The data comes from the U.S. Census Bureau.

Parking

Because the placement and quantity of parking is often related to the quality of bicycle and pedestrian connections, connectivity is also evaluated by consideration of how each community deals with parking in its station areas, as described in its zoning code and comprehensive plan.

For this HIA, parking evaluation is based on several assumptions (Table 23) about how parking affects the physical form of a station area, which in turn affects whether walking or bicycling to destinations is an attractive option.

Table 23: Parking Assumptions and Assessment Criteria

Assumptions Regarding Parking in Station Areas	Assessment Criteria
In station areas establishing and/or maintaining a quality walking environment is prioritized over convenience for drivers.	Does the zoning code allow for reduced parking within a transit station area?
Many retail developments such as shopping centers, strip malls, and big-box retail and grocery stores have excess parking that is never used. Often, this parking is built according to city ordinances that require a minimum number of stalls per square foot of development.	Does the zoning code specify parking minimums? Does the zoning code specify parking maximums? Does the zoning code allow for the potential of no new parking at the developer's discretion?
It is possible to share parking between compatible uses.	Does the zoning code allow for shared parking between compatible uses? Does the city own municipal parking lots used for shared parking?
It is possible to reduce the need for parking by welcoming other modes of transportation (e.g., transit, walking, bicycling, and car sharing).	Does the zoning code allow for reduced parking with provision of bicycle parking or on-site car sharing? Does the city practice Travel Demand Management and use any tools to reduce single-occupancy-vehicle travel?*
City streets can be valuable sources of parking spaces.	Does the city allow on-street parking on local streets in its station areas?
Charging for parking can help control demand, shift trips to biking, walking, and transit, and garner a return on a physical investment.	Does the city charge for parking in any locations within a Gold Line BRT station area?
Parking design and the placement in relation to the street and buildings is critical to maintaining a walkable environment.	Does the comprehensive plan discuss design and siting of parking lots with regard to visual impacts or pedestrian environment?
Outside of downtown Minneapolis and downtown Saint Paul, few new developments in the Twin Cities region are built with no new parking.	Does the comprehensive plan discuss design and siting of parking lots with regard to visual impacts or pedestrian environment?

* Travel Demand Management (TDM) is a set of tools to reduce single-occupancy-vehicle travel and facilitate use of transportation choices for work and non-work trips. By promoting modes of travel such as ridesharing, vanpooling, transit, bicycling, and walking, TDM improves the efficiency and capacity of the existing transportation

system. TDM also includes strategies like staggered work schedules and telecommuting, which can shift and reduce overall demand on the transportation system.

Housing

A brief summary of the affordable housing conditions in each Gold Line BRT community is provided, as documented in their comprehensive plans. The existing housing conditions are then evaluated by the following criteria: progress toward regional affordable housing goals as defined by the Metropolitan Council; housing cost burden as it relates to household income and transportation costs; and residential densities measured in households per acre.

Evaluation criteria were determined by established local and regional policies and by the data available.

Affordable Housing in the Region

The Metropolitan Council collects data on each city's past performance with regard to meeting the regional need for affordable housing. The criteria used for this HIA are consistent with those from the Metropolitan Council. The evaluation provided in Housing section is an adapted version of the Metropolitan Council assessment to include only Gold Line BRT communities.

METROPOLITAN COUNCIL AFFORDABLE HOUSING ALLOCATION PROCESS

According to the Metropolitan Land Planning Act, cities' comprehensive plans must include:

> "…a housing implementation program, including official controls to implement the housing element of the land use plan, which will provide sufficient existing and new housing to meet the local unit's share of the metropolitan area need for low and moderate income housing.[24]"

The Metropolitan Council calculates each local government's share of the region's need for affordable housing every ten years. These calculations are provided local jurisdictions for use in preparing their comprehensive plans. The number of new affordable units prescribed for each city is calculated by how much the city is projected to grow, and then is adjusted in two ways:

- **Ratio of low-wage jobs to low-wage workers:** The ratio of low-wage jobs in the community to low-wage workers who live in a community indicates whether a community imports low-wage workers to fill its low-wage jobs and could therefore use more new affordable housing for those workers.
- **Existing affordable housing:** Placing new affordable housing in communities where existing affordable housing is scarce expands choice for low-income households.

The outcome of this process is a required number of affordable units that each city is expected to fulfill within the ten-year period; these are shown in Table 24 for the Gold Line BRT cities.

Table 24: Affordable Housing Unit Allocations for 2021-2030

City	Net Growth between 2020 and 2030	Units of Affordable Housing Allocated
Saint Paul	6,700 households	1,973 units
Maplewood	1,900 households	510 units
Landfall	0 households	0 units
Oakdale	500 households	152 units
Woodbury	2,700 households	1,043 units

METROPOLITAN COUNCIL ASSESSMENT CRITERIA

To ensure local accountability, the Metropolitan Council maintains several key measures of each local jurisdiction (cities and townships):

- How many new housing units, both owner-occupied and rental, meet the criteria for affordability?
- How many existing housing units are affordable, including both owner-occupied and rental, and subsidized and unsubsidized units?
- What is each local jurisdiction's Housing Performance Score?

The Housing Performance Score is calculated on an annual basis for each of the region's cities and townships. It assesses local efforts to develop and maintain affordable housing and support low- and moderate-income households through a variety of programs and services. The Metropolitan Council uses the scores to prioritize funding to communities that are maintaining or expanding their supply of affordable housing and using fiscal, planning, and regulatory tools to promote affordable and mixed-income housing. At the same time, the Metropolitan Council grants funding preference under the Local Housing Incentives Account to cities with lower scores.

Although the definitions of affordability have changed, the Metropolitan Council has been reporting the count of new affordable housing units added in the region every year since 1996. For a number of years, the Metropolitan Council has used a single threshold of 60% of area median income in its Housing Performance Scores, limiting the housing efforts that count toward the scores. In keeping with the *2040 Housing Policy Plan*'s approach, the scores will now include a wider definition of affordable housing and credit cities for all affordable housing production or preservation at or below 80% of area median income, and homeownership activities up to 115% of area median income. Affordable housing at 30% of AMI and below will receive the highest scores.

The Metropolitan Council tracks all new housing constructed in the region and determines its affordability at 30%, 50%, and 80% of area median income. The Metropolitan Council also maintains an annual "Inventory of Affordable Housing" that documents the existing affordable housing stock, and calculates and reports on each local jurisdiction's annual Housing Performance Score. The Housing Performance Score is calculated out of 100 available points from four main areas:

- Recent or new construction projects completed in the last 10 years (0-35 points)
- Recent preservation projects in last 10 years or substantial rehabilitation in last 3 years (15-50 points)
- Housing programs and policies in place and in use in the last 5 years (0-25 points) and
- Characteristics of the existing housing stock (0-25 points)

A score of 0 indicates a lack of any housing activity and 100 reflects outstanding performance in meeting affordable housing goals, providing housing-related services, and approving and contributing to housing development, redevelopment, rehabilitation, and preservation.

The HIA reports the number of new and existing affordable units in each Gold Line BRT community, as well as each city's annual Housing Performance Score over the past six years (2010-2015), and suggests continual monitoring of this measure in the coming years.

HOUSING COST BURDEN

The Center for Neighborhood Technology's Housing + Transportation Affordability Index (H+T Index) presents housing and transportation data as maps, charts, and statistics for 917 metropolitan and slightly smaller metropolitan areas—covering 94% of the US population. Costs are available from the regional down to the census-block-group level.

According to the Center for Neighborhood Technology (CNT), planners, lenders, and most consumers consider housing affordable if the cost of housing is 30% or less of household income. Research done by CNT across metro areas of varying sizes has found that spending 15% of income on transportation is an attainable goal for transportation affordability. Therefore, locations where combined housing and transportation costs constitute less than 45% of median household income are considered affordable to the typical household.

The H+T Index "typical household" is one that earns the median regional income, is the average regional household size, and has the regional average number of commuters per household. By fixing income, household size, and commuters, the model controls for the impact of these variables on transportation costs. Differences in transportation costs are therefore a result of neighborhood characteristics and variation in the built environment.

The HIA assessment uses the H+T Index to gather the housing and transportation costs as a percentage of area median income for the census blocks, the smallest geographic unit used by the U.S. Census Bureau for data collected from all houses, immediately adjacent to each station location, as well as each local government as a whole.

RESIDENTIAL DENSITY

Because land within the station areas is scarce and living near a transitway station presents a benefit to existing and future residents in the form of lower transportation costs, residential density is an important consideration in the development of affordable housing near transit. The HIA included existing residential densities in transit station areas according to each city's comprehensive plan.

Jobs

Diversity and number of jobs in the corridor station areas is measured using several criteria: projected employment growth using Metropolitan Council forecast employment by Transportation Analysis Zone (TAZ), employment density in station areas measured in jobs per acre; transit access to jobs measured by the types of transit service available at each Gold Line BRT station and their connectivity to regional job centers; economic development initiatives that direct local and regional economic development resources toward station areas; and socially-supportive resources such as food, and shelter.

Projected Employment Growth

Overall, job growth has a positive impact on improving the employment status of people that are unemployed or underemployed. In this category, the projected employment growth at each transit station area, based on 2040 forecast data provided by the Metropolitan Council was evaluated.

Employment Density

Accessibility to jobs via transit is an important measure of the benefit of a transit service. Density provides a measure of the form in which jobs are clustered in the station areas. This provides guidance on how many potential jobs could be added if a given area is redeveloped. Employment density was used as a measurement for this assessment.

Transit Access to Jobs

Equitable access to jobs can be measured by how easily one can commute to a work site by transit. For this assessment, the types of transit service available at each transit station and their connectivity to job centers were evaluated using the following criteria:

- Does the transit station currently have a direct transit connection to a central business district (CBD), either Minneapolis or Saint Paul?
- Does the transit station currently have a direct connection to an existing transitway?
- Is the station on Metro Transit's "Hi-Frequency Network" offering transit service every 15 minutes or better on weekdays and Saturdays?
- Is there service offered during peak periods?
- What types of local service are available? Urban local? Suburban local?
- Are there multiple midday trips available outside of the morning and afternoon rush hours?

- Are there multiple evening trips available outside of the afternoon rush hour?

Economic Development Initiatives

The Gold Line BRT community's land use, station area, and economic development plans were reviewed to determine their economic development initiatives. An important first step in directing local and regional economic development resources toward transitway station areas is the completion of station area plans. Station area plans typically present a vision for a station area, identify commercial and residential real estate development opportunities and timelines, and point to infrastructure upgrades that set in motion development and redevelopment and improve access and circulation within the station area. The City of Saint Paul completed detailed station area planning with intensive feedback from community members in 2015. Maplewood, Landfall, and Oakdale completed high-level preliminary station area plans for their stations.

Supportive Resources

This assessment included an inventory of centers along the Gold Line BRT that provide food, shelter, and other types of support. This is not intended to be a study of these resources. Rather, it is an acknowledgement that access to these resources by transit is important, as they present potential paths to employment, improved health outcomes for people in need, or both.

Safety

Safety in the Gold Line BRT station areas is considered with regard to bicycling and walking, as well as personal safety from crime. Safety while traveling by bicycle or walking is evaluated by considering the sidewalk and bicycle networks in the stations areas, the maintenance plans for such facilities, and street speed limits and design speeds. Personal safety is evaluated by reviewing policies presented in each city's comprehensive plan that support Crime Prevention Through Environmental Design (CPTED) principles.

Safety from Crime

The assessment reviewed policies presented in each city's comprehensive plan that support crime prevention.

Crime Prevention Through Environmental Design

In her influential 1961 treatise *The Death and Life of Great American Cities,* Jane Jacobs introduced the concept of "eyes on the street", also referred to as "natural surveillance" (see box below).[25]

> ***"A city street equipped to handle strangers, and to make a safety asset, in itself, out of the presence of strangers, as the streets of successful city neighborhoods always do, must have three main qualities:***
>
> ***First, there must be a clear demarcation between what is public space and what is private space. Public and private spaces cannot ooze into each other as they do typically in suburban settings or in projects.***
>
> ***Second, there must be eyes upon the street, eyes belonging to those we might call the natural proprietors of the street. The buildings on a street equipped to handle strangers, and to insure the safety of both residents and strangers, must be oriented to the street. They cannot turn their backs or blank sides on it and leave it blind.***
>
> ***And third, the sidewalk must have users on it fairly continuously, both to add to the number of effective eyes on the street and to induce the people in buildings along the street to watch the sidewalks in sufficient numbers. Nobody enjoys sitting on a stoop or looking out a window at an empty street. Almost nobody does such a thing. Large numbers of people entertain themselves, off and on, by watching street activity."***
>
> **- Jane Jacobs, *The Death and Life of Great American Cities***

Beginning with Jacobs' observations, the relationship between the built environment and criminal activity or perceptions of unsafe spaces has been well documented. CPTED has emerged as an approach to deterring criminal behavior. CPTED is based on the idea that the proper design and effective use of the built environment can lead to a reduction in the incidence and fear of crime, and an improvement in quality of life. Three basic principles govern CPTED:

- **Natural Surveillance:** Natural surveillance is achieved through design and maintenance that allows people engaged in their normal activity to easily observe the space around them, and eliminates hiding places for people engaged in criminal activity. Natural surveillance is generally achieved by the use of appropriate lighting, low or see-through fencing or landscaping, the removal of areas that offer concealment, and the placement of windows, doors, and walkways to provide the opportunity for easy observation of surrounding areas.
- **Territoriality:** Territoriality is clear designation between public, private, and semi-private areas and is intended to make it easier for people to understand and participate in an area's intended use. Territoriality communicates a sense of active "ownership" of an area that can discourage the perception that illegal acts may be committed in the area without notice or consequences. The use of see-through screening, low fencing, gates, signage, different pavement textures, or other landscaping elements that visually show the transition between areas intended for different uses are examples of the principle of territoriality.
- **Access Control:** Access control is a concept directed primarily at decreasing criminal accessibility, especially into areas where a person with criminal intent would not easily be seen by others. Examples of access control would include a highly visible gate or entry way through which all users of a property must enter, or the appropriate use of signage, door and window

locks, or fencing to discourage unwanted access into private space or into dark or unmonitored areas.

Municipal Tools for Implementing CPTED Principles

There are several policy and regulatory tools a city can use to implement CPTED principles in rural, suburban, or urban contexts:

- **Comprehensive Plan:** The comprehensive plan guides development in a given community, and governs the arrangement of a city's land, streets, and buildings and the infrastructure that supports them. Inclusion of CPTED in the comprehensive plan allows for implementation of its principles in the zoning code.
- **Zoning Codes:** Zoning codes govern how public and private spaces interact. This includes the use and form of buildings, such as setbacks, facades, and windows, as well as landscaping, and driveway and parking placement. The design orientation of buildings with windows near to and facing the street can increase natural surveillance by both residential and commercial neighbors.
- **Street Planning and Design Policy:** In order for a street to attract the walkers and bicyclists who bring activity and eyes to the area, it must function well for those users. In 2010, the State of Minnesota passed "Complete Streets" legislation that requires the Minnesota Department of Transportation (MnDOT) to implement a statewide Complete Streets policy. The policy affects all trunk highways, as well as county state-aid highways and municipal state-aid streets when a variance is requested. The legislation encourages, but does not require local units of government to pass complete streets policies. However, municipalities may find that a complete streets policy is an effective tool for implementing CPTED principles. For example, it forces planners, designers, and elected officials to consider streets' form and function by integrating amenities (e.g., lighting, signage, landscaping, and pavement markers) that create a safer environment from a user's personal safety perspective.

Safety While Traveling

The assessment reviewed policies presented in each city's comprehensive plan that supports personal safety while traveling on foot or bicycle.

Municipal Tools for Implementing CPTED Principles

A number of conditions contribute to actual and perceived safety while traveling by foot or by bicycle:

- **Sidewalk Networks:** Providing sidewalks on both sides of every street allows for pedestrians to access destinations without walking in vehicular traffic and keeps pedestrian movements more predictable to other users of the street. Pedestrian-scale lighting along the sidewalk network helps to keep the sidewalks useful and attractive even after dark. Landscaped boulevards between the sidewalk and street offer a buffer between vehicular traffic and pedestrians, and provide a place for street trees to grow and shade the sidewalk. Marked crosswalks are an important component to the sidewalk network. Marked pedestrian crossings serve as a visual cue to drivers that pedestrians are present and have a location for crossing.

- **Bicycle Networks**: Well-marked bicycle facilities, whether they are off-street trails, cycle tracks, on-street lanes, or shared lanes with vehicular traffic, allow for bicyclists to move in a predictable manner, direct vehicular traffic to maintain a reasonable distance from bicyclists, signal the potential of bicyclists on the road, and encourage bicyclists not to use sidewalks.
- **Maintenance of Sidewalks and Bicycle Facilities:** In addition to constructing sufficient pedestrian and bicycle facilities, these facilities must be adequately maintained, both day-to-day and long term. Snow removal is especially important for safety, as it helps to prevent ice from developing on sidewalks and trails. Poorly maintained infrastructure can also be a physical barrier to using active modes of transportation, particularly for vulnerable populations like children and older adults, and people with mobility challenges. In that respect, pedestrian and bicycle facilities should be regularly maintained and preserved to ensure they do not deteriorate over time.
- **Speed Limits and Design Speeds:** Vehicle speed is an important safety issue for bicycles and pedestrians. The speed of the car in a pedestrian or bicycle crash greatly affects the severity of injury for those involved. The likelihood of fatalities in crashes involving a vehicle and a pedestrian or person on a bicycle decreases substantially as vehicle speeds slow. Beyond speed limits, roadway design elements can make drivers more aware of their surroundings, drive more slowly and cautiously and in turn reduce the likelihood of fatal crashes.
- **Lighting:** Good lighting for pedestrians helps to create a safer, more inviting environment that allows for better use of pedestrian infrastructure after dark. As noted, proper lighting and clear sightlines are elements of “natural surveillance,” so people engaged in their normal activities can easily observe the space around them and spaces where criminal activity can occur are reduced.

Appendix B: Literature Review

Listed below are the key findings of studies, reports, policy papers, and scientific publications. Items with a "✓" highlight research that is directly or indirectly linked to social equity.

Gold Line BRT - HIA Literature Review				
Health Element	**Social Equity**	**Key Words**	**Summary**	**Reference Number**
Connectivity	✓	Washington County, health assessment, healthy food	The Washington County Community Health Improvement Plan completed in 2014, found that one in five adults living at or below 200% of the federal poverty level reported meeting the recommended daily intake of fruits and vegetables. In order to address this concern, Washington County organized the Chronic Disease Prevention Committee, a committee of more than 20 partners from across the county focused on improving access to healthy food, among a variety of other health-related topics.	26
Connectivity	✓	Ramsey County, health assessment, healthy food, physical activity	The Ramsey County Community Health Assessment was completed in 2013. Ramsey County has more residents, particularly children and people of color, living in poverty than any other metro county. Low-income families are more likely to face barriers in accessing health foods, participating in physical activity, and choosing where to live.	27
Connectivity		Washington County, health assessment, access, primary care, zero-vehicle households	The Washington County Community Health Improvement Plan also found that transportation could be substantial barrier to maintaining health, especially regarding the ability to access primary care services. About 3.4% of all Washington County households had no vehicle access.	28
Connectivity		Washington County, residential survey, access, transit	Survey responses from Washington County residents in the 2013 Residential Survey listed "Ease of travel by public transit in Washington County" as the most significant potential problem in the county.	29
Connectivity	✓	Access, transportation, housing, employment,	A Federal Highway Administration (FHWA) study completed in 2013 found that fewer transportation options can lead to increase transportation costs and inequitable access to	30

		healthy food, access	employment, housing, and healthy foods.	
Connectivity	✓	Healthy food, disease prevention, childhood development, low-income, people of color, access	Good nutrition is vital to health, disease prevention, and childhood development. When people have access to healthy food options they are better able to include healthy food in their diets. Previous studies have found that low-income and people of color often live in environments that, compared to middle and upper-middle class areas, are less likely to have access to supermarkets and other venues selling a variety of higher quality food items. Also, low-income and minority neighborhoods have more fast food restaurants and liquor stores.	31
Connectivity	✓	Census, people of color, foreign-born, access	Data from the 2009 American Community Survey (ACS) indicated that the rate of public transportation usage among the foreign-born population was 10.8%, more than twice that of the native-born population, at 4.1%.	32
Connectivity		Pedestrian, walkability, commute, physical activity	Connectivity to safe and modern pedestrian facilities that enhance the walkability of neighborhoods surrounding transit facilities is an important consideration for transit projects. Walking to transit facilities and destinations can improve health. A 2005 article in the *American Journal of Preventative Medicine* reported that 29% of people using transit to get to work met their daily requirements for physical activity from walking to work.	33
Connectivity	✓	Access, education	Access to educational facilities is an important factor to consider when studying transit connectivity. When people have access to education they have better chances of securing jobs that pay well and do not expose them to dangerous or unhealthy conditions. They also gain knowledge and skills that help them access health information and resources.	34
Connectivity		Access, health care, GIS	The University of Minnesota's Design for Health Study identified that access to health care, both preventative medicine and acute care, is an important factor to the health of a community. The study recommended that health care facility planning can benefit from geographic information system (GIS) optimization modeling, which determines the best location, capacity,	35, 36

			and cost of new health care facilities. This is a common decision support tool for forecasting new hospital locations and determining underserved areas. The report cited examples of GIS modeling used for health care systems in Pennsylvania and North Carolina	
Connectivity		Zoning, land use, transportation, access, comprehensive plan, TOD, multimodal	The importance of zoning for transit is in the coordination between transportation and land use. Accessibility and connectivity can be addressed in comprehensive planning by integrating it into elements, such as transportation, public services, mobility, circulation, and design. It might also be addressed in supplemental plans, such as transit-oriented development (TOD) and multimodal master plans.	37
Connectivity		Land use, zoning, urban sprawl, physical activity, obesity, morbidity	Previous studies have shown the detrimental health effects of urban sprawl and poor land use planning. Zoning's separation of uses created vast suburban communities where routine daily trips to stores and schools must be done in automobiles. A 2003 study, *Relationship between Urban Sprawl and Physical Activity, Obesity, and Morbidity,* found that people living in counties marked by sprawling development are likely to walk less and weigh more than people who live in less sprawling counties.	38
Connectivity		Walkability, community design, basic goods and services	A 2006 report from the Atlanta Regional Health Forum and the Atlanta Regional Commission recommended that good neighborhood design should include schools that are integrated with residences offering the opportunity to walk or bicycle to school and residences that are integrated with shopping options such as grocery stores, pharmacies, and other retail stores.	39
Connectivity	✓	Healthy food, zoning, financial incentive, low-income	A 2008 study in New York City found that many low- and moderate-income neighborhoods across the city were underserved by grocery stores offering a full line of healthy foods. In response, the City of New York developed the Food Retail Expansion to Support Health (FRESH) program to facilitate the development of stores selling a full range of food products with an emphasis on fresh fruits and vegetables, meats, and other perishable goods. This program	40

			provides zoning and financial incentives for neighborhood grocery stores to locate in some of the most underserved neighborhoods in the City with primarily pedestrian-oriented, local shopping districts.	
Connectivity		Walkability, basic goods and services	While providing connectivity to basic needs and services is an important feature of transit projects, the reality is that a quarter mile is the distance that most people are willing to walk to transit regardless of the pedestrian infrastructure available.	41
Connectivity		Access, basic goods and services, health care, healthy food	In a report sponsored by the Minnesota Department of Transportation, Hennepin County, and the Metropolitan Council, researchers studied a variety of methods to measure accessibility, including "place rank", "cumulative opportunity", and "gravity based". These methods could be used to measure accessibility to basic needs, such as healthy foods, health care, and education.	42
Connectivity	✓	Land use, social, environmental impact, sprawl, social inclusion, mobility, access	In a report sponsored by the Victoria Transport Policy Institute, researchers study ways that transportation decisions affect land use patterns, and the resulting economic, social, and environmental impacts. Finding that sprawl tends to reduce social inclusion and increase the costs of providing basic mobility (Sanches and Brenman, 2007). Described more positively, by improving accessibility and affordable travel options (walking, cycling, ridesharing and public transit) Smart Growth tends to improve accessibility for disadvantaged people, improving their productivity and opportunities.	43
Connectivity		Sprawl, community design, physical activity, walkability	The American Academy of Pediatrics (2009) argues that conventional, sprawled community design is unhealthy, particularly for children, because it discourages physical activity. Research by Lawton (2001), Khattak and Rodriguez (2003), and Gehling indicate that residents of more urban, walkable communities are more likely to achieve recommended levels of physical activity than residents of more automobile-oriented, sprawled communities.	44
Connectivity		Walkability, mixed-use, social capital,	Studies also found that people living in walkable, mixed-use neighborhoods have higher levels of social capital compared with those living in car-	45

		public participation, engagement, community cohesion	oriented suburbs. Walkable neighborhood residents were more likely to know their neighbors, participate politically, trust others and be socially engaged, suggesting that polices and projects that support walking and public transit use, and increase land use mix, tend to increase community cohesion	
Connectivity		Commute, stress, psychosomatic, sickness	In an Occupational and Environmental Health article, commuting was found for many workers to be a necessity, which is imposed by external factors, such as the housing market and job opportunities. Commuting is shown to interfere with patterns of everyday life by restricting free-time and reducing sleeping time. Commuters also reported higher psychological stress scores, more health complaints, essentially of psychosomatic nature, and greater absenteeism from work due to sickness.	46
Connectivity		Commute, physical activity, body mass index (BMI), blood pressure	Commuting distance [is] adversely associated with physical activity, cardiorespiratory fitness, adiposity, and indicators of metabolic risk. [Research found] commuting distance was negatively associated with physical activity and cardiorespiratory fitness and positively associated with body mass index, waist circumference, systolic and diastolic blood pressure, and continuous metabolic score in fully adjusted linear regression models.	47
Connectivity		Commute, walking, bicycling, cardiovascular risk, women	Active commuting that incorporates walking and cycling was associated with an overall 11% reduction in cardiovascular risk, which was more robust among women.	48
Connectivity		Parking, access, walkability, Smart Growth, energy consumption, emissions, pollution, conservation	A 2015 study found that parking management (flexible minimum parking requirements, shared parking, priced parking and regulations to encourage efficient use of parking facilities) affects [energy consumption and emissions through] relative price and convenience of driving, and affects land use density, accessibility and walkability. Smart Growth tends to reduce per capita energy consumption and pollution emissions, by reducing per capita vehicle travel and supporting other energy conservation strategies such as shared building walls and district heating.	49

Connectivity	✓	Public transportation, cognitive disabilities, access, social, independence	Public transportation systems are among the most ubiquitous and complex large-scale systems found in modern society. For those unable to drive such as people with cognitive disabilities, these systems are essential gateways for participation in community activities, socialization, and independence.	50
Connectivity	✓	Equity, opportunity, access, education, employment	There is an ongoing debate about how to measure vertical equity. There is general agreement that everybody deserves "equity of opportunity," meaning that disadvantaged people have adequate access to education and employment opportunities. Transportation affects equity of opportunity. Without adequate transport it is difficult to access education and employment. It therefore meets the most "conservative" test of equity.	51
Connectivity	✓	Community design, disabled, physical activity, walkability, integration, mobility, elderly	The design of the built environment has a substantial impact on the ability of persons with disabilities to be physically active, to use transportation systems, and to be socially integrated into their community. Communities that have user-friendly transportation systems and are compact and walkable are more accessible for persons with disabilities, allowing them to participate more fully in the community by working, shopping, and living within the integrated setting. Persons who use wheelchairs and other mobility devices generally benefit whenever a community is made more walkable, as long as appropriate accommodations (such as curb cuts) are included in such community improvements. Elderly persons without disabilities may receive similar benefits in improved quality of life from community designs that aid persons with disabilities.	52
Housing	✓	Expense, affordable, low-income, stress, instability	Transportation and housing costs are the two largest expenses for American families. A lack of affordable housing within communities may compromise the health of low-income residents as they spend more on housing costs and less on health needs. It can also put residents at greater risk of exposure to problems associated with poor-quality housing (mold, pests, lead, and other hazardous substances), and cause stress and other adverse health outcomes because of potential housing instability.	53

Housing	✓	Cost, spending, income, shared housing, substandard, basic needs and services, social networks	High housing costs relative to the income of an individual or household result in one or more outcomes with adverse health consequences: spending a high proportion of income on housing, sharing housing with other individuals or families, accepting lower-cost substandard housing, moving to where housing costs are lower, or becoming homeless. Spending a high proportion of income on rent or a mortgage means fewer resources for food, heating, transportation, health care, and child care. Sharing housing can mean crowded conditions, with risks for infectious disease, noise, and fires. Lower-cost housing is often substandard, with exposure to waste and sewage, physical hazards, mold spores, poorly maintained paint, cockroach antigens, old carpeting, inadequate heating and ventilation, exposed heating sources and wiring, and broken windows. Moving away can result in job loss, difficult school transitions, and the loss of health-protective social networks.	54
Housing	✓	TOD), displacement, low-income, communities of color, cost of living	As transit-oriented development (TOD) has been constructed in many cities, including Portland and Washington, DC, it has often been accompanied by displacement of low-income persons and communities of color. Higher-income populations are finding compact living near transit desirable, driving up the property value of land near transit. This has resulted in increased rents and/or property taxes for existing residents, who may ultimately be displaced because of the higher cost of living. Additionally, research has shown that transit investments can result in more expensive housing, more wealthy residents, and higher vehicle ownership, which, in some neighborhoods with new transit projects, can price out core transit users such as low-income households and renters.	55, 56
Housing		Home ownership, cardiovascular disease	Home ownership has been independently linked to improved health among residents. Home ownership may generate a degree of security and control. Additionally, for residents, a higher rate of homeownership in a neighborhood has been associated with fewer years of life lost due to cardiovascular disease. However, home ownership might not always promote health; for	57, 58, 59

			instance, people living on the margins of home ownership and those at risk for mortgage arrears may suffer increased insecurity and poorer mental health.	
Housing		Home ownership, social cohesion, civic participation, neighborhood investment	Homeownership positively influences the social cohesion and civic participation of a neighborhood, which, in turn, can affect health. Homeowners are more likely to feel invested in their community, which could also be linked to improved housing and neighborhood quality	60
Housing		Displacement, mental stress, social network, affordability, psychological well-being	Unstable housing conditions can lead to involuntary displacement, which can cause or contribute to mental stress, loss of supportive social networks, costly school and job relocations. Displacement also increases risk of substandard housing and overcrowding. Evidence suggests that related issues associated with housing affordability, such as keeping up with utility bills, mortgage payments, or home repairs may be linked to lower levels of psychological well-being and a greater likelihood of seeing a doctor.	61, 62, 63
Housing		Homelessness, children, mental health, developmental delays, depression, stability	In extreme cases, unstable housing can lead to homelessness. Studies have shown that homeless children are more vulnerable to mental health problems, developmental delays, and depression compared to children who live in stable housing conditions	64
Housing	✓	Senior citizens, affordability, access, care, supportive services, aging in place, low-income, elderly, education, medical care, safety	Many senior citizens also experience a growing need for supportive health-related services that can be provided through programs linking affordable housing with access to care and supportive services. An evaluation of an aging-in-place program for low-income older adults that offered onsite health education, medical care coordination, health monitoring, and discharge planning found that receiving the onsite services made the residents feel safer and confident they could stay in their homes as they aged.	65
Housing		Density, employment, residential density, light	Many studies have been completed to help determine the relationship between housing densities and viability of transit service. Work by the Transit Cooperative Research Program	66, 67

		rail, cost effective	reinforces thresholds offered by previous research and expands the nature of some thresholds to apply to different types of transit service and to include employment characteristics. More recent work related specifically to rail transit suggests that light-rail systems need around 30 people per gross acre around stations and heavy rail systems need 50% higher densities than this to place them in the top one-quarter of cost-effective rail investments in the U.S.	
Housing		Density, access	Similarly, the University of Minnesota's Design for Health study recommends a residential threshold of an average of more than seven units per gross acre, and all residential or employment areas should be located within three-quarters of a mile of a transit stop. These thresholds emphasize opportunities to access transit service in terms of service locations and times, which are often linked to density. While seven units per acre serves as a threshold, higher densities can produce even greater benefits in terms of accessibility	68
Housing		Neighborhood characteristics, walkability, bicycle, density, job-housing diversity, walkable design, destinations, distance, ridership	A study completed by the California Department of Housing and the California Department of Transportation in 2007 found that there are five neighborhood characteristics that shape whether peoples use public transportation, walk, bicycle, or drive. These factors are commonly referred to as the "5 D's" and they are • Net Residential Density: Denser developments generate fewer vehicle trips per dwelling unit than less dense developments. • Job-Housing Diversity: Having residences and jobs in close proximity will reduce the vehicle-trips generated by each by allowing some trips to be made on foot or by bicycle. • Walkable Design: Improving the walking/biking environment will result in more non-auto trips and a reduction in auto travel (with synergistic effects with Density and Diversity). • Destinations: Households situated near the regional center of activity generate fewer auto trips and vehicle-miles of travel. • Distance: Transit ridership rates among station area residents increase exponentially as the distance to a transit station declines.	69

Housing		Housing quality, children, risk factors, asthma, respiratory illness, injury, building management, intervention, allergens	In a 2007 study, it was found that poor quality housing can affect health by exposing children to risk factors for asthma and other respiratory illnesses, and unintentional injuries. Proper maintenance and building management have proven to be effective interventions. For example, researchers have found that most asthma is associated with exposure to allergens, including those often found in poor-quality housing, such as mold, dust mites, mice and rats, and cockroaches (non-allergic asthma represents only about 20% of cases).	70
Housing	✓	Housing costs, low-income, tradeoffs, health insurance spending, uninsured	Researchers at the Center for Housing Policy, found that when confronted with high housing costs, low-income households may make tradeoffs related to spending on health insurance. In a working paper on the spending habits of insured and uninsured households, Levy and DeLeire (2003) found evidence that "the prices of other goods – most notably housing – may be additional important factors causing some households not to purchase health insurance."	71
Housing	✓	Supply, affordability, low-income, spatial segregation, income, race, ethnicity, social class, unsafe neighborhoods, necessities	Additionally, the inadequate supply of affordable housing for low-income families and the increasing spatial segregation of some households by income, race, ethnicity, or social class into unsafe neighborhoods are among the most prevalent community health concerns related to family housing. When affordable housing is not available to low-income households, family resources needed for food, medical or dental care, and other necessities are diverted to housing costs.	72
Housing		Bicycle, protected lanes, safety, access, cost, compact development, independence, no car household	By helping make bicycle transportation mainstream, protected lanes make travel safer and more accessible—lowering household transportation costs, enabling compact development, broadening individual independence, and increasing the ability for individuals living in no- and low-car households to get to goods and services.	73
Jobs		Economy, income, predictor, disease	The relationship between the state of the economy and health is well documented. Research shows that income is one of the strongest and most constant predictors of health	74

			and disease, and that the strong relationship between income and health is not limited to a single illness or disease.	
Jobs	✓	Washington County, obesity, income, federal poverty level, access, living wage, low-wage	According to research conducted for the Washington County Community Health Improvement Plan, obesity is twice as common among those whose household income is less than 200%of the federal poverty level. This indicates that access to jobs that provide a living wage, not just low-wage jobs, is an important factor of health.	75
Jobs		Unemployment, heart disease	In a study in Sweden involving over 600,000 residents, the neighborhood unemployment rate predicted coronary heart disease risk for the neighborhood's residents, even after controlling for individual demographics and socioeconomic measures.	76
Jobs		Unemployment, premature mortality, cardiovascular disease, hypertension, depression, suicide	Unemployment is associated with premature mortality, cardiovascular disease, hypertension, depression, and suicide.	77, 78
Jobs		Transit service, employment characteristics, density	Work completed by the Transit Cooperative Research Program expanded on previous research to evaluated transit service and employment characteristics. Based on this research, recommended commercial development densities for variable, transit service are presented in Table 3.25.	79
Jobs		Walkability, density	Similarly, research based in King County, Washington found considerable shifts from auto use to transit use and walking with densities between 20 and 75 employees per gross acre and again with more than 125 employees per acre.	80
Jobs	✓	Transit infrastructure, connected networks, capacity, reliability, economic cost, quality of life,	In *Transportation and Economic Development*, similar research finds that high density transportation infrastructure and highly connected networks are commonly associated with high levels of economic development. When transportation systems are efficient, they provide economic and social opportunities and benefits that result in positive multipliers effects	81

		efficiency, social opportunity, positive multipliers, access, markets, employment	such as better accessibility to markets, employment, and additional investments. When transportation systems are deficient in terms of capacity or reliability, they can have an economic cost such as reduced or missed opportunities and lower quality of life.	
Jobs		Vehicle travel, environmental cost	Another study published in the *Journal of the American Planning Association*, indicates that local balance between jobs and housing reduces vehicle travel and associated environmental and health costs.	82
Jobs		Access, employment	Research studying the relationship between transit-based job accessibility and employment outcomes for workers without automobiles found that improved transit-based job accessibility significantly expands both the probability of being employed and the probability of working 30 hours or more per week for autoless workers in San Francisco.	83
Jobs	✓	Poverty, low-wage, low-income, communities of color, black/African American, job readiness, placement	A 2005 study in Buffalo, New York found that black/African American adults in poverty have poorer access to automobiles than whites, and, as a result, they may be able to search for jobs only within a smaller area. This study recommends enhancements to public transit in places with large concentrations of low-wage jobs and increased access to reliable automobiles in places with small concentrations of low-wage jobs. Above all, unemployment rates in low-income neighborhoods suggest a need to enhance programs to improve job readiness, placement and support services.	84
Jobs		Traffic, pollution, long-term exposure, design, quality of life	Motor vehicle traffic is the main source of ground-level urban concentrations of air pollutants with recognized hazardous properties. Approximately 36,000 to 129,000 adult deaths a year can be attributed to long-term exposure to air pollution generated by traffic in European cities. Reviving the concept that the result of urban design should be improved quality-of-life and that where people live as it relates to where they work, shop or go to school can have a dramatic impact on their health and quality of life.	85

Jobs	✓	Welfare, spatial separation, employment services, commute, access	A 2001 study stated welfare participants face a spatial separation from jobs and employment-related services. The analysis shows that welfare participants' access to employment varies dramatically depending on their residential location and commute method. Many welfare participants live in job-rich neighborhoods and are able to reach numerous jobs without difficulty by either car or public transit. Others, however, live in job-poor neighborhoods where a reliance on public transit significantly reduces their access to employment. In these neighborhoods long and unreliable commutes on public transit often severely limit their ability to find and reliably travel to and from work. Therefore, given the distinctly uneven patterns of employment opportunities in metropolitan areas, policies to address the transportation needs of welfare participants should be targeted to reflect the characteristics of the neighborhoods in which welfare participants live.	86
Jobs		Poverty, spatial separation, commute, place-based economic development	As noted in the Journal of Regional Science, poverty rates increase with greater rural distances from successively larger metropolitan areas. This outcome results from the reduced urban density effects at greater distances and incomplete commuting and migration responses to lower labor demand in rural areas. One implication is that remote areas may particularly experience greater reductions in poverty from place-based economic development	87
Safety		Built environment, walking, bicycle, facility, risk	Providing a safe built environment of walking- and bicycle-friendly facilities is a key part in promoting safety. Unsafe traffic mixes of motor vehicles, pedestrians, and bicycles all lead to increased risk of injury and death.	88
Safety		Complete streets	MnDOT published the *Complete Streets Implementation Resource Guide for Minnesota Local Agencies* in 2013. This resource includes an overview on Complete Streets, a brief synthesis of local and national practices, an understanding of the various terms and definitions, guidance on implementation and a summary of agencies in Minnesota with Complete Streets with complete streets policies or other guidance and projects in Minnesota related to Complete Streets.	89

Safety		Bicycle, pedestrian, traveler behavior, built environment, design, ADA compliance, speed, traffic calming, formal design guidelines	Bicycle and pedestrian crashes are the result of many different causes, including disobedient behavior of the traveler (drivers, pedestrians, or bicyclists) and built environments that do too little to protect pedestrians and bicyclists. Too often, streets and intersections are designed mainly to accommodate fast moving automobile traffic. Even if a speed limit is posted at 25 mph, the overall design of a corridor may do little to provide safeguards for walkers or bicyclists. To address this, there are a variety of strategies available aiming to modify features of the built environment to better accommodate those who walk and bicycle, increasing their safety. These strategies can include traffic calming, complete streets, and formal design guidelines such as ADA compliance.	90
Safety		Roadway features, pedestrian, design, traffic calming, crosswalks, medians, driver behavior	Several types of built roadway features were noted to have the best results for promoting pedestrian safety, including marked crosswalks and traffic calming measures. Marked crosswalks, particularly those which are well designed (e.g., with raised medians) and noticeable to drivers, significantly reduce pedestrian crashes. In areas with traffic calming, drivers “read” the potential hazards of the road environment and adjusted their behavior in response, thereby resulting in fewer crashes.	91, 92
Safety		Traffic volumes, pedestrian, cyclist, bicycle, road-injury burden, crash	High traffic volumes increase the risk of pedestrian, cyclist, and motorist injury and death. Pedestrians, cyclists, and motorized two-wheeler users bear a disproportionate share of the global road-injury burden and are all at high risk of crash injury.	93
Safety	✓	MnDOT, Context Sensitive Solutions, CSS, interdisciplinary, mobility, walkability, satisfaction, quality of life	MnDOT provides a number of resources to ensure “context sensitive solutions” are applied to transportation projects. Context Sensitive Solutions is a collaborative interdisciplinary approach that involves all stakeholders in providing a transportation facility that fits its settings. Examples of context sensitive benefits include from a safety perspective include improved mobility for users, improved walkability, safety (vehicular, pedestrian, bicyclists), community satisfaction, and quality of life.	94

Safety		Speed, bicycles, pedestrians, traffic calming, context sensitive solutions, design	Vehicle speed is an important safety issue for bicycles and pedestrians. The speed of car and pedestrian/bicycle crashes is an important predictor of severity of injury. Studies have shown that 5%of pedestrians who are struck at 20 mph are killed, 45%at 30 mph, and 85%at 40 mph. Traffic calming and context sensitive design can reduce the extent to which vehicles speed.	95
Safety		Density, collisions, traffic volumes, pedestrians	Research has shown that growth in residential density predicts increases in vehicle injury collisions. This is the case independent of traffic volumes. In addition, if the increase in density along the corridor increases vehicular traffic due to an upsurge in residents or in commercial destinations, then pedestrians will be at a greater risk for collision-related injuries if safety measures are not included. However some research has shown that increases in the number of pedestrians can increase drive awareness and reduce the number of collisions.	96, 97, 98, 99
Safety		Density, transit station, neighborhood design, sidewalk connectivity, traffic calming, bike lanes	Studies from the Transportation Research Board indicate that in addition to density and proximity to transit stops, neighborhood design (e.g., sidewalk connectivity) affects transit use. Areas that have complete sidewalks, buildings oriented towards the street, traffic calming, and bicycle lanes, provide a better experience for people traveling to and from transit stops.	100
Safety		Pedestrian environment, design walkability	A high-quality pedestrian environment can support walking both for practical purposes and for pleasure. Recent studies in the United States have demonstrated that people walk, on average, 70 minutes longer in pedestrian-oriented communities.	101
Safety		Access, children, healthy community, controlled crossings, commute, Safe Routes to School, pedestrian, walking	Providing safe access for children who walk to school is a key consideration for building a healthy community. Parental concerns about the lack of traffic lights and controlled crossings on their child's school route reduce the likelihood that their child will actively commute to school. In an evaluation of a Safe Routes to School program, the presence of pedestrian safety measures at street crossings was associated with a greater likelihood of walking to school for children.	102, 103

Safety		Traffic-related deaths, pedestrian, race/ethnicity, prevention, cultural differences, demographics	To determine traffic-related pedestrian death rates by sex, age group, race/ethnicity, and urbanization level, the Center for Disease Control (CDC) analyzed 2001–2010 data from the National Vital Statistics System (NVSS). The results of that analysis indicated that the overall, annualized, age-adjusted traffic-related pedestrian death rate was 1.58 deaths per 100,000 population. The study noted that strategies to prevent pedestrian deaths should include consideration of the needs of older adults and cultural differences among racial/ethnic populations due to changing demographics.	104
Safety		Crime Prevention Through Environmental Design (CPTED), behavior, criminal acts, built, social, administrative environment, transit	Crime Prevention Through Environmental Design (CPTED) is defined as a multi-disciplinary approach to deterring criminal behavior through environmental design. CPTED strategies rely upon the ability to influence offender decisions that precede criminal acts by affecting the built, social, and administrative environment. An article published by the American Public Transportation Association indicated that the following features were imperative for crime prevention in a transit environment: facility and structural design; landscape design; lighting; fencing; protective covers and coating materials; security hardware; close circuit television and monitoring equipment; public address systems; passenger emergency communication systems; gas detection systems; motion detectors; alarm systems; electronic car readers/access systems; ticket vending machines; photo enforcement; four quadrant gates; and wayside intrusion detection systems.	105
Safety		CPTED, crime prevention, pedestrian, lighting	Another study showed that sensitively deployed street lighting can lead to reductions in crime and fear of crime, and increase pedestrian street use after dark.	106
Safety		Walkability, crime	A U.S. Department of Transportation survey found that half of the respondents would walk or walk more if there were safe pathways and crime was not a consideration.	107

Safety		Design, built environment, natural surveillance, mixed-use, transit facilities, anxiety	A report from the Transportation Research Board found that design of the built environment can create preconditions for information but effective control of the public environment. The design orientation of buildings with windows facing the street can increase natural surveillance by neighbors. In mixed-use and commercial areas, design can improve opportunities for surveillance by introducing storefronts facing the sidewalk. The placement of transit facilities away from desolate areas, and near places where they can be overseen by shop owners or neighbors, the replacement of pedestrian subways with safe, ground level crossings, the elimination of empty alleys, as well as fences and heavy landscaping blocking sightlines can reduce fear and feelings of anxiety. Design can create preconditions for informal but effective control of the public environment.	108
Safety	✓	CPTED, zone, surveillance, criminal, risk, prevention, design, monitoring, lighting, landscaping, security	A National Criminal Justice Reference Service report found that in order to provide maximum control, an environment is first divided into smaller, clearly defined areas or zones, which become the focal points for the application of CPTED elements. These zones are designated as public, semiprivate, or private and an effort is made to design each zone so that persons that use it feel a strong sense of territoriality that will encourage them to take control and defend it. The principal weapon in the protection of a defensible space is surveillance, since criminals are least likely to act when there is a high risk of their actions being witnessed. Open designs that minimize visual obstacles and eliminate places of concealment while encouraging the use of the environment are utilized. Special monitoring equipment is installed in places that are isolated or seldom used. Furthermore, lighting is installed in ways that enhance surveillance and reduce fear. Landscaping is also designed with surveillance in mind: Bushes are kept to a maximum of 3 feet in height, and the lower branches of trees are at least 6 feet off the ground. Finally, physical security measures aim at delaying penetration and thus reducing the probability that crime will occur.	109

Safety		CPTED, physical security, risk, surveillance, design, movement control, access, management, maintenance, defensible space, legitimate users	A University of Huddersfield publication summarized the principles of CPTED as • Physical security - securing buildings and spaces to a level which is appropriate to risk. Where possible products, which are tested to the relevant security standards, should be utilized. • Surveillance - designing building and space to allow both formal and informal surveillance from users of that space and to create a feeling of unease amongst non-legitimate users of the space. • Movement control – limiting access, exit and through movement. • Management and maintenance – ensuring buildings and the surrounding spaces are designed to create a positive image and to ease future maintenance of the space. Securing in place programmed management and maintenance systems. • Defensible space – ensuring that spaces have a clearly defined ownership, purpose and role to enhance feelings of territoriality amongst residents and legitimate users.	110
Safety	✓	Walkability, mixed-use, social capital, car-oriented, neighborhood, social engagement, public transit, community cohesion, land use	Leyden (2003) found that people living in walkable, mixed-use neighborhoods have higher levels of social capital compared with those living in car-oriented suburbs. Walkable neighborhood residents were more likely to know their neighbors, participate politically, trust others and be socially engaged, suggesting that policies and projects supporting walking and public transit use and increasing land use mix, tend to increase community cohesion.	111
Safety	✓	Community involvement, rational choice, risk, territorial appropriation, reward trade-off, empowerment, manageable space	Additionally, community involvement sends a message to potential offenders that a place is 'owned' (involving rational choice/risk to reward trade-offs). This is also called community empowerment, territorial appropriation, or manageable space (Perlgut, 1982).	112

References

[1] Besser, L. M., and Dannenberg, A. L. (2005). Walking to Public Transit: Steps to Help Meet Physical Activity Recommendations. *American Journal of Preventative Medicine.* 29(4): 273-80. Retrieved from http://dx.doi.org/10.1016/j.amepre.2005.06.010.

[2] Transportation Research Board. (1998). *Managing speed: Review of current practice for setting and enforcing speed limits. Transportation Research Board Special Report 254.* Retrieved from http://onlinepubs.trb.org/onlinepubs/sr/sr254.pdf.

[1] Metropolitan Council. (2015). *Thrive MSP 2040*. Retrieved from http://www.metrocouncil.org/Planning/Projects/Thrive-2040/Thrive-MSP-2040-Plan.aspx.

[4] Ramsey County. (2013). *Ramsey County Community Health Assessment 2013*. Retrieved from https://www.ramseycounty.us/sites/default/files/Open%20Government/Public%20Health%20Data/community_health_assessment_030515.pdf.

[5] Washington County. (2013). *Washington County Community Health Assessment 2014.* Retrieved from https://www.co.washington.mn.us/DocumentCenter/View/5452.

[6] Gateway Corridor. (2015). *Gateway Corridor Purpose and Need*. Retrieved from http://thegatewaycorridor.com/wp-content/uploads/2016/02/2015-Purpose-and-Need.pdf.

[7] Raynault, E. & Christopher, E. (2013). How Does Transportation Affect Public Health? *Public Roads,* 76 (6). Retrieved from http://www.fhwa.dot.gov/publications/publicroads/13mayjun/05.cfm.

[8] Besser, L. M., and Dannenberg, A. L. (2005). Walking to Public Transit: Steps to Help Meet Physical Activity Recommendations. *American Journal of Preventative Medicine.* 29(4): 273-80. Retrieved from http://dx.doi.org/10.1016/j.amepre.2005.06.010.

[9] Metropolitan Council. (2014). *Housing Policy Plan 2040*. Retrieved from http://www.metrocouncil.org/Housing/Planning/2040-Housing-Policy-Plan.aspx.

[10]Metropolitan Council. (2015). *2040 Housing Policy Plan Amendment*. Retrieved from

http://metrocouncil.org/Housing/Publications-And-Resources/HOUSING-POLICY-PLANS-REPORTS/HOUSING-POLICY-PLAN-2040/Adopted-amendment-to-the-2040-Housing-Policy-Plan.aspx.

[11] Robert Wood Johnson Foundation. (2013). *Health Policy Snapshot: How Does Employment—or Unemployment— Affect Health?* Retrieved from http://www.rwjf.org/content/dam/farm/reports/issue_briefs/2013/rwjf403360.

[12] Robert Wood Johnson Foundation. (2013). *Health Policy Snapshot: How Does Employment—or Unemployment— Affect Health?* Retrieved from http://www.rwjf.org/content/dam/farm/reports/issue_briefs/2013/rwjf403360.

[13] Metropolitan Council. (n.d.). *Community Profiles*. Retrieved from http://stats.metc.state.mn.us/profile/.

[14] Minnesota Department of Employment and Economic Development. (2015). *Quarterly Census of Employment and Wages Q2 2014*. Accessed December 2015. Retrieved from http://stats.metc.state.mn.us/profile/Default.aspx.

[15] Metropolitan Council. (2015). *Transportation Policy Plan*. Retrieved from http://www.metrocouncil.org/Transportation/Planning-2/Key-Transportation-Planning-Documents/Transportation-Policy-Plan-(1)/The-Adopted-2040-TPP-(1).aspx.

[16] Gateway Corridor. (2014). *Economic Development Analysis.* Retrieved from http://thegatewaycorridor.com/wp-content/uploads/2016/02/2014-7-28-Economic-Development-Analysis.pdf.

[17] Nelson, A. C. (2014). *Twin Cities Metropolitan Council Area Trends, Preferences, and Opportunities: 2010 to 2020, 2030 and 2040*. Prepared for the Metropolitan Council. Retrieved from http://metrocouncil.org/METC/files/57/571ff237-6d73-4e26-86bc-3c12978b1b89.pdf.

[18] Fan, Y. & Guthrie, A. 2013. *Achieving System-Level, Transit-Oriented Jobs-Housing Balance: Perspectives of Twin Cities Developers and Business Leaders*. Metropolitan Council. Retrieved from http://www.corridorsofopportunity.org/sites/default/files/Achieving%20Systems-Level%20Jobs-Housing%20Balance_FINAL.pdf.

[19] City of Saint Paul. (ND). *Bicycle and Pedestrian Count Reports 2013 & 2014*. Accessed August 2015. Retrieved from http://www.stpaul.gov/index.aspx?NID=5248.

[20] City of Saint Paul. (2015). *Gold Line Station Area Plans*. Retrieved from https://www.stpaul.gov/sites/default/files/Media%20Root/Planning%20%26%20Economic%20Development/Adopted%20Gold%20Line%20Station%20Area%20Plans%20email.pdf.

[21] City of Maplewood. (2013). *Living Streets Policy*. Retrieved from http://maplewoodmn.gov/1166/Living-Streets-Policy.

[22] *Walk Score Methodology*. Accessed October 2015. Retrieved from https://www.walkscore.com/methodology.shtml.

[23] *Bike Score Methodology.* Accessed October 2015. Retrieved from https://www.walkscore.com/bike-score-methodology.shtml.

[24] State of Minnesota. (2015). 2015 Minnesota Statutes. *The Office of the Revisor of Statutes*. Retrieved from https://www.revisor.mn.gov/statutes/?id=473.859.

[25] Jacobs, J. (1961). The Death and Life of Great American Cities. *Modern Library Editions & Random House Inc. New York*.

[26] Washington County. (2014). *2014 Community Health Improvement Plan for Washington County.* Retrieved from http://www.co.washington.mn.us/DocumentCenter/View/5513.

[27] Ramsey County. (2013). *Ramsey County Community Health Assessment 2013*. Retrieved from https://www.ramseycounty.us/sites/default/files/Open%20Government/Public%20Health%20Data/community_health_assessment_030515.pdf.

[28] Washington County. (2014). *2014 Community Health Improvement Plan for Washington County.* Retrieved from http://www.co.washington.mn.us/DocumentCenter/View/5513.

[29] Washington County. (2014). *2014 Community Health Improvement Plan for Washington County.* Retrieved from http://www.co.washington.mn.us/DocumentCenter/View/5513.

[30] Raynault, E. & Christopher, E. (2013). How Does Transportation Affect Public Health? *Public Roads,* 76 (6). Retrieved from http://www.fhwa.dot.gov/publications/publicroads/13mayjun/05.cfm.

[31] Zenk, S., et al. (2005). Neighborhood Racial Composition, Neighborhood Poverty, and the Spatial Accessibility of Supermarkets in Metropolitan Detroit. *American Journal of Public Health*, 95(4): 660- 67.

[32] McKenzie, B., & Rapino, M. (2011). *Commuting in the United States: 2009*. US Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau. 2009 American Community Survey data. Retrieved from http://www.census.gov/prod/2011pubs/acs-15.pdf.

[33] Besser, L. M., and Dannenberg, A. L. (2005). Walking to Public Transit: Steps to Help Meet Physical Activity Recommendations. *American Journal of Preventative Medicine.* 29(4): 273-80. Retrieved from http://dx.doi.org/10.1016/j.amepre.2005.06.010.

[34] Hennepin County Public Works. (2013). *Bottineau Transitway Health Impact Assessment Final Report*. Retrieved from http://www.hennepin.us/~/media/hennepinus/residents/transportation/bottineau-transitway/HIA%20Full%20Report%20Final%2012192013.pdf.

[35] University of Minnesota Design for Health. (2007). *Planning Information Sheet: Promoting Accessibility with Comprehensive Planning and Ordinances.* Retrieved from http://designforhealth.net/wp-content/uploads/2012/02/BCBS_ISAccessibility__080107.pdf.

[36] Walsh, S. J., Page, P. H., & Gesler, W. M. (1997). Normative Models and Healthcare Planning: Network-Based Simulations within a Geographic Information system Environment. *Health Services Research,* 32(2): 243-60.

[37] University of Minnesota Design for Health. (2007). *Planning Information Sheet: Promoting Accessibility with Comprehensive Planning and Ordinances.* Retrieved from http://designforhealth.net/wp-content/uploads/2012/02/BCBS_ISAccessibility__080107.pdf.

[38] Ewing, R., et al. (2003). Relationship Between Urban Sprawl and Physical Activity, Obesity and Morbidity. *American Journal of Health Promotion, 18*(1): 47-57.

[39] Atlanta Regional Health Forum and Atlanta Regional Commission. (2006). *Land Use Planning for Public Health: The Role of Local Boards of Health in Community Design and Development.* Retrieved from http://www.cdc.gov/healthyplaces/publications/landusenalboh.pdf.

[40] New York City Housing. (2008). *Going to Market: New York City's Neighborhood Grocery Store and Supermarket Shortage.* Retrieved from http://www.nyc.gov/html/dcp/html/supermarket/index.shtml.

[41] United States Department of Transportation and Federal Highway Administration. (2004). *National Household Travel Survey, 2001*. ICPSR04047-v1. Ann Arbor, MI: Inter-university Consortium for Political and Social Research. http://doi.org/10.3886/ICPSR04047.v1.

[42] El-Geneidy, A. M., & Levinson, D. M. (2006). *Access to destinations: Development of Accessibility Measures.* Technical Report No. MnDOT 2006-16. Retrieved from http://nexus.umn.edu/projects/Access/Access-FinalReport.pdf.

[43] Litman, T. (2016). *Considering the Impacts, Benefits and Costs of Different Land Use Development Patterns. Evaluating Transportation Land Use Impacts.* Retrieved from http://www.vtpi.org/landuse.pdf.

[44] Litman, T. (2016). *Considering the Impacts, Benefits and Costs of Different Land Use Development Patterns. Evaluating Transportation Land Use Impacts.* Retrieved from http://www.vtpi.org/landuse.pdf.

[45] Litman, T. (2016). *Considering the Impacts, Benefits and Costs of Different Land Use Development Patterns. Evaluating Transportation Land Use Impacts.* Retrieved from http://www.vtpi.org/landuse.pdf.

[46] Costa, G., Pickup, L., & Di Martino, V. (1987). Commuting--a further stress factor for working people: evidence from the European Community. II. An empirical study. *International Archives of Occupational and Environmental Health*, 60(5), 377-385.

[47] Hoehner, C. M., Barlow, C. E., Allen, P., & Schootman, M. (2012). Commuting Distance, Cardiorespiratory Fitness, and Metabolic Risk. *American Journal of Preventive Medicine*, 42(6), 571-578.

[48] Hamer, M., & Chida, Y. (2008). Active Commuting and Cardiovascular Risk: A Meta-Analytic Review. *Preventive Medicine*, 46(1), 9-13.

[49] Litman, T. (2016). Considering the Impacts, Benefits and Costs of Different Land Use Development Patterns. *Evaluating Transportation Land Use Impacts*. Retrieved from http://www.vtpi.org/landuse.pdf

[50] Carmien, S., et al. (2005). Socio-technical Environments Supporting People with Cognitive Disabilities Using Public Transportation. *ACM Transactions on Computer-Human Interaction*, 12(2), 233-262.

[51]Litman, T. (2002). Evaluating Transportation Equity. *World Transport Policy & Practice*, 8(2), 50-65.

[52] Dannenberg, A. L., et al. (2003). The Impact of Community Design and Land-Use Choices on Public Health: A Scientific Research Agenda. *American Journal of Public Health*, 93(9), 1500-1508.

[53] Cohen, R. (2007). *The Positive Impacts of Affordable Housing on Health: A Research Summary.* Retrieved from http://www.nhc.org/media/documents/Housingand Health1.pdf.

[54] San Francisco Department of Public Health, (2004). *The Case for Housing Impacts Assessment: The Human Health and Social Impacts of Inadequate Housing and Their Consideration in CEQA Policy and Practice.* Retrieved from http://www.sustainablecommunitiesindex.org/etc/004_HIAR-May2004.pdf.

[55] PolicyLink. (2008). *Equitable Development Toolkit, Transit-oriented Development.* Retrieved from http://www.policylink.org/sites/default/files/transit-oriented-development_0.pdf.

[56] Billingham, C., B. Bluestone, and S. Pollack. (2010). *Maintaining Diversity in America's Transit-Rich Neighborhoods: Tools for Equitable Neighborhood Change.* Boston, MA: Dukakis Center for Urban and Regional Policy at Northeastern University. Retrieved from https://www.bostonfed.org/commdev/necd/2010/issue1/diversity-transit-rich-neighborhoods.pdf.

[57] Connolly, S., O'Reilly, D. & Rosato, M. (2010). House Value as an Indicator of Cumulative Wealth is Strongly Related to Morbidity and Mortality Risk in Older People: A Census-Based Cross- Sectional and Longitudinal Study. *International Journal of Epidemiology.* 39: 383-391.

[58] Franzini, L. & Spears, W. (2003). Contributions of Social Context to Inequalities in Years of Life Lost to Heart Disease in Texas, USA. *Social Science & Medicine.* 57(10): 1847-1861.

[59] Nettleton, S. & Burrows, R. (1998). Mortgage Debt, Insecure Ownership and Health: An Exploratory Analysis. *Sociology of Health & Illness*. 20(5): 731–753.

[60] Macintyre, S., et al. (2003). What Features of the Home and the Area Might Help to Explain Observed Relationships Between Housing Tenure and Health? Evidence from the west of Scotland. *Health & Place*. 9(3): 207–218.

[61] Guzman, C., Bhatia, R., & Duranzo, C. (2005). *Anticipated Effects of Residential Displacement on Health: Results from Qualitative Research.* San Francisco: San Francisco Department of Public Health. Retrieved from http://www.sfhealthequity.org/component/jdownloads/finish/6/211.

[62] Taylor, M., Pevalin, D., &Todd, J. (2006). *The Psychological Costs of Unsustainable Housing Commitments*. Essex, UK: University of Essex, Institute for Social and Economic Research.

[63] Smith, S., Easterlow, D., Munro, M., & Turner, K. (2003). Housing as Health Capital: How Health Trajectories and Housing Paths are Linked. *Journal of Social Issues.* 59(3): 501-525.

[64] Kyle, T. & Dunn, J. (2008). Effects of Housing Circumstances on Health, Quality of Life, and Healthcare Use for People with Severe Mental Illness: A Review. *Health and Social Care in the Community.* 16(1): 1-15.

[65] Smith, S., Rayer, S., & Smith, E. (2008). Aging and Disability: Implications for the Housing Industry and Housing Policy in the United States. *Journal of the American Planning Association.* 74(3): 289-306.

[66] Transit Cooperative Research Program (TCRP). (1995). An evaluation of the relationships between transit and urban form. *Research Results Digest*. Retrieved from http://onlinepubs.trb.org/Onlinepubs/tcrp/tcrp_rrd_07.pdf.

[67] Cervero, R., & Guerra, E. (2011). *Urban densities and transit: A multi-dimensional perspective*. Institute of Transportation Studies, University of California, Berkeley.

Chicago. Retrieved from http://www.its.berkeley.edu/publications/UCB/2011/VWP/UCB-ITS-VWP-2011-6.pdf.

[68] University of Minnesota Design for Health. (2007). *Planning Information Sheet: Promoting Accessibility with Comprehensive Planning and Ordinances.* Retrieve from http://designforhealth.net/wp-content/uploads/2012/02/BCBS_ISAccessibility__080107.pdf.

[69] Lee, R. & Cevero, R. (2007). *The Effect of Housing Near Transit Stations on Vehicle Trip Rates and Transit Trip Generation: A Summary of Available Evidence.* California Department of Housing and Community Development and the California Department of Transportation. Retrieved from http://www.hcd.ca.gov/financial-assistance/transit-oriented-development-housing-program/todresearch_sumappda102207.pdf

[70] Lubell, J., Crain, R., & Cohen, R. (2007). Framing the issues—the positive impacts of affordable housing on health. *Center for Housing Policy*, 34.

[71] Lubell, J., Crain, R., & Cohen, R. (2007). Framing the issues—the positive impacts of affordable housing on health. *Center for Housing Policy*, 34.

[72] Anderson, L., Charles, J., Fullilove, M., Scrimshaw, S., Fielding, J., & Normand, J. (2003). Providing affordable family housing and reducing residential segregation by income. *American Journal of Preventive Medicine*, 24(3), 47-67.

[73] Andersen, M., & Hall, M. (2015). *Building equity: Race, ethnicity, class and protected bike lanes: An idea book for fairer cities*. PeopleForBikes and Alliance for Biking & Walking. Retrieved from http://b.3cdn.net/bikes/60e4ef1291e083cada_8ym6ip7pw.pdf.

[74] Yen, I., and Bhatia, R. (2002). *How Increasing the Minimum Wage Might Affect the Health Status of San Francisco Residents: A Discussion of the Links Between Income and Health.*

[75] Washington County. (2014). *2014 Community Health Improvement Plan for Washington County.* Retrieved from http://www.co.washington.mn.us/DocumentCenter/View/5513.

[76] Theobald, H. et al. (2006). Neighborhood Violent Crime and Unemployment Increase the Risk of Coronary Heart Disease: A Multilevel Study in an Urban Setting. *Social Science Medicine.* 62(8): 2061-2071.

[77] Cornwall, A., & Gaventa, J. (2000). From users and choosers to makers and shapers repositioning participation in social policy1. *IDS Bulletin, 31*(4), 50-62. Retrieved from http://www.eldis.org/vfile/upload/1/document/0708/ DOC2894.pdf.

[78] Jin, R. L., Shah, C. P., & Svoboda, T. J. (1995). The impact of unemployment on health: a review of the evidence. *CMAJ: Canadian Medical Association Journal, 153*(5), 529.

[79] Cervero, R., & Seskin, S. (1995). An evaluation of the relationships between transit and urban form. *TCRP Research Results Digest*, (7). Retrieved from http://onlinepubs.trb.org/Onlinepubs/tcrp/tcrp_rrd_07.pdf.

[80] Frank, L. D., & Pivo, G. (1994). Impacts of mixed use and density on utilization of three modes of travel: single-occupant vehicle, transit, and walking. *Transportation Research Record*, 44-44.

[81] Rodrigue, J. & Notteboom, T. (2013). Transportation and Economic Development. *The Geography of Transport Systems.* Retrieved from http://people.hofstra.edu/geotrans/eng/ch7en/conc7en/ch7c1en.html.

[82] Duncan, M. & Cervero, R. (2006). Which Reduces Vehicle Travel More: Jobs-Housing Balance or Retail-Housing Mixing? *Journal of the American Planning Association*. 72(4): 475-490.

[83] Kawabata, M. (2003). Job access and employment among low-skilled autoless workers in US metropolitan areas. *Environment and Planning.* 35(9): 1651 –1668.

[84] Hess, D. B. (2005). Access to employment for adults in poverty in the Buffalo-Niagara region. *Urban Studies, 42*(7), 1177-1200.

[85] Jackson, R. J., & Kochtitzky, C. (2001). Creating a healthy environment. *The Impact of the Built Environment on Public Health. Washington, DC: Sprawl Watch Clearinghouse*. Retrieved from http://www.cdc.gov/healthyplaces/articles/Creating%20A%20Healthy%20Environment.pdf.

[86] Blumenberg, E., & Ong, P. (2001). Cars, buses, and jobs: welfare participants and employment access in Los Angeles. *Transportation Research Record: Journal of the Transportation Research Board*, (1756), 22-31.

[87] Partridge, M. D., & Rickman, D. S. (2008). Distance From Urban Agglomeration Economies And Rural Poverty. *Journal of Regional Science, 48*(2), 285-310. Retrieve from http://aede.osu.edu/sites/aede/files/publication_files/Distance%20from%20Urban%20Agglomeration%20Economies%20and%20Rural%20Poverty.pdf.

[88] Penden, M, et al., ed. (2004). *World Report on Road Traffic Injury Prevention.* Geneva: World Health Organization. Retrieved from http://www.who.int/violence_injury_prevention/publications/road_traffic/world_report/en/index.html.

[89] Marti, M., Kuehl, R., & Giese, J. (2013). *Complete Streets Implementation Resource Guide for Minnesota Local Agencies* (No. MN/RC–2013RIC02).

Chicago. Retrieved from http://www.dot.state.mn.us/research/TS/2013/2013RIC02.pdf.

[90] University of Minnesota Design for Health. (2007). *Planning Information Sheet: Considering Safety Through Comprehensive Planning and Ordinances.* Retrieved from http://designforhealth.net/wp-content/uploads/2012/12/BCBS_ISSafety_082807.pdf.

[91] Zegeer, C., Stewart, J., Huang, H., & Lagerwey, P. (2001). Safety effects of marked versus unmarked crosswalks at uncontrolled locations: analysis of pedestrian crashes in 30 cities. *Transportation Research Record: Journal of the Transportation Research Board*, (1773), 56-68.

[92] Dumbaugh, E. (1995). Safe Streets, Livable Streets. *Journal of the American Planning Association*. 71(3): 283-298. Retrieved from http://www.naturewithin.info/Roadside/TransSafety_JAPA.pdf.

[93] Ewing, R. H., & Kreutzer, R. (2006). *Understanding the Relationship Between Public Health and the Built Environment: A Report Prepared For the LEED-ND Core Committee*. Organisation for Economic Co-operation and Development. Retrieved from http://www.usgbc.org/Docs/Archive/General/Docs3901.pdf.

[94] Minnesota Department of Transportation (MnDOT). *Context Sensitive Solutions*. Retrieved from http://www.dot.state.mn.us/context-sensitive-solutions/about.html.

[95] Transportation Research Board. (1998). *Managing speed: Review of current practice for setting and enforcing speed limits. Transportation Research Board Special Report 254.* Retrieved from http://onlinepubs.trb.org/onlinepubs/sr/sr254.pdf.

[96] LaScala, E. A., Gerber, D., & Gruenewald, P. J. (2000). Demographic and environmental correlates of pedestrian injury collisions: a spatial analysis. *Accident Analysis & Prevention*, 32(5), 651-658.

[97] Loukaitou-Sideris, A., Liggett, R., & Sung, H. G. (2007). Death on the crosswalk A study of pedestrian-automobile collisions in Los Angeles. *Journal of Planning Education and Research*, 26(3), 338-351.

[98] Lee, C., & Abdel-Aty, M. (2005). Comprehensive Analysis of Vehicle-Pedestrian Crashes at Intersections in Florida*. Accident Analysis and Prevention 37*(4): 775-786.

[99] Jacobsen, P.L. (2003). Safety in Numbers: More Walkers and Bicyclists, Safer Walking and Bicycling. *Injury Prevention 9*(3): 205-209.

[100] Transportation Research Board. (1996). Transit and urban form. *Transportation Research Board Special Report 16.* Retrieved from http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_16-1.pdf.

[101] Penden, M, et al., ed. (2004). *World Report on Road Traffic Injury Prevention.* Geneva: World Health Organization. Retrieved from

http://www.who.int/violence_injury_prevention/publications/road_traffic/world_report/en/index.html.

[102] Davison, K. K., & Lawson, C. T. (2006). Do attributes in the physical environment influence children's physical activity? A review of the literature. *International Journal of Behavioral Nutrition and Physical activity, 3*(1), 19.

[103] Boarnet , M.G., et al. (2005). Evaluation of the California Safe Routes to School Legislation: Urban Form Changes and Children's Active Transportation to School. *American Journal of Preventive Medicine. 28*(2): 134–140.

[104] Centers for Disease Control and Prevention (CDC). (2013). Motor vehicle traffic-related pedestrian deaths-United States, 2001-2010. *Morbidity and Mortality Weekly Report (MMWR), 62*(15), 277. Retrieved from .

[105] Francis, R. (1999). Crime Prevention Through Environmental Design (CPTED). *American Public Transportation Association*.

[106] Painter, K. (1996). The influence of street lighting improvements on crime, fear and pedestrian street use, after dark. *Landscape and Urban Planning 35*(2-3): 193-201.

[107] Zegeer, C., et al. (1994). The National Bicycling And Walking Study: Transportation Choices For A Changing America. Final Report (No. FHWA-PD-94-023). Retrieved from http://www.fhwa.dot.gov/environment/bicycle_pedestrian/resources/study/index_10yr.cfm.

[108] National Research Council Committee on Physical Activity, Land Use, & Institute of Medicine. (2005). *Does the Built Environment Influence Physical Activity? Examining the Evidence* (No. 282). Transportation Research Board. Retrieved from http://onlinepubs.trb.org/onlinepubs/archive/downloads/sr282papers/sr282Sideris.pdf.

[109] Gardner, R. (1981). *Crime Prevention Through Environmental Design. Security Management, 25(4),* 36-42. Retrieved from https://www.ncjrs.gov/App/Publications/abstract.aspx?ID=76531.

[110] Armitage, R. (2014). Crime Prevention Through Environmental Design. In: *Encyclopedia of Criminology and Criminal Justice*. London: Springer.

[111] Litman, T. (2016). *Considering the Impacts, Benefits and Costs of Different Land Use Development Patterns. Evaluating Transportation Land Use Impacts.* Retrieved from http://www.vtpi.org/landuse.pdf.

[112] Samuels, R. (1996). *Crime Prevention Through Environmental Design: Community Participation and Afterdark Design.* Retrieved from http://www.urbanclimateresearch.org/pdfDocuments/env/Robert%20Samuels%20Crime%20Prevention%20Environmental%20Design%20Attorney%20Gen%20conf%201996.pdf.

BOARD OF COUNTY COMMISSIONERS
WASHINGTON COUNTY, MINNESOTA

RESOLUTION NO. 2018-062

DATE June 19, 2018

DEPARTMENT Public Works

MOTION BY COMMISSIONER Karwoski

SECONDED BY COMMISSIONER Weik

RESOLUTION AUTHORIZING SUBMITTAL OF APPLICATIONS TO THE METROPOLITAN COUNCIL FOR FUNDING UNDER THE METROPLITAN COUNCIL REGIONAL SOLICITATION

WHEREAS, the Regional Solicitation process started with the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991; and

WHEREAS, as authorized by the most recent federal surface transportation funding act, FAST ACT, projects will be selected for funding as part of three federal programs: Surface Transportation Program (STP), Congestion Mitigation and Air Quality Improvement (CMAQ) Program, and Transportation Alternatives Program (TAP); and

WHEREAS, pursuant to the Regional Solicitation and the regulations promulgated there under, eligible project sponsors wishing to receive federal grants for a project shall submit an application first with the appropriate metropolitan planning organization (MPO) for review and inclusion in the MPO's Transportation Improvement Program (TIP); and

WHEREAS, the Metropolitan Council and the Transportation Advisory Board (TAB) act as the MPO for the seven county Twin Cities region and have released the Regional Solicitation for federal transportation funds for 2022 and 2023; and

WHEREAS, Washington County is an eligible project sponsor for Regional Solicitation funds; and

WHEREAS, Washington County is proposing to submit grant applications for the following projects to the Metropolitan Council as part of the 2018 Regional Solicitation:

1. Trail segment implementation of the Central Greenway Regional Trail along County State Aid Highway (CSAH) 19 (Woodbury Drive) between 80th Street and the entrance of Cottage Grove Ravine Regional Park and the segment along CSAH 19 at Dale Road extending 3000 feet south in the City of Cottage Grove; and

2. Trail improvements and ADA compliant enhancement along CSAH 12 (75th Street North) from CSAH 29 (Hilton Trail) to CSAH 15 (Manning Avenue) existing trails in the Cities of Grant and Mahtomedi; and

3. Trail implementation along CSAH 38 from the pedestrian bridge crossing TH (Trunk Highway) 61 to the Wakota Bridge in the City of Newport; and

4. Construction of a roundabout at CSAH 19 (Keats Avenue) and CSAH 10 (10th Street) in the City of Lake Elmo; and

5. Construction of the roadway lanes of the Helmo-Bielenberg bridge over I-94 in collaboration with the Gold Line Bus Rapid Transit (BRT) guideway in the Cities of Oakdale and Woodbury; and

WHEREAS, the projects will be of mutual benefit to Metropolitan Council, Washington County, and the Cities of Cottage Grove, Grant, Mahtomedi, Oakdale, Lake Elmo and Woodbury; and

WHEREAS, Washington County is committed to providing the county share of the costs if the projects are selected as part of the 2018 Regional Solicitation; and

WHEREAS, Washington County is committed to completing the project, if selected, and funding is provided as part of the 2018 Regional Solicitation;

NOW, THEREFORE, BE IT RESOLVED, that Washington County is requesting funding from the federal government through the Metropolitan Council's 2018 Regional Solicitation and the county is committed to completing the projects identified above and providing the county share of funding.

ATTEST: [signature]

COUNTY ADMINISTRATOR

[signature]

COUNTY BOARD CHAIR

	YES	NO
MIRON	X	
KARWOSKI	X	
KRIESEL	X	
LAVOLD	X	
WEIK	X	

8301 Valley Creek Road • Woodbury, MN 55125-3330 • www.woodburymn.gov
(651) 714-3543 • TDD (651) 714-3568 • FAX (651) 714-3501

July 5, 2018

Wayne Sandberg, County Engineer
Washington County Public Works
11660 Myeron Road
Stillwater, MN 55082

RE: **Support for Washington County's Regional Solicitation Application for the Helmo/Bielenberg Bridge, a new connection between the City of Oakdale and the City of Woodbury**

Dear Mr. Sandberg:

The purpose of this letter is to express the City of Woodbury's support for Washington County's application for Federal funds through the Metropolitan Council's 2018 Regional Solicitation program for the Helmo/Bielenberg Bridge in the Cities of Oakdale and Woodbury.

The proposed project includes the construction of a new bridge over Interstate 94 (I-94) connecting Helmo Avenue in the City of Oakdale with Bielenberg Drive in the City of Woodbury. The bridge will consist of dedicated Bus Rapid Transit (BRT) lanes, as part of the METRO Gold Line BRT project; as well as bicycle and pedestrian trail facilities and general purpose traffic lanes. These improvements are consistent with both the City of Woodbury's and the County's 2030 Comprehensive Plans, as well as with their draft 2040 Comprehensive Plans.

The proposed bridge will provide regional benefit, acting as a reliever for traffic at the I-694/I-494/I-94 interchange, as well as to County Road 13 (Radio Drive/Inwood Avenue). Due to the regional traffic function of this proposed improvement, it is the City's strong position that ultimately the bridge should be owned and maintained by Washington County rather than Woodbury or Oakdale.

In addition to the general purpose traffic lanes, the transit guideway and bicycle/pedestrian facilities will promote connectivity between the two communities, allowing greater access to jobs and other destinations. Investment in such facilities is becoming increasingly critical to Woodbury's and Washington County's economic development efforts, as we seek to attract new businesses who rely on enhanced transportation and transit facilities.

The City of Woodbury continues to support Washington County's efforts to improve the County transit system as identified in the draft 2040 Washington County Comprehensive Plan and look forward to having continued dialogue regarding the ownership of the proposed bridge by Washington County. Thank you for the opportunity to send our support and your commitment to get this project completed.

Sincerely,

Clint Gridley
City Administrator

City of Oakdale
RESOLUTION NO. 2018-57

SUPPORTING WASHINGTON COUNTY'S APPLICATION FOR FEDERAL FUNDING FOR THE HELMO/BIELENBERG BRIDGE OVER INTERSTATE 94 THROUGH THE METROPOLITAN COUNCIL'S 2018 REGIONAL SOLICITATION PROGRAM.

At a meeting of the City Council of the City of Oakdale held on July 10, 2018 at the Oakdale Municipal Building, 1584 Hadley Avenue North, Oakdale, Minnesota, with the following members present: Mayor Paul Reinke, Council Members Mark Landis, Lori Pulkrabek, and Bill Rasmussen, and the following absent: Council Member Kevin Zabel; the Oakdale City Council resolved:

WHEREAS, the Metropolitan Council and the Transportation Advisory Board (TAB) act as the Metropolitan Planning Organization (MPO) for the seven county Twin Cities region and have released the Regional Solicitation for federal transportation funds for 2022 and 2023; and

WHEREAS, Washington County is an eligible project sponsor for Regional Solicitation funds; and

WHEREAS, the City Council approved the alignment of the Gold Line Bus Rapid Transit as the Locally Preferred Alternative on November 22, 2016; and

WHEREAS, the Gold Line Bus Rapid Transit facility includes a station at Helmo Avenue North and 3rd Street North (the "Helmo Station") and a bridge from Oakdale to Woodbury at Helmo Avenue North and Bielenberg Drive (the "Helmo/Bielenberg Bridge"); and

WHEREAS, the City of Oakdale commits to providing non-financial support and to work with Washington County to construct a bridge over Interstate 94 to connect Helmo with Bielenberg, which accommodates pedestrian, general vehicular traffic and the BRT; and

WHEREAS, the City Council conducted a small area planning process for the area around the Helmo Station to ensure that the land use, circulation, and parks and open space form a cohesive, transit-oriented neighborhood; and

WHEREAS, the City Council amended the 2030 Comprehensive Plan and Oakdale Zoning Ordinance to articulate the vision, goals, and standards that will facilitate transit oriented development in the Helmo Station area; and

WHEREAS, the Helmo Station area plan establishes a multi-modal circulation system consisting of new roads, sidewalks, multi-use trails, and the bus rapid transit facility; and

WHEREAS, the Helmo/Bielenberg Bridge is an essential component of the multimodal system that provides a new connection between the cities of Oakdale and Woodbury; and

WHEREAS, the key stakeholders, the Metropolitan Council, Washington County, the City of Oakdale and the City of Woodbury, will all collaboratively benefit from the Helmo/Bielenberg Bridge; and

WHEREAS, Washington County is submitting an application to the Metropolitan Council for federal funding through Regional Solicitation for federal transportation funds for the construction of the multimodal Helmo/Bielenberg Bridge; and

NOW, THEREFORE BE IT RESOLVED, the City Council of the City of Oakdale supports Washington County's application for funding the construction of the multimodal Helmo/Bielenberg Bridge.

Voting in Favor: Mayor Reinke, Council Members Landis, Pulkrabek, and Rasmussen;

Voting Against: None.

Resolution duly seconded and passed this 10th day of July, 2018.

Paul Reinke, Mayor

Attest:

Susan Barry, City Clerk

2030 Comprehensive Plan Amendment: Helmo Station Area – Effective June 13, 2018

On April 24, the City Council accepted the Helmo Station Bus Rapid Transit Oriented Development Plan, a small area plan for the area around the planned Gold Line Bus Rapid Transit station at Helmo Avenue North and 3rd Street North. The City Council subsequently approved an amendment to the 2030 Comprehensive Plan on April 24, 2018 to change the Future Land Use classification of the subject area to provide for the mix of uses recommended in the plan. The Metropolitan Council reviewed the proposed amendment on June 13, 2018 and found that it conformed to the regional systems plans for transportation, wastewater, and parks; it is consistent with *Thrive MSP 2040* and Metropolitan Council policies; and is compatible with the plans of adjacent jurisdictions; and determined that the City may place the amendment into effect.

Consistency with the Comprehensive Plan

The Helmo Station Bus Rapid Transit Oriented Development plan achieves the following City of Oakdale Comprehensive Plan goals:

2030 Comprehensive Plan Goals:

Community Goal 2: Provide a diversity of land use opportunities within the City, to ensure a wide range of employment, consumer, and housing choices.

Land Use Goal 3: Promote and encourage a diverse array of housing types, styles, and price points to serve a diverse population.

Transportation Goal 3: Promote a multi-modal transportation plan that is fully integrated with land use planning.

Draft 2040 Comprehensive Plan Goals:

Land Use Goal 1: The City shall facilitate the redevelopment and development of certain property.
- *Policy 3. Prepare small area development plans for the following areas to guide public and private investment to achieve a transit oriented development pattern.*
  - *a. Helmo Avenue North and 4th Street North (Bus Rapid Transit Station Area) Transportation*

Land Use Goal 3: The City's visual appearance shall incorporate streetscaping and public art.
- *Policy 1. Identify and prioritize areas to enhance streetscaping at major intersections and along key corridors.*
- *Policy 2. Develop streetscape design standards for landscaping, lighting, street furniture, sidewalks, and public art in priority areas.*

Transportation Goal 4: Sidewalks, trails, and bikeways shall be connected within the city and between adjacent cities.
- *Policy 3. Support the construction of new sidewalk and trail connections identified in the Gold Line Station Area Plans.*
- *Policy 6. Support the rehabilitation and reconstruction of complete streets that enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities.*

Policy 7. Support the rebuilding of the 4th Street Bridge over I-694 to include space for a dedicated pedestrian walkway and bus rapid transit guideway.
Policy 8. Support the addition of a pedestrian walkway adjacent to the 4th Street Bridge over I-694 to improve access to the Helmo transit station from the west side of I-694.

Transportation Goal 5: Transit service shall improve mobility options for residents, workers, businesses and transit dependent persons.
Policy 1. Collaborate with Metro Transit to assess current transit service and improve transit service for residents, workers, businesses and transit dependent residents.
Policy 2. Collaborate with Metro Transit to assess and improve transit facilities and sidewalk and trail connections to and from transit facilities.
Policy 3. Collaborate with Metro Transit to develop bus connections between employment and residential areas in the City and the Gold Line bus rapid transit station areas.

Parks and Trails Goal 2: Recreational programming, park facilities and open space shall be accessible to all physical abilities and incomes.
Policy 1. Develop a plan to ensure programming, parks and open spaces are accessible for all abilities and incomes.
Policy 2. Develop a plan to ensure the public use of open space, including wetlands, is open to all pedestrians and bicyclists.

Housing Goal 1: All people, regardless of age, income, family status, ability, race or ethnicity, shall have realizable choices and access to a safe, stable, and affordable home.
Housing Choice Policies
Policy 1. Guide and zone land to facilitate and promote the construction of a full range of housing choices to include single-family detached homes, twinhomes, townhomes, duplexes-fourplexes, and multifamily buildings.
Policy 2. Promote the development of a variety of housing types within close proximity and safe pedestrian access to shopping and services, including transit, and schools, parks, trails, and open space.

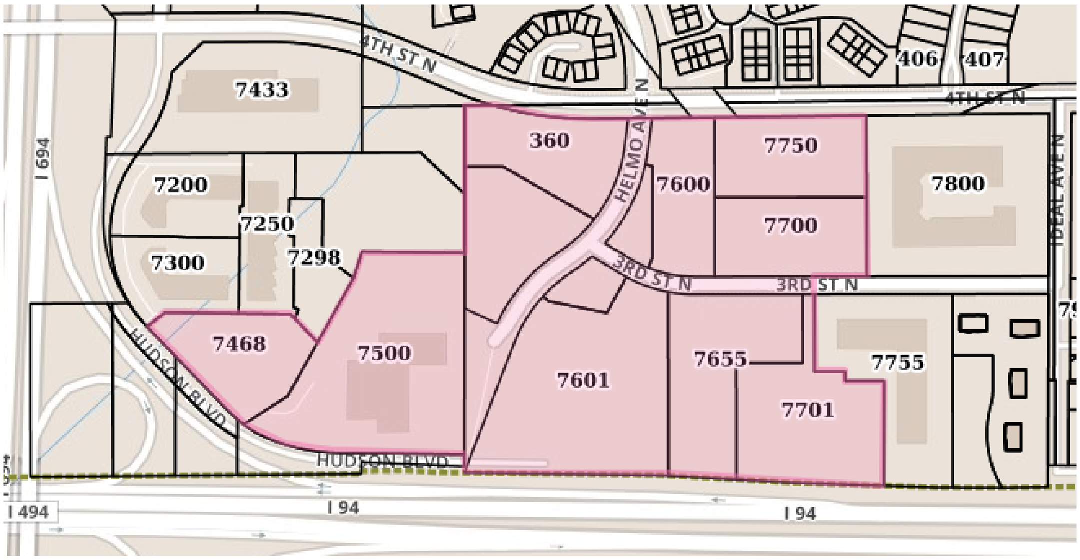
Future Land Use Guiding

The Future Land Use classification for the subject area is *Bus Rapid Transit Oriented Development (BRTOD)* defined as follows:

Bus Rapid Transit Oriented Development occurs in the form of a Planned Unit Development (PUD), where a mix of transit-supportive development (multi-family medium density residential; multi-family high density residential; office-industrial; professional office; and commercial/retail uses) along with park and open space amenities all come together in the form of one cohesive development. Residential densities shall be 15-24 dwelling units per acre (DU/Ac) for Medium Density Residential land uses and 30-50 DU/Ac for High Density Residential land uses. Non-residential land uses shall have a 0.5-1.0 FAR (floor area ratio). Densities may be adjusted by the City Council on a project specific basis and in accordance with detailed development plans.

Helmo Station Area – Subject Parcels

The BRTOD Future Land Use Classification applies to the following highlighted parcels (see also Figure 7.3 Future Land Use Map on p. 7-14):



Address	PID	Legal Description
7468 Hudson Blvd N	3202921340016	Lot 3, Block 1 Crossroads of Oakdale 2nd Addition
7500 Hudson Blvd N	3202921430022	Lot 1, Block 2 Crossroads of Oakdale
360 Helmo Ave N	3202921430037	Lot 1, Block 3 Oaks Business Park
7750 3rd St N	3202921440093	Lot 2, Block 2 Oaks Business Park; Excepting the east 35.50 feet
7700 3rd St N	3202921440094	Lot 3, Block 2 Oaks Business Park; Excepting the east 35.50 feet
7600 3rd St N	3202921430036	Lot 4, Block 2 Oaks Business Park
7701 3rd St N	3202921440091	Lot 2, Block 2 Oaks Business Park 2nd Addition
7655 3rd St N	3202921430038	Lot 3, Block 1 Oaks Business Park 2nd Addition
7601 3rd St N	3202921430039	Lot 4, Block 1 Oaks Business Park 2nd Addition
(stormwater pond)	3202921430031	Lot B Oaks Business Park
(stormwater pond)	3202921430032	Lot C Oaks Business Park
(stormwater pond)	3202921430033	Lot D Oaks Business Park

Forecast Adjustments

The Helmo Station Area Plan estimates the potential for 962 units of apartments and townhomes in an area previously guided for non-residential uses. The Metropolitan Council has adjusted the forecasts for the subject area (in 2040 TAZ #2412) to add 700 households and 1,700 population.

The forecast for population, households, and employment in Oakdale has been adjusted to reflect this amendment as follows:

	Census	Previous Council Forecasts			Revised Council Forecasts		
	2010	2020	2030	2040	2020	2030	2040
Population	27,401	28,500	29,500	30,200	28,500	31,200	31,900
Households	10,956	11,700	12,200	12,500	11,700	12,900	13,200
Employment	8,651	11,300	12,600	14,000	11,300	12,600	14,000

Helmo Station Area BRTOD Small Area Plan Narrative

The site history, planning process, and description of the Helmo Station BRTOD small area plan is contained in Appendix F.

5. Congestion Reduction/Air Quality

B. Explanation of Methodology and Assumptions Used:

A cruise speed of 35 mph was used on the new roadway. This is consistent with the speed limit on Helmo Avenue north of I-94. To calculate the gallons of fuel consumed, the fuel emission equation from Chapter 18 of the Synchro User guide was used, this equation is consistent with the methodology outlined in the application. The 6.35 gallons is based on 10% of the ADT using the new bridge within the peak hour. The calculation assumes no delay and no stops on the new roadway as there is no traffic control on the new roadway that would cause NB/SB vehicles to stop. The total travel used for the fuel calculation was calculated by multiplying 1,050 vehicles per hour by the segment length of 0.16 miles and the speed assume in K4 and K5 was equal to the cruising speed.

City of Oakdale 2030 Comprehensive Plan

https://www.ci.oakdale.mn.us/201/Comprehensive-Plan

City of Woodbury 2030 Comprehensive Plan

https://www.woodburymn.gov/departments/planning/current_comprehensive_plan.php

1: Inwood Ave N & 4th Street N/Hudson Blvd N

Direction	All
Future Volume (vph)	2725
CO Emissions (kg)	3.39
NOx Emissions (kg)	0.66
VOC Emissions (kg)	0.78

2: Inwood Ave/Inwood Ave N & 3rd Street N/I-94 WB Ramps

Direction	All
Future Volume (vph)	4195
CO Emissions (kg)	5.43
NOx Emissions (kg)	1.06
VOC Emissions (kg)	1.26

3: Radio Drive/Inwood Ave & EB I-94 Ramp/Woodbury Lakes Road

Direction	All
Future Volume (vph)	5145
CO Emissions (kg)	6.17
NOx Emissions (kg)	1.20
VOC Emissions (kg)	1.43

4: Radio Drive & Hudson Road/City Place Blvd

Direction	All
Future Volume (vph)	4901
CO Emissions (kg)	6.56
NOx Emissions (kg)	1.28
VOC Emissions (kg)	1.52

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	120	370	265	55	65	185	880	95	20	755	50
Future Volume (veh/h)	80	120	370	265	55	65	185	880	95	20	755	50
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	82	124	381	273	57	67	191	907	98	21	778	52
Adj No. of Lanes	1	1	1	2	1	1	2	2	1	1	2	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	192	369	313	453	412	350	446	1225	548	84	933	418
Arrive On Green	0.11	0.20	0.20	0.13	0.22	0.22	0.13	0.35	0.35	0.05	0.26	0.26
Sat Flow, veh/h	1774	1863	1583	3442	1863	1583	3442	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	82	124	381	273	57	67	191	907	98	21	778	52
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1721	1863	1583	1721	1770	1583	1774	1770	1583
Q Serve(g_s), s	3.3	4.3	15.0	5.7	1.9	2.6	3.9	17.1	3.3	0.9	15.7	1.9
Cycle Q Clear(g_c), s	3.3	4.3	15.0	5.7	1.9	2.6	3.9	17.1	3.3	0.9	15.7	1.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	192	369	313	453	412	350	446	1225	548	84	933	418
V/C Ratio(X)	0.43	0.34	1.22	0.60	0.14	0.19	0.43	0.74	0.18	0.25	0.83	0.12
Avail Cap(c_a), veh/h	234	369	313	454	412	350	454	1225	548	234	1121	501
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.6	26.1	30.4	31.0	23.7	24.0	30.4	21.8	17.3	34.8	26.3	21.2
Incr Delay (d2), s/veh	1.5	0.5	122.6	2.2	0.2	0.3	0.7	2.4	0.2	1.6	4.7	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	2.3	17.2	2.8	1.0	1.2	1.9	8.7	1.5	0.5	8.3	0.8
LnGrp Delay(d),s/veh	33.1	26.6	153.0	33.3	23.9	24.3	31.0	24.2	17.4	36.4	31.0	21.4
LnGrp LOS	C	C	F	C	C	C	C	C	B	D	C	C
Approach Vol, veh/h		587			397			1196			851	
Approach Delay, s/veh		109.6			30.4			24.7			30.6	
Approach LOS		F			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.1	31.7	14.5	20.5	15.3	25.5	12.7	22.2
Change Period (Y+Rc), s	5.5	5.5	4.5	5.5	5.5	5.5	4.5	5.5
Max Green Setting (Gmax), s	10.0	24.0	10.0	15.0	10.0	24.0	10.0	15.0
Max Q Clear Time (g_c+I1), s	2.9	19.1	7.7	17.0	5.9	17.7	5.3	4.6
Green Ext Time (p_c), s	0.0	4.0	0.2	0.0	0.2	2.3	0.1	2.0

Intersection Summary	
HCM 2010 Ctrl Delay	43.6
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	70	275	255	50	85	255	1060	695	205	1125	60
Future Volume (veh/h)	60	70	275	255	50	85	255	1060	695	205	1125	60
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	62	72	284	263	52	88	263	1093	0	211	1160	62
Adj No. of Lanes	1	1	1	2	1	1	2	2	1	1	2	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	156	311	265	383	355	302	383	1198	536	245	1292	578
Arrive On Green	0.09	0.17	0.17	0.11	0.19	0.19	0.11	0.34	0.00	0.14	0.37	0.37
Sat Flow, veh/h	1774	1863	1583	3442	1863	1583	3442	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	62	72	284	263	52	88	263	1093	0	211	1160	62
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1721	1863	1583	1721	1770	1583	1774	1770	1583
Q Serve(g_s), s	3.0	3.0	15.0	6.6	2.1	4.3	6.6	26.5	0.0	10.4	27.8	2.3
Cycle Q Clear(g_c), s	3.0	3.0	15.0	6.6	2.1	4.3	6.6	26.5	0.0	10.4	27.8	2.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	156	311	265	383	355	302	383	1198	536	245	1292	578
V/C Ratio(X)	0.40	0.23	1.07	0.69	0.15	0.29	0.69	0.91	0.00	0.86	0.90	0.11
Avail Cap(c_a), veh/h	198	311	265	384	355	302	384	1203	538	247	1301	582
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.7	32.4	37.4	38.4	30.2	31.1	38.4	28.4	0.0	37.8	26.9	18.8
Incr Delay (d2), s/veh	1.6	0.4	76.1	5.0	0.2	0.5	5.0	10.6	0.0	25.2	8.5	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	1.6	12.1	3.4	1.1	1.9	3.4	14.7	0.0	6.8	15.1	1.0
LnGrp Delay(d),s/veh	40.3	32.7	113.4	43.4	30.4	31.6	43.4	39.0	0.0	63.0	35.4	18.9
LnGrp LOS	D	C	F	D	C	C	D	D		E	D	B
Approach Vol, veh/h		418			403			1356			1433	
Approach Delay, s/veh		88.7			39.2			39.9			38.8	
Approach LOS		F			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.9	35.9	15.5	20.5	15.5	38.3	13.4	22.6
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Max Green Setting (Gmax), s	12.5	30.5	10.0	15.0	10.0	33.0	10.0	15.0
Max Q Clear Time (g_c+I1), s	12.4	28.5	8.6	17.0	8.6	29.8	5.0	6.3
Green Ext Time (p_c), s	0.0	1.8	0.1	0.0	0.1	3.0	0.0	1.4

Intersection Summary	
HCM 2010 Ctrl Delay	45.0
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	235	150	805	0	0	0	0	1775	525	100	1330	225
Future Volume (veh/h)	235	150	805	0	0	0	0	1775	525	100	1330	225
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	198	216	830				0	1830	541	103	1371	0
Adj No. of Lanes	1	1	2				0	3	1	2	2	1
Peak Hour Factor	0.97	0.97	0.97				0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	2
Cap, veh/h	514	540	918				0	2128	663	359	2071	927
Arrive On Green	0.29	0.29	0.29				0.00	0.42	0.42	0.10	0.59	0.00
Sat Flow, veh/h	1774	1863	3167				0	5253	1583	3442	3539	1583
Grp Volume(v), veh/h	198	216	830				0	1830	541	103	1371	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583				0	1695	1583	1721	1770	1583
Q Serve(g_s), s	7.9	8.2	22.2				0.0	28.8	26.6	2.4	23.1	0.0
Cycle Q Clear(g_c), s	7.9	8.2	22.2				0.0	28.8	26.6	2.4	23.1	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	514	540	918				0	2128	663	359	2071	927
V/C Ratio(X)	0.38	0.40	0.90				0.00	0.86	0.82	0.29	0.66	0.00
Avail Cap(c_a), veh/h	533	560	952				0	2135	665	390	2108	943
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	25.0	25.1	30.1				0.0	23.3	22.6	36.4	12.4	0.0
Incr Delay (d2), s/veh	0.5	0.5	11.6				0.0	3.8	7.8	0.4	0.8	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	4.3	11.2				0.0	14.1	13.0	1.2	11.5	0.0
LnGrp Delay(d),s/veh	25.5	25.6	41.7				0.0	27.1	30.5	36.9	13.1	0.0
LnGrp LOS	C	C	D					C	C	D	B	
Approach Vol, veh/h		1244						2371			1474	
Approach Delay, s/veh		36.3						27.8			14.8	
Approach LOS		D						C			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	14.7	42.4		31.1		57.1						
Change Period (Y+Rc), s	5.5	5.5		5.5		5.5						
Max Green Setting (Gmax), s	10.0	37.0		26.5		52.5						
Max Q Clear Time (g_c+I1), s	4.4	30.8		24.2		25.1						
Green Ext Time (p_c), s	0.1	6.1		1.3		25.7						
Intersection Summary												
HCM 2010 Ctrl Delay			26.1									
HCM 2010 LOS			C									
Notes												

User approved volume balancing among the lanes for turning movement.

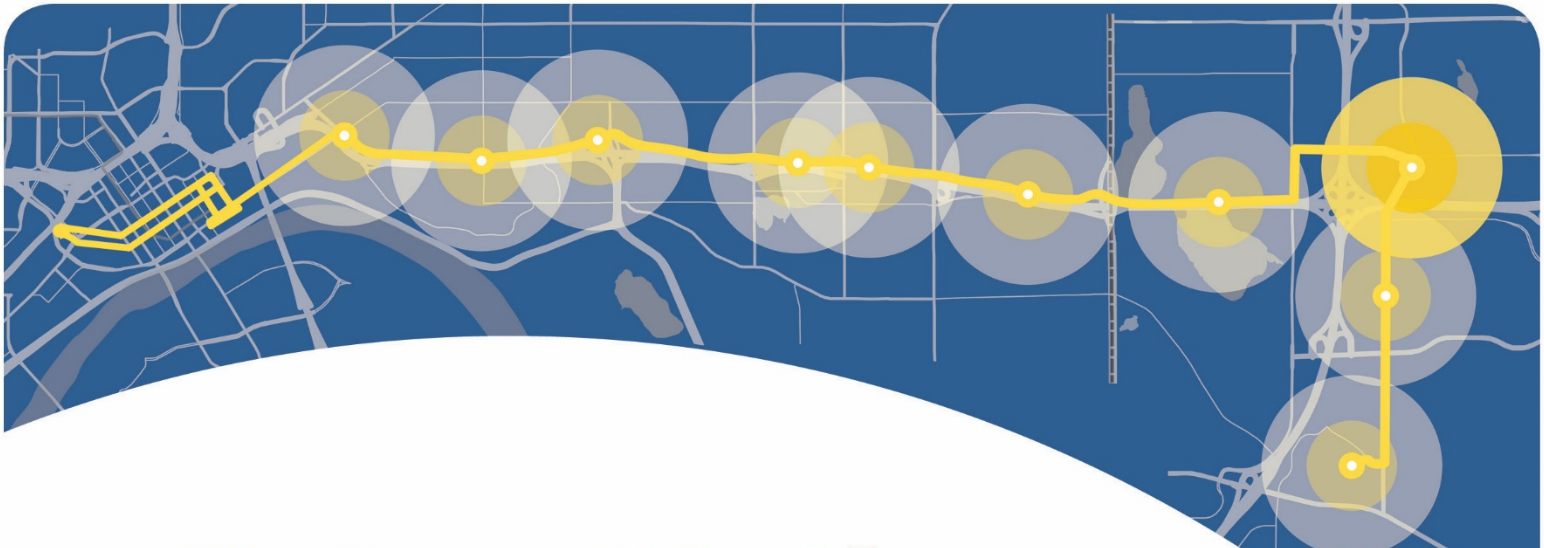
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	705	50	205	40	25	185	90	1435	50	180	1415	520
Future Volume (veh/h)	705	50	205	40	25	185	90	1435	50	180	1415	520
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	764	0	211	41	26	191	93	1479	52	186	1459	536
Adj No. of Lanes	3	0	1	1	1	1	2	3	1	2	3	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	888	0	414	127	310	263	348	1565	487	384	1617	503
Arrive On Green	0.17	0.00	0.26	0.07	0.17	0.17	0.10	0.31	0.31	0.11	0.32	0.32
Sat Flow, veh/h	5322	0	1583	1774	1863	1583	3442	5085	1583	3442	5085	1583
Grp Volume(v), veh/h	764	0	211	41	26	191	93	1479	52	186	1459	536
Grp Sat Flow(s),veh/h/ln	1774	0	1583	1774	1863	1583	1721	1695	1583	1721	1695	1583
Q Serve(g_s), s	12.4	0.0	10.1	2.0	1.0	10.2	2.2	25.2	2.1	4.5	24.4	28.2
Cycle Q Clear(g_c), s	12.4	0.0	10.1	2.0	1.0	10.2	2.2	25.2	2.1	4.5	24.4	28.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	888	0	414	127	310	263	348	1565	487	384	1617	503
V/C Ratio(X)	0.86	0.00	0.51	0.32	0.08	0.73	0.27	0.94	0.11	0.48	0.90	1.06
Avail Cap(c_a), veh/h	929	0	414	200	315	267	387	1574	490	387	1617	503
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	36.0	0.0	27.9	39.2	31.3	35.1	36.9	30.0	22.0	37.1	29.0	30.3
Incr Delay (d2), s/veh	8.0	0.0	1.0	1.5	0.1	9.3	0.4	12.0	0.1	1.0	7.4	58.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.7	0.0	4.5	1.0	0.6	5.1	1.1	13.5	0.9	2.2	12.5	20.4
LnGrp Delay(d),s/veh	44.0	0.0	29.0	40.6	31.4	44.4	37.3	42.0	22.1	38.0	36.4	88.7
LnGrp LOS	D		C	D	C	D	D	D	C	D	D	F
Approach Vol, veh/h		975			258			1624			2181	
Approach Delay, s/veh		40.7			42.5			41.1			49.4	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.4	32.8	11.9	28.7	14.5	33.7	20.3	20.3
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Max Green Setting (Gmax), s	10.0	27.5	10.0	20.5	10.0	27.5	15.5	15.0
Max Q Clear Time (g_c+I1), s	6.5	27.2	4.0	12.1	4.2	30.2	14.4	12.2
Green Ext Time (p_c), s	0.2	0.1	0.0	1.0	0.1	0.0	0.4	0.2

Intersection Summary	
HCM 2010 Ctrl Delay	44.7
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.



Helmo Station BRTOD Plan

GATEWAY CORRIDOR

METRO Gold Line

FINAL—APRIL 2018

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ACKNOWLEDGEMENTS:

The Gold Line BRTOD Plans project is a partnership between Washington County, Ramsey County and the cities of Saint Paul, Maplewood, Landfall, Oakdale, and Woodbury.

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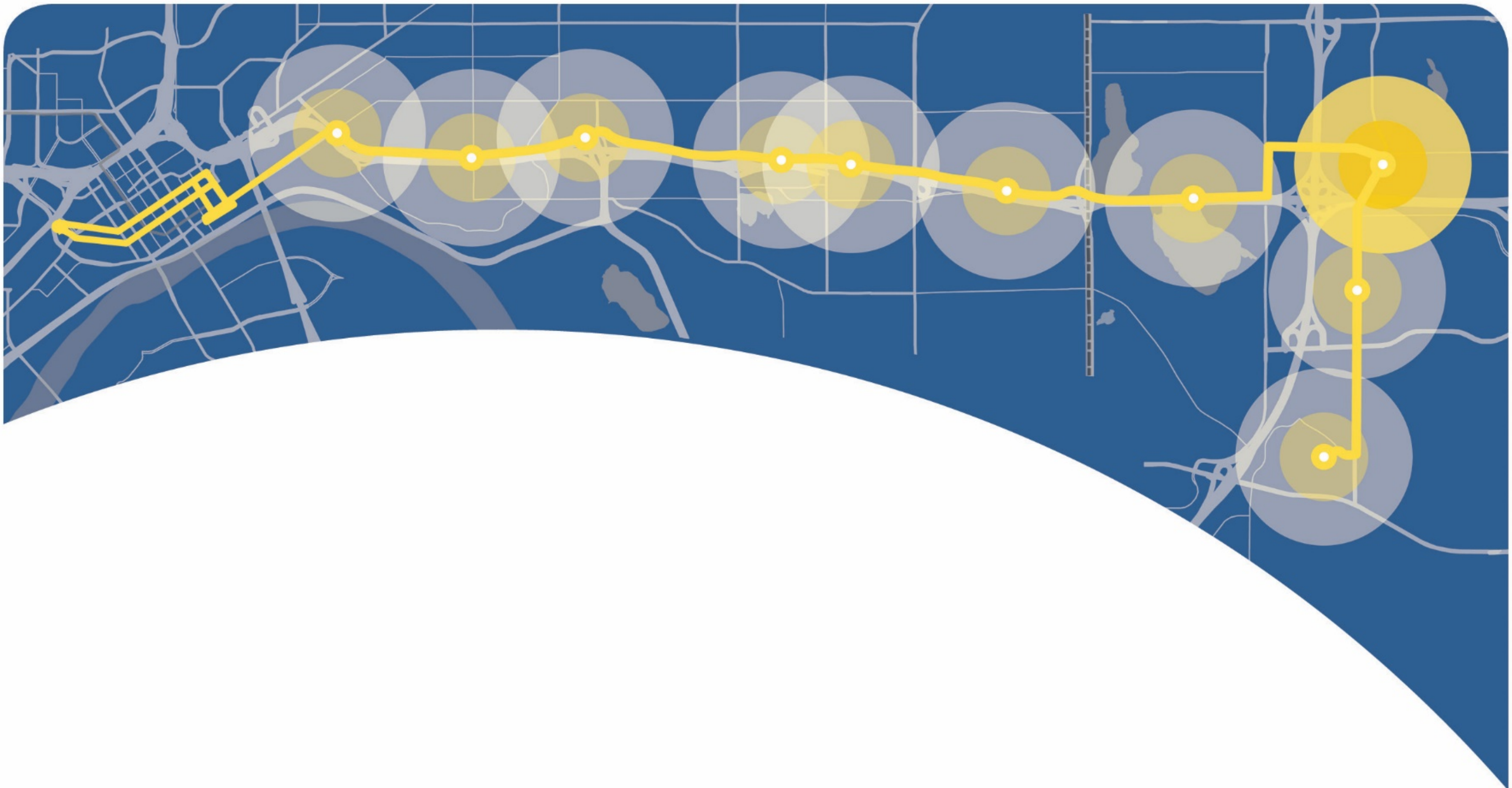


INTRODUCTION

GATEWAY CORRIDOR
GOLD LINE BRT

PROJECT PURPOSE

The Helmo Station Bus Rapid Transit Oriented Plan (Helmo BRTOD Plan) will serve as a traditional small area plan and policy guide for redevelopment of the area within a 1/2-mile radius of the planned bus rapid transit (BRT) station within the City of Oakdale. Helmo Station area planning, conducted over an approximately twelve-month period, was developed collaboratively by Oakdale City staff, with City Council, the Washington County Regional Rail Authority (WCRRA), the Gateway Corridor Commission (GCC), and station area stakeholders, including property owners and community residents. Four sets of community engagement sessions and individual stakeholder meetings were held to solicit feedback and comments on station area opportunities/constraints and BRTOD concepts during the plan development process.

STATION AREA PLANNING

The Helmo BRTOD Plan is part of corridor-wide station area planning effort for the future METRO Gold Line BRT system connecting the cities of St Paul, Maplewood, Landfall, Oakdale, and Woodbury. Ten stations are planned for the alignment running along the north side of I-94 west to east from downtown St Paul to Oakdale, with the line continuing south over I-94 into Woodbury (Figure 1).

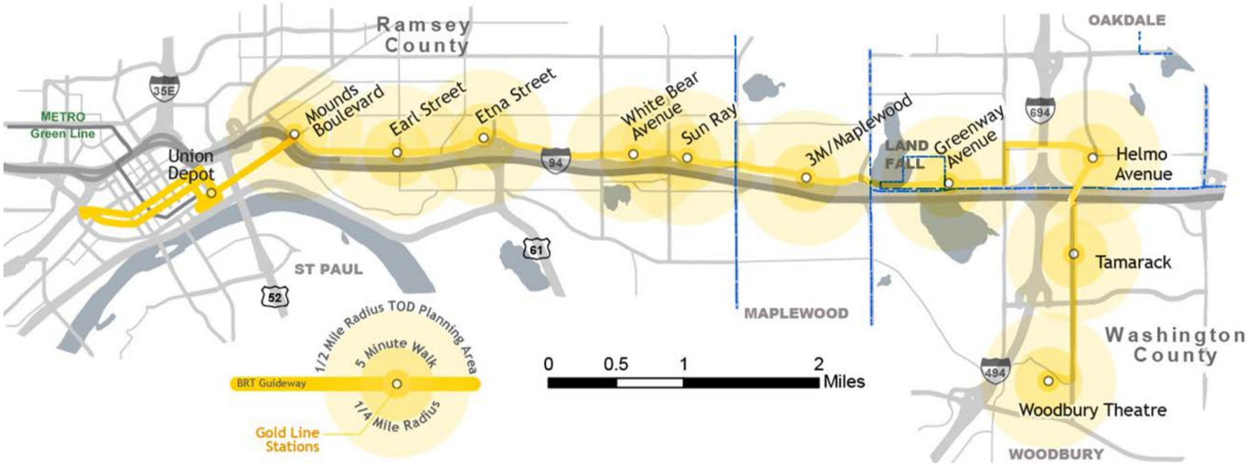
This plan, and the corridor-wide study, is commissioned by the Gateway Corridor Commission (GCC), on behalf of the Metropolitan Council and is funded by a grant from the Federal Transit Administration (FTA) as a Pilot Program for Transit-Oriented Development Planning. The Washington County Regional Railroad Authority (WCRRA) is the fiscal agent and staff lead for the Commission. The Gold Line BRTOD plans are intended to increase the potential ridership base and enable station areas to achieve their transit-supportive, market-driven development potential. BRT provides the opportunities for each city to respond to a new market potential. The BRTOD plans will identify infrastructure investments and policy changes needed to achieve the larger vision of a vibrant and transit-supportive community. Successful plans will meet the needs of each station and city while maintaining the continuity of the Corridor as a whole. This is a small area planning process with a focus on the opportunities that fixed-guideway transit can bring to the communities along the METRO Gold Line.

Station area planning is committed to gaining as many Gold Line riders as possible and increasing the number of people riding within each station area. The key project objectives are to:

- Establish a multi-modal corridor (for walking, biking, transit & auto)
- Increase potential ridership (through transit access & new development)
- Enable station areas to achieve their development potential (capture latent market demand & improve quality of life)
- Identify infrastructure investments and policy changes (ensure funding priorities and policies encourage development)

Implementing these objectives is a shared responsibility of the City, Metro Transit, and other Gold Line project partners. Some of the recommendations in this report can be constructed as part of the BRT project but it will be a collaborative process to determine what can be funded through the BRT project.

FIGURE 1. METRO GOLD LINE BRT SYSTEM AND PLANNING AREA



BACKGROUND

Prior to this station area planning process, the Gateway Corridor Commission, a joint-powers board of local elected officials, business and community leaders financial members and Ramsey and Washington County Regional Railroad Authorities, led the METRO Gold Line (also known as the Gateway Corridor) planning work, which included the Alternatives Analysis (preliminary routes and station locations), selection of a Locally Preferred Alternative (determination in conjunction with project partners for the preferred BRT alignment and station locations) and development of preliminary engineering drawings within existing streets, MnDOT rights-of-ways, and affected adjacent properties.

Within the ½ mile Helmo BRT station planning area, the land uses consist of office, warehouse, and light manufacturing uses located on the partially built out Oaks Business Park east of Helmo Avenue and south of 4th Street and similar uses within the Crossroads Properties along Hudson Boulevard and west of Helmo Avenue. North of 4th Street, consists of townhomes, a City-owned golf course, Powerline Park, and a significant amount of public open space. The station area is bounded by 1-694 to the west and by I-94 along the southern boundary. No access to I-94 or freeway crossing south of I-94 exists today. A two-lane 4th Street bridge provides east/west access over I-694.

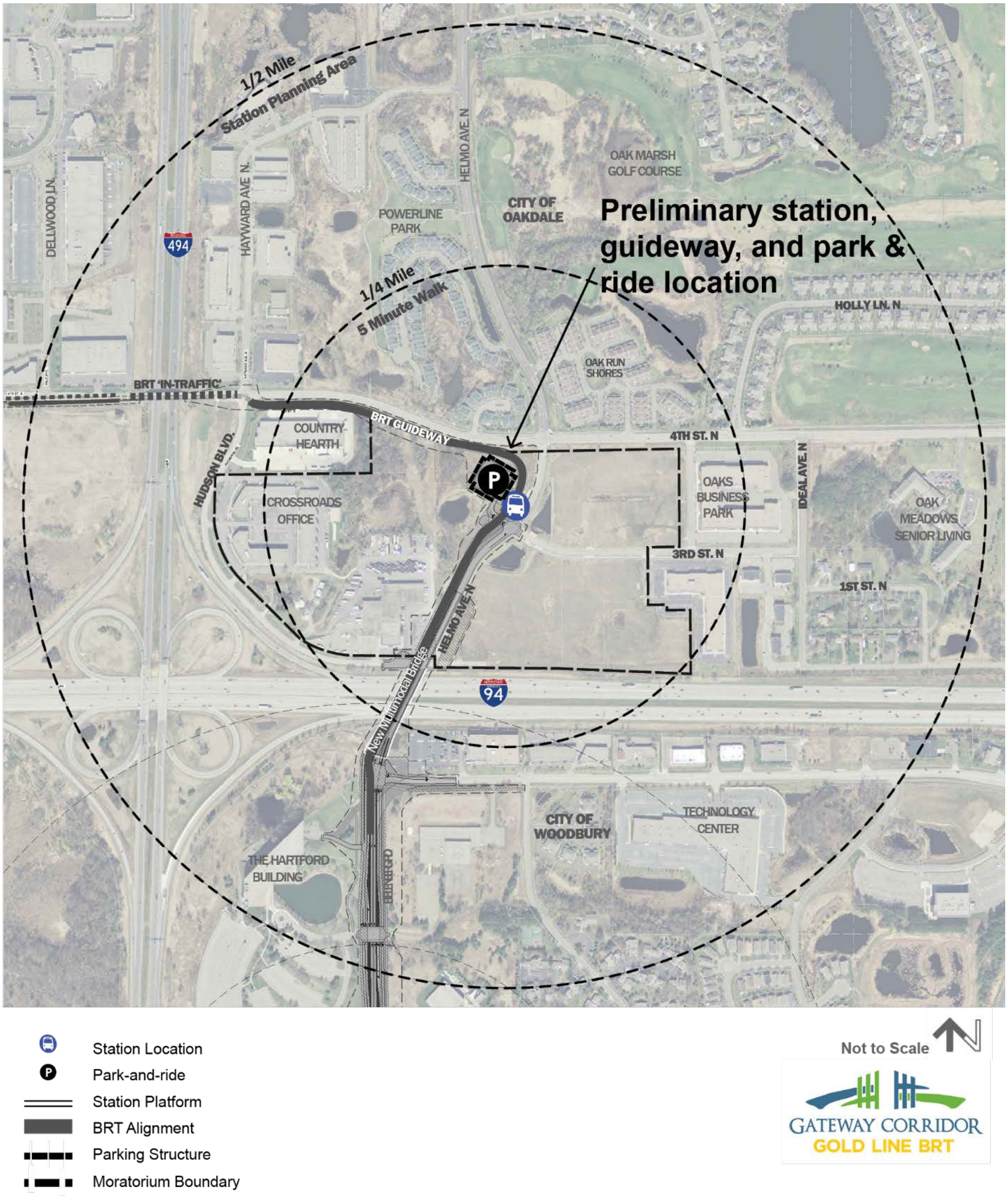
Preliminary engineering for the Gold Line BRT includes buses in mixed-traffic that approach the Helmo Station area from the west across the 4th Street bridge (crossing over I-694); travel along the south side of 4th Street within a bus-only guideway (dedicated lanes next to the roadway) and turning south along the west side of Helmo Avenue, continuing across I-94 within a new Helmo Avenue/Bielenberg Bridge into the City of Woodbury. The BRT station and a planned park-and-ride parking lot are located in the southwest corner of 4th Street and Helmo Avenue.

DEVELOPMENT MORATORIUM & COMPREHENSIVE PLAN AMENDMENT

In June 2017, the Oakdale City Council adopted a moratorium on all development within the Crossroads Properties and the Oaks Business Park, an area within approximately ¼ mile from the proposed Helmo Station, and authorized the Helmo Station area planning project (under the direction of the City staff) to study and review land use and zoning regulations near the proposed Helmo Station to ensure that development is consistent with the City's vision and goals for that area. In addition, as an outcome of station area planning for the Helmo Station the City is proposing to amend the 2030 Comprehensive Plan to facilitate transit-oriented development around the station area. The lifting of the moratorium and Comprehensive Plan amendment adoption is anticipated to occur in June 2018. The Helmo Station BRTOD Planning project was directed by City staff to:

- Create a framework (land use, circulation, and infrastructure plans) for transit-supportive development of the moratorium properties and improved BRT station access.
- Suggest refinements, for consideration by Metro Transit, for the Helmo BRT station location, guideway, and planned park-and-ride.
- Provide necessary market and traffic analysis and environmental review documentation in the form of an Environmental Assessment Worksheet (EAW)—part of the Minnesota Pollution Control Agency’s required environmental review process designed to disclose information about the potential negative environmental effects of a proposed development and ways to avoid or minimize them before the project is permitted and built

FIGURE 2. HELMO STATION PLANNING AREA



BRTOD PLANNING PROCESS

The BRTOD Plan process consisted of four phases: identification of station area opportunities, issues and concerns to establish specific goals for the Helmo Station; development of preliminary BRTOD concepts for transit-oriented development and station access; refinement of BRTOD concepts to establish preferred land uses and station access improvements; and the preparation of the BRTOD Plan. Each phase of the process included engagement with City staff, the City Council, moratorium property owners and adjacent residents to gather feedback and receive guidance on advancing into subsequent phases.

The station location, and its environment, are key determinates in attracting transit-oriented development and ensuring the safe and direct access that will maximize transit ridership. Evaluation of the preliminary engineering plans for the Helmo Station through the lens of transit-oriented development potential and station access, identified the following issues.

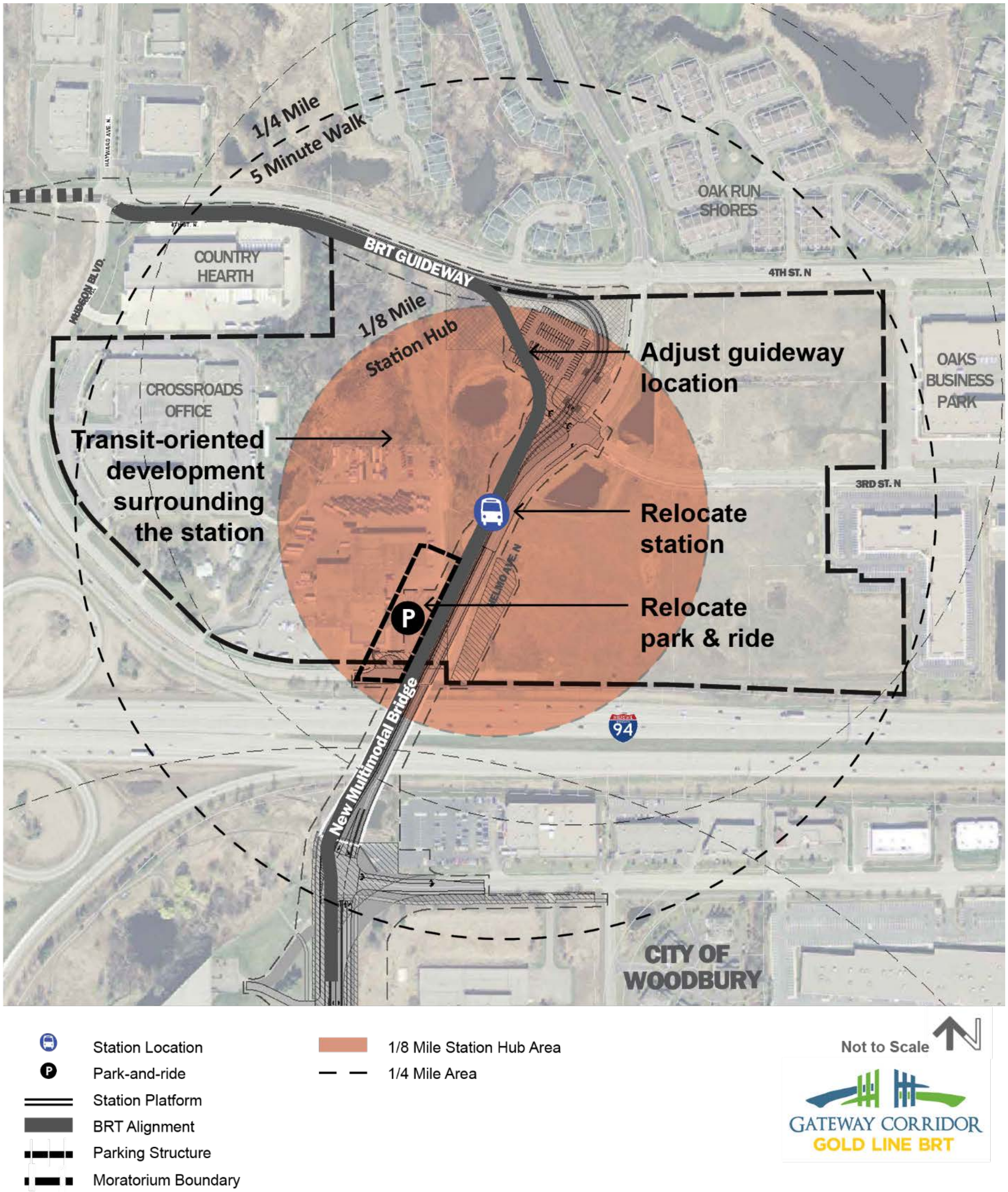
- The location of the park-and-ride, guideway and station (southwest corner of 4th Street and Helmo Avenue) precludes transit-oriented development adjacent to the station.
- The majority of vacant and underutilized land with the potential for new transit-supportive development is located south of the 3rd Street and Helmo Avenue intersection.
- Proximity of the park-and-ride and station to existing residents posed potential issues with auto traffic congestion at the intersection of 4th Street and Helmo Avenue and noise associated with the frequency of buses arriving and departing at the station.
- The guideway location between the adjacent roadways and the park-and-ride requires vehicles to cross the guideway and creates the potential for park-and-ride traffic back up into Helmo Avenue.
- Station access is limited to a single walkway separated from adjacent streets by the BRT guideway and not well integrated with existing trails located on Helmo Avenue and 4th Street.

In response to these issues and concerns, a refinement to the station location and guideway; park-and-ride; and alternative station access routes were identified and included:

- Relocating the station and park-and-ride approximately 400 feet to the south, adjacent to vacant or potentially redevelopable properties, allowing for transit-oriented development surrounding the Helmo BRT Station.
- Adjusting the alignment of the guideway approximately 150 feet to the west, away from Helmo Avenue, to allow for transit-oriented development to occur on both sides of Helmo Avenue at 4th Street.
- Removing the walkway along the guideway and replacing it with a mixed-use trail. The mixed-use trail would be located between the guideway and the west side of Helmo Avenue from the planned BRT bridge to 4th Street and continues west along the north side of 4th Street to the 4th Street bridge.

These recommendations were generally supported by City staff, City Council, moratorium stakeholders and adjacent residents and were carried forward into the refinement of BRTOD concepts and the preparation of the BRTOD Plan.

FIGURE 3. HELMO STATION AREA REFINEMENTS



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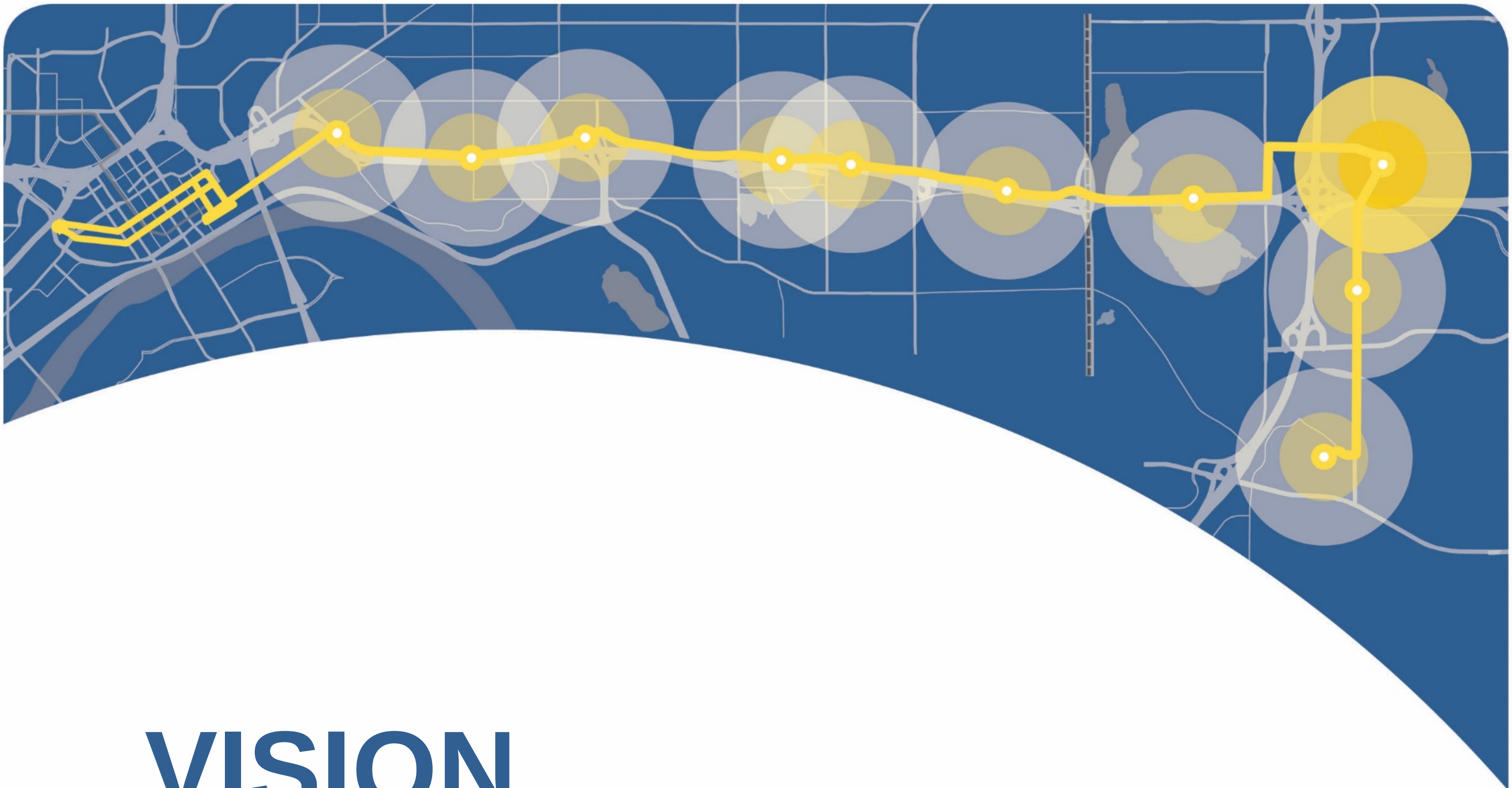


VISION

GATEWAY CORRIDOR
GOLD LINE BRT

BRTOD CONCEPT

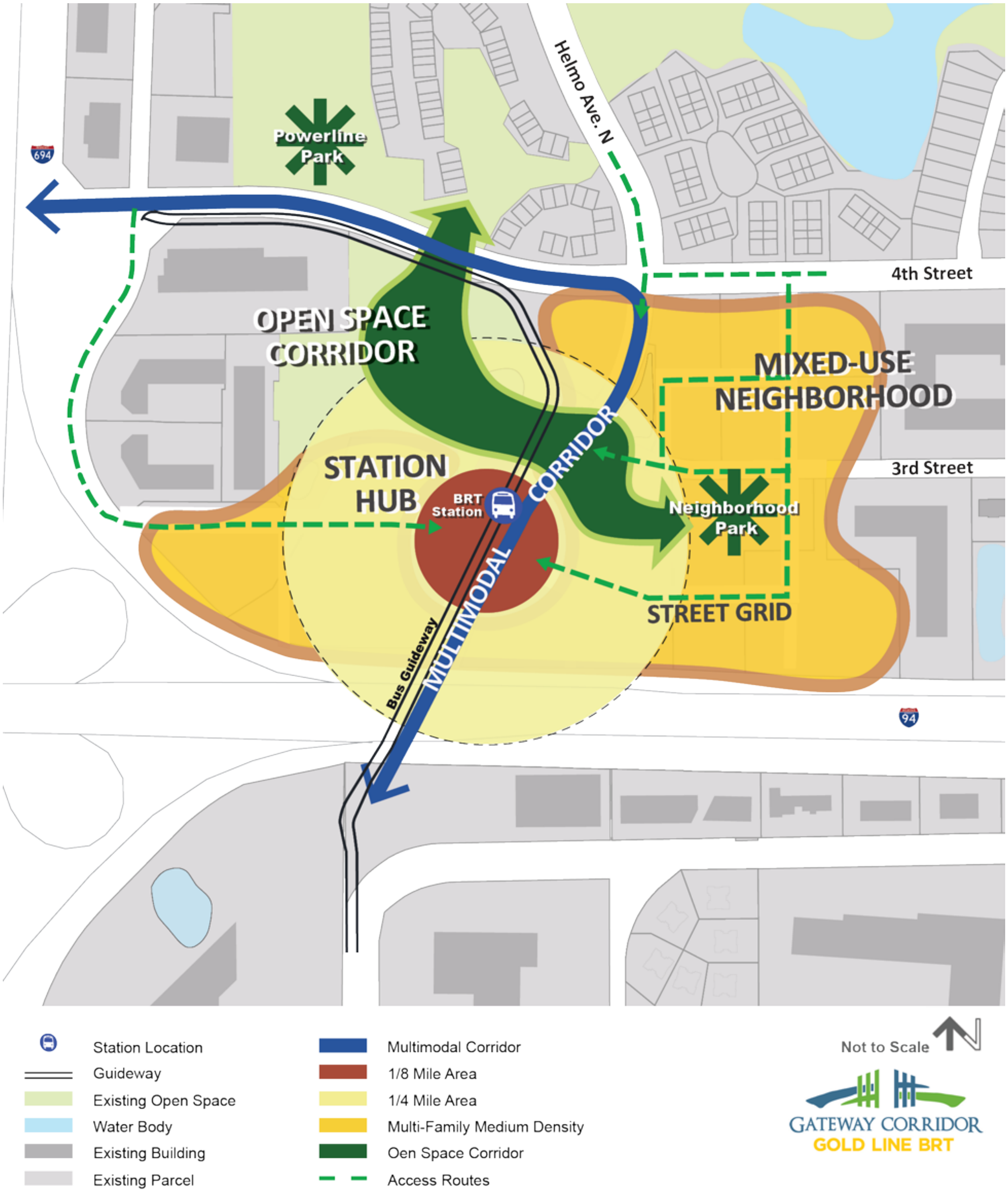
The Helmo Station BRTOD concept provides a snap-shot of the key ideas informing the land use and circulation elements of the plan. The concept responds to specific Helmo Station Area objectives identified during the plan's initial engagement with stakeholders. Objectives included:

- Maintaining and enhancing open space and trails
- Preserving existing neighborhoods and quality of life
- Managing traffic and congestion
- Creating a safe station environment
- Ensuring safe walking and biking
- Promoting compatible development

A new neighborhood park, street grid, and enhanced open space corridor provides a catalyst for transit-supportive redevelopment that includes:

- Station Hub—Street-oriented retail within or adjacent to high-density multi-family buildings at the intersection of the planned Helmo Avenue bridge, relocated Helmo BRT station, and a realigned Hudson Boulevard. Uses will create an animated 18-hour environment of activity surrounding the station platform. As result of this activity and eyes-on-the-station, the transit platform will be safer at all times of the day.
- Mixed Use Neighborhood—Multi-family housing surrounding a new neighborhood park and employment (professional and flex office) uses adjacent to the existing Oaks Business Park and oriented to the I-94 freeway.
- Open Space Corridor—Open space enhancements and new trail connections create a green setting for urban transit-oriented development with links to existing and new parks.
- Street Grid—A proposed Hudson Boulevard realignment west of Helmo Avenue and a new street grid east of Helmo Avenue improve access to the station and development parcels within the Helmo Station area.
- Multimodal Corridor—A walking and biking trail adjacent to the BRT line links station to station along the entire corridor. A new I-94 bridge crossing will provide improved access for transit, walking, biking, and auto traffic between Oakdale and Woodbury to the south.

FIGURE 4. FUNDAMENTAL CONCEPT DIAGRAM



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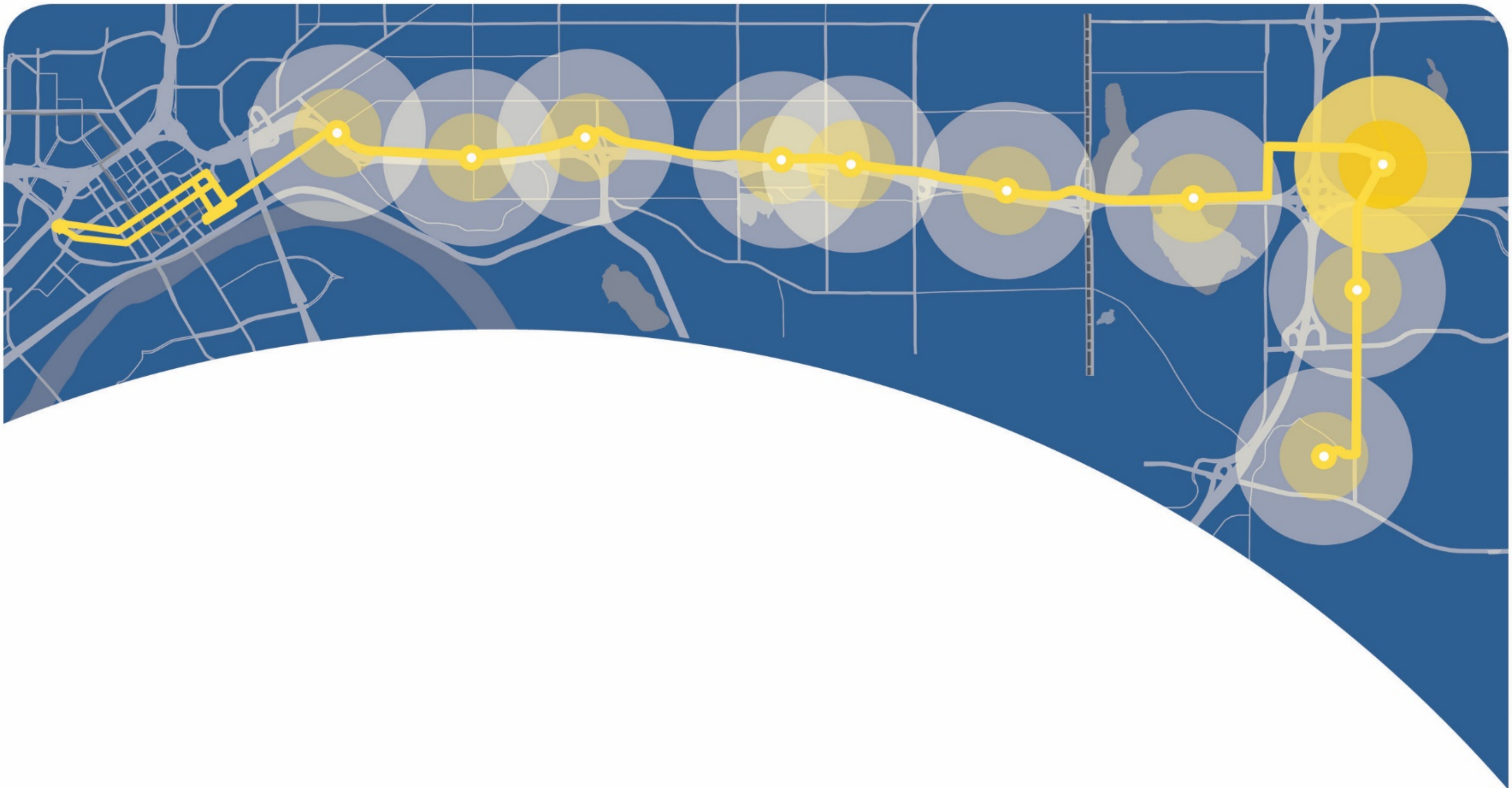


DEVELOPMENT PLAN

GATEWAY CORRIDOR
GOLD LINE BRT

BUILD-OUT CONCEPT

The build-out concept represents a five- to ten-year development plan and informs policy and regulatory updates that define the types of uses, permitted density, parking and building heights in the station area.

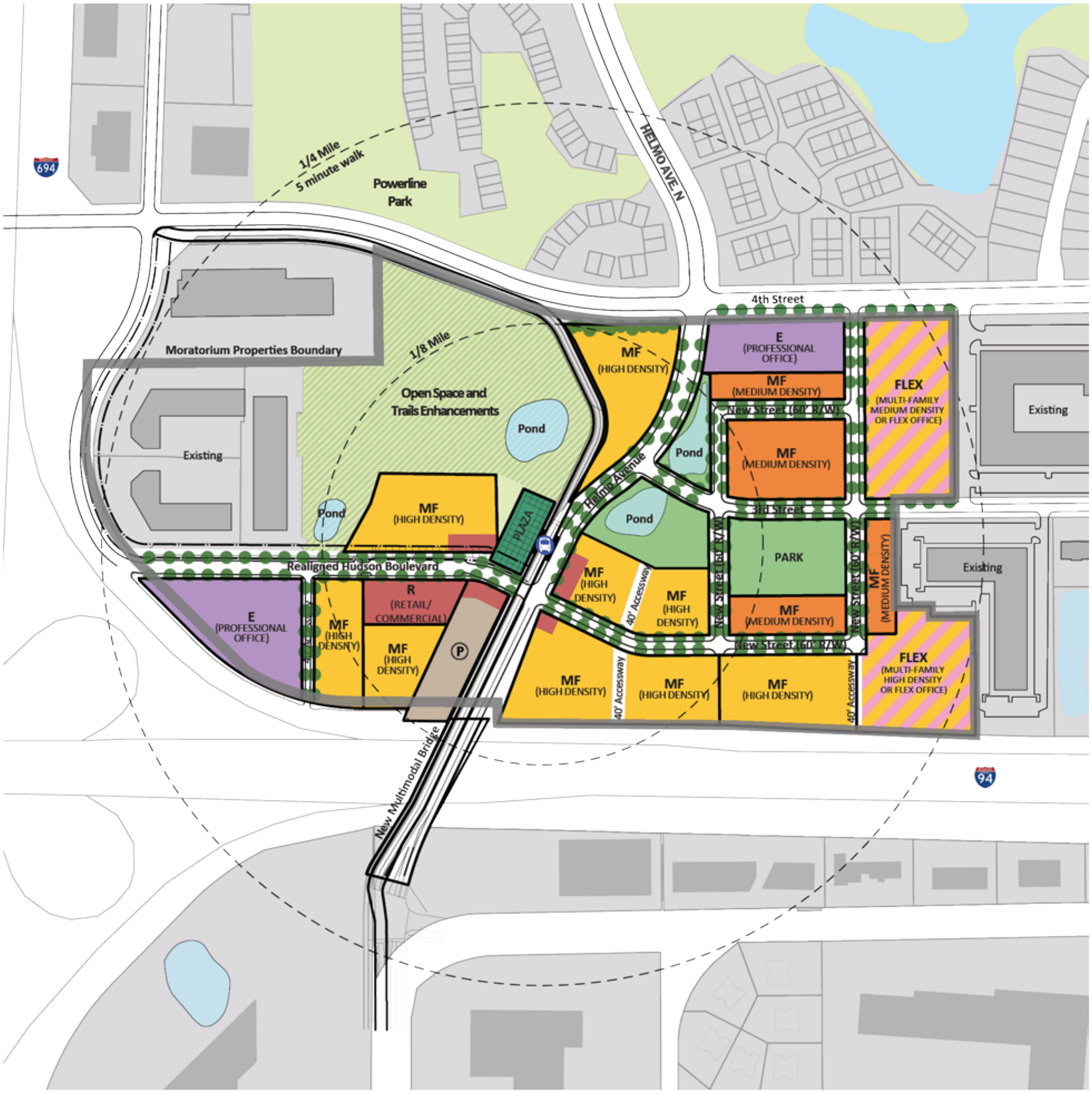
The development plan for the station area identifies the location of transit-supportive multi-family (785 to 945 units~~),~~ employment (office at 125,800 and office with flex up to 317,844 square feet) and limited retail and services (30,000 square feet), parks, station plaza, open space and natural areas (15.22 aces) and a 100 space park and ride that provide for a safe and active BRT station environment and capitalizes on the station area's open space and trail amenities, and access to BRT.

TABLE 1. BUILD-OUT SUMMARY

USE	LAND AREA	DENSITY	HEIGHT	DEV. TOTAL	PARKING	PARKING TOTAL
	square feet (sf)	FAR | du/ac (min.)	Stories (max)	# of Units Bldg. (sf) Road (lf)	Spaces/unit Spaces/1000 sf	Spaces
EAST of BRT GUIDEWAY						
Multi-family (HD)	491,633 to 611,290	30-50 du/ac	3 to 6	484-594 units	1.5/unit (max)	726 to 891
Multi-family (MD)	184,250 to 330,000	15-24 du/ac	3	69-119 units	2/unit (max)	138-238
Employment	63,193 to 328,013	0.5 to 1.0 FAR	3 to 6	31,500 sf to 223,844 sf	2/1000 sf (max)	64 to 449
Retail	----	Bldg. Ground floor	3	5,000	2.5/1000 sf (max)	13
Open Space	96,000	—	—	---	—	—
Park	84,000	—	—	---	—	—
New Roads	83,000	—	—	3,150 LF	—	—
WEST of BRT GUIDEWAY						
Multifamily (HD)	204,200	50 du/ac	6	232	1.5/unit (max)	348
Employment	94,300	1.0 FAR	6	94,300 sf	2/1000 sf (max)	189
Retail	38,000	.5 FAR/ Bldg. Ground floor	3	20,000 sf 5,000 sf	2.5/1000 sf (max)	63
Park & Ride	51,250	—	—	—	—	100
Station Plaza	26,000	—	—	—	—	—
Natural Area (Existing)	455,000	—	—	—	—	—
New Roads	83,000	—	—	1,140 lf	—	—
Crossroads Prop. (Existing)	335,300	—	—	—	—	—

* Totals represent an approximation of areas, units and spaces

FIGURE 5. BUILD-OUT DIAGRAM



Station Location	Retail/Commercial
Park-and-ride	Multi-Family Medium Density
Guideway	Multi-Family High Density
Existing Open Space	Flex (Multi-Family or Flex Office)
Water Body	Professional Office
Existing Building	Enhanced Open Space and Trails
Existing Parcel	Parks and Open Space
Parking	Plaza

Not to Scale

GATEWAY CORRIDOR GOLD LINE BRT

LAND USE FRAMEWORK

The land use framework diagram illustrates the new development patterns and identifies the types of station area uses. On many parcels, a mix of vertical uses is suggested. Where parcels contain a vertical mix of uses, the most likely predominant land use is indicated. Predominant uses have been sited and categorized into ‘subareas’ to:

- Maximize development potential based upon existing adjacent uses adjacencies and site attributes.
- Maximize utilization of existing and planned improvements such as planned BRT within street rights-of-way, stormwater, and other utilitiesRespond to a conceptual short-term and long-term development strategy.
- Provide flexibility to respond to possible changing market conditions.

MULTI-FAMILY RESIDENTIAL

The Helmo Station area offers the opportunity for a significant amount of multi-family development with direct access to BRT. A range of multi-family housing types, including apartments and townhomes, provides development flexibility and is arranged with the highest intensity at the station and lower intensity adjacent to existing neighborhoods.

PARKS AND OPEN SPACE

New parks and open space enhancements are centrally located within the station area to serve as an amenity for multi-family housing development and to provided facilities for existing neighborhoods.

RETAIL/COMMERCIAL

A limited amount of retail concentrated at the Helmo Station provides daily activity and is supported by existing area residents, new multi-family and employment uses, and direct, convenient auto access from Helmo Avenue and the future Helmo Avenue/BRT bridge.

EMPLOYMENT

Employment uses consist of traditional professional office and flex office, such as office/research and development/ light manufacturing, on sites visible from 1-94 and adjacent to existing office uses with direct access and visibility from drive-by traffic from 4th Street.

PARK-AND-RIDE

One hundred commuter parking spaces is needed to serve the Helmo Station and is anticipated to be located south of the station, adjacent to Helmo Avenue/BRT bridge.

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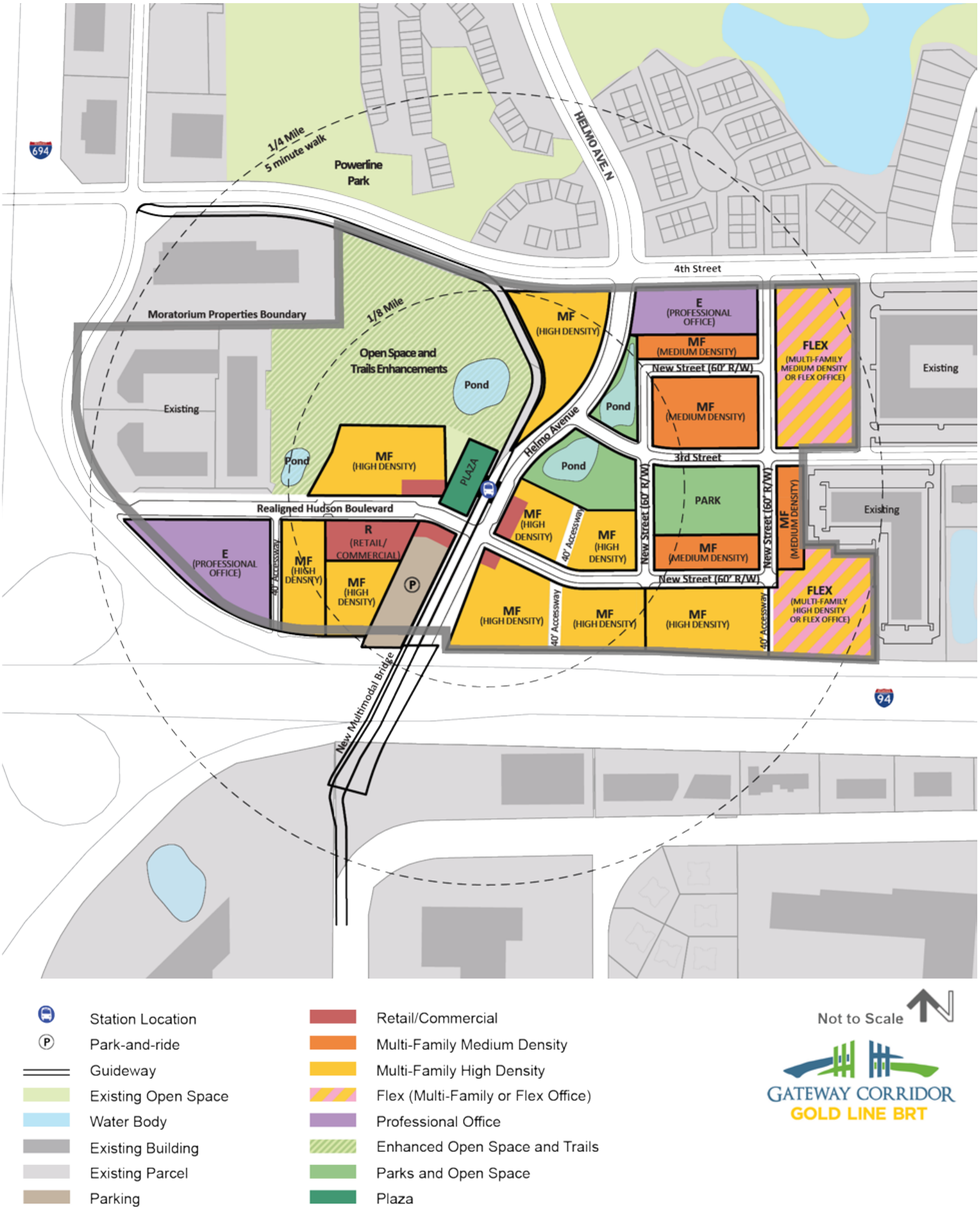
FIGURE 6. LAND USE FRAMEWORK



MULTI-FAMILY RESIDENTIAL

The housing blocks provide for a range of multi-family housing opportunities, from affordable apartments, townhomes, and senior housing, to market rate apartment blocks.

Residential development within the station area meets the following essential real estate criteria for successful housing development:

- **Proximity—**Housing development surrounding the BRT station provide ready transit access for those commuting to destinations such as the Woodbury Village Shopping Center, Battle Creek and Mounds parks, as well as, downtown St Paul.
- Amenity—The sites are located adjacent to a neighborhood park, and large open spaces with access to area multi-use trails, parks and the golf course. Additional housing blocks will front the relocated BRT station with access to daily needs goods and services.
- Jobs-Housing Balance—With BRT, the station area becomes an attractive location and opportunity to live close to jobs such as 3M, and close-by office development across I-94 in Woodbury, thereby enabling them to save time and money commuting.

GENERAL DEVELOPMENT CHARACTER

- Development should avoid an institutional, repetitive, 'apartment complex' character. Multiple developers and design teams should be fostered to ensure variety and interest.
- Development should front the BRT station or the neighborhood park to create a more urban street edge that defines and creates a vibrant pedestrian friendly public realm. Primary building access/lobbies should be from the street, green spaces, or pedestrian corridors rather than directly from internal parking lots or structures.
- Parking should be located behind, within buildings, or in structures where feasible. Design techniques that minimize parked car visual impacts from streets and the disruption of the pedestrian environment should be fostered.
- Along Helmo Avenue and the realigned Hudson Boulevard, buildings should be oriented with windows, doors and lobby entries facing toward the street and BRT station.

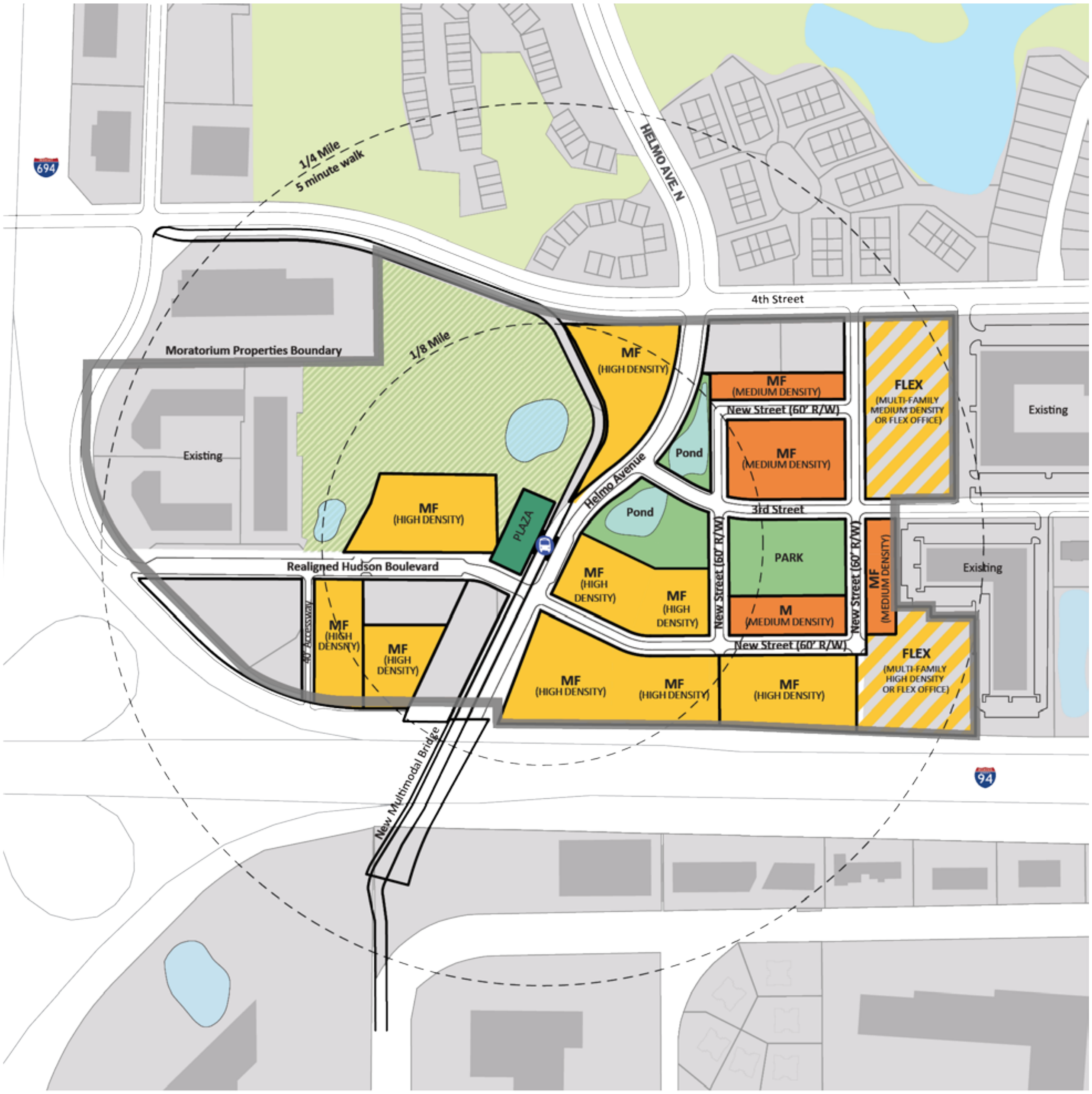
DEVELOPMENT DETAIL

Table 2 indicates the recommended density, height, parking requirements for medium and high-density housing. Additional requirements are identified in the Implementation chapter of the plan.

TABLE 2. MULTI-FAMILY DEVELOPMENT SUMMARY

USE	LAND AREA	DENSITY	HEIGHT	DEV. TOTAL	PARKING	PARKING TOTAL
	square feet (sf)	FAR | du/ac	Stories (max)	# of Units Bldg. (sf) Road (lf)	Spaces/unit Spaces/1000 sf	Spaces
EAST of BRT GUIDEWAY						
Multi-family (HD)	491,633 to 611,290	30-50 du/ac	3 to 6	484-594 units	1.5/unit (max)	726 to 891
Multi-family (MD)	184,250 to 330,000	15-24 du/ac	3	69-119 units	2/unit (max)	138-238
WEST of BRT GUIDEWAY						
Multifamily (HD)	204,184	30 -50 du/ac	4 to 6	232	1.5/unit (max)	348
* Totals represent an approximation of areas, units and spaces.						

FIGURE 7. RESIDENTIAL LAND USE FRAMEWORK



Station Location
Guideway
Existing Open Space
Water Body
Existing Building
Existing Parcel
Multi-Family Medium Density
Multi-Family High Density
Flex (Multi-Family or Flex Office)
Enhanced Open Space and Trails
Parks and Open Space
Plaza

Not to Scale N

GATEWAY CORRIDOR
GOLD LINE BRT

PARKS AND OPEN SPACE

New parks and open spaces are centrally located to serve station area development. These parks and open spaces are intended to be accessible to the immediate development and the community, enhancing the quality of life and promoting community health.

NEIGHBORHOOD PARK

A new neighborhood park and enhanced stormwater ponds act as a focal point for new development and provide both active/passive recreational opportunities for new residents and adjacent neighborhoods. Elements of the park and enhanced ponds include:

- A 1.93-acre park located south of 3rd Street and east of the existing Oaks Business Park stormwater pond is envisioned to include passive areas with a large open lawn and walkway with perimeter landscaping; small plaza/seating area; and some active areas with children's play equipment and possible half basketball court.
- 2.21 acres of existing stormwater ponds (3rd Street and Helmo Avenue) are envisioned as a passive setting with increased tree cover, benches, perimeter landscaping and pathways.

OPEN SPACE ENHANCEMENTS

Much of the site east of the planned BRT bus guideway is natural area (10. 48 acres), with a stream, wildlife and open space. Two stormwater ponds are located on the south and eastern edges of the site. Preservation of the natural area is desirable, as is inclusion of a walking and biking trail connecting with the Powerline Line Park trail on the north and the Helmo Station platform. Elements of the open enhancements include:

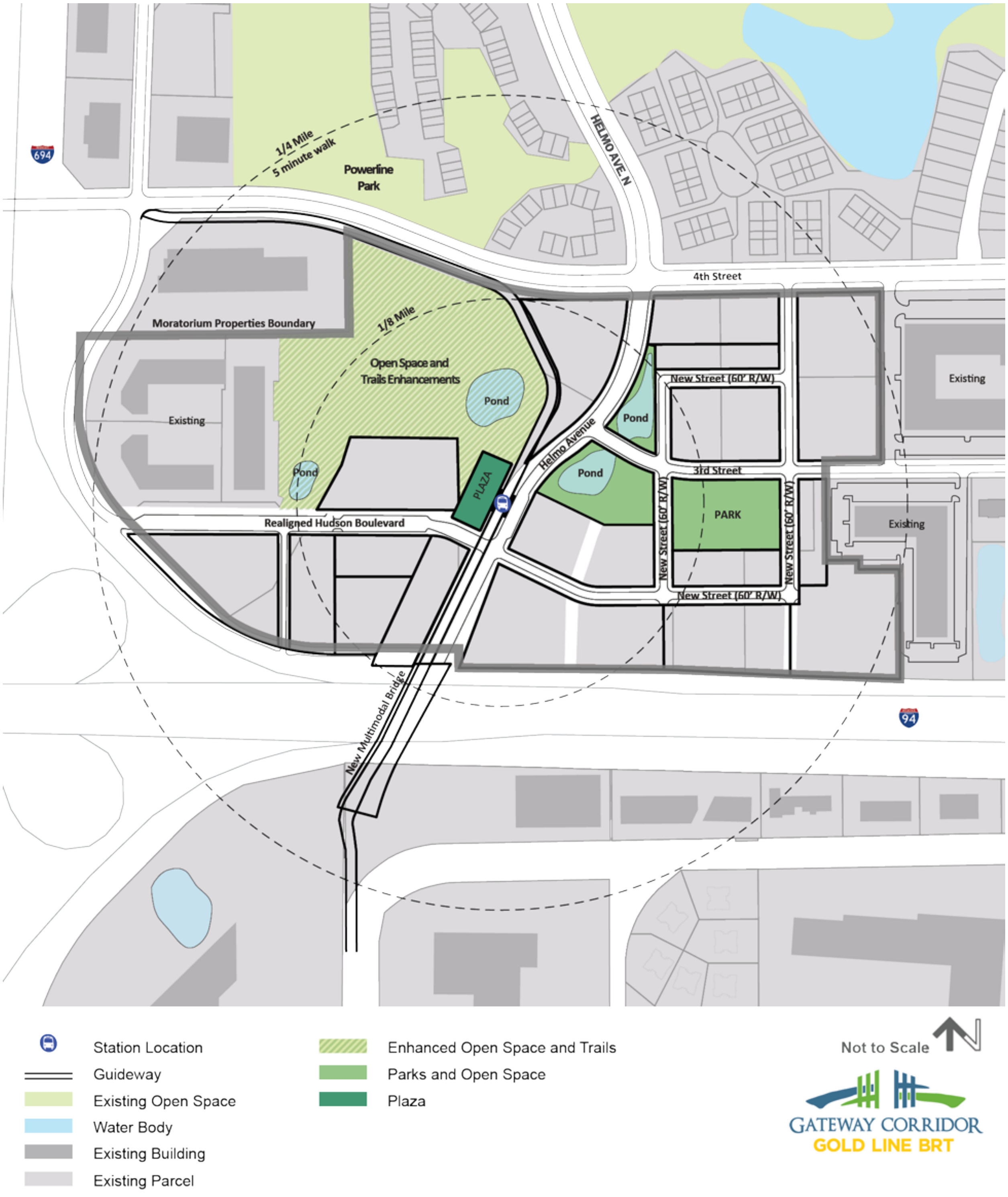
- A 10-foot wide (minimum) asphalt or compacted crushed gravel trail (approximately 1,550 linear feet) connecting the Helmo Station BRT platform to the existing Powerline Park trail entrance on 4th Street located approximately 675 feet west of the Helmo Avenue and 4th Street intersection.
- A small overlook or viewing area located between the large pond and 4th Street. This area currently includes a mature stand of trees on a flat high point adjacent to 4th Street.

STATION PLAZA

At the Helmo Station, a plaza is intended to serve as an attractive pass-through area for BRT passengers and as a public gathering space between the station and new storefront retail and commercial uses on the edges. The plaza design and its function will need to be coordinated between the City and Metro Transit for final determination of the design and use. Elements of the plaza could include:

- A primarily paved area to allow for pass through and flexibility for assembly of staged events/activities and daily use gathering and social interaction.
- Amenities such as fixed or moveable seating, tables, and lighting; canopy trees to provide shade and tree cover and possible perimeter plantings or planters to increase visual interest and quality of the public space.
- Public art integrated with the BRT station and shelter design.
- Consolidated bicycle parking and/or a bike station (covered or enclosed building) with secure bike parking, possibly showers/restrooms, lockers and ancillary uses such as repair services or a café. A private or public vendor may operate the facility. Daily fees or monthly/annual membership fees may be required to access part or all of the facility.

FIGURE 7. PARKS AND OPEN SPACE FRAMEWORK



RETAIL/COMMERCIAL

Ground-floor retail and commercial uses are envisioned within single-use and mixed-use buildings oriented to the Helmo Station. A limited amount of retail and commercial development anticipated at the Helmo Station meets the following essential real estate criteria:

- Proximity — the sites are located within mixed-use housing development, and adjacent to commuters entering and existing the Helmo BRT station to the adjacent park-and-ride.
- Good visibility — with construction of the Helmo Avenue multi-modal bridge (car, bike, bus and pedestrian) the sites are located adjacent to a significant increase in drive-by exposure from Helmo Avenue
- Access — located at the intersection of the planned Helmo Avenue bridgehead and the BRT Station ground-floor retail and commercial uses will benefit from activity both in terms of walk and biking as well as drive-by traffic along Helmo Avenue

GENERAL DEVELOPMENT CHARACTER

- Buildings should front primary streets, such as the realigned Hudson Boulevard and Helmo Avenue, to create an urban street edge that defines a pedestrian friendly public realm. Primary building access should be oriented to the street, green spaces, or pedestrian corridors rather than to internal parking lots or structures.
- Parking should be located behind or within buildings, or in structures where feasible. Design techniques that minimize parked-car visual impacts from streets and the disruption of the pedestrian environment should be fostered.
- Retail should be pedestrian-oriented. Curbside parking will be required along the realigned Hudson Boulevard and portions of Helmo Avenue where ground-floor retail uses occur. This will require careful consideration of 'right-sized' travel lane widths (11' maximum) and the elimination of dedicated right-turn lanes. If constructed, dedicated right-turn lanes will negatively impact retail, commercial, and transit access for pedestrian and bicycles and will likely preclude the ability to provide the curbside parking that is vital for the success of commercial and retail development.

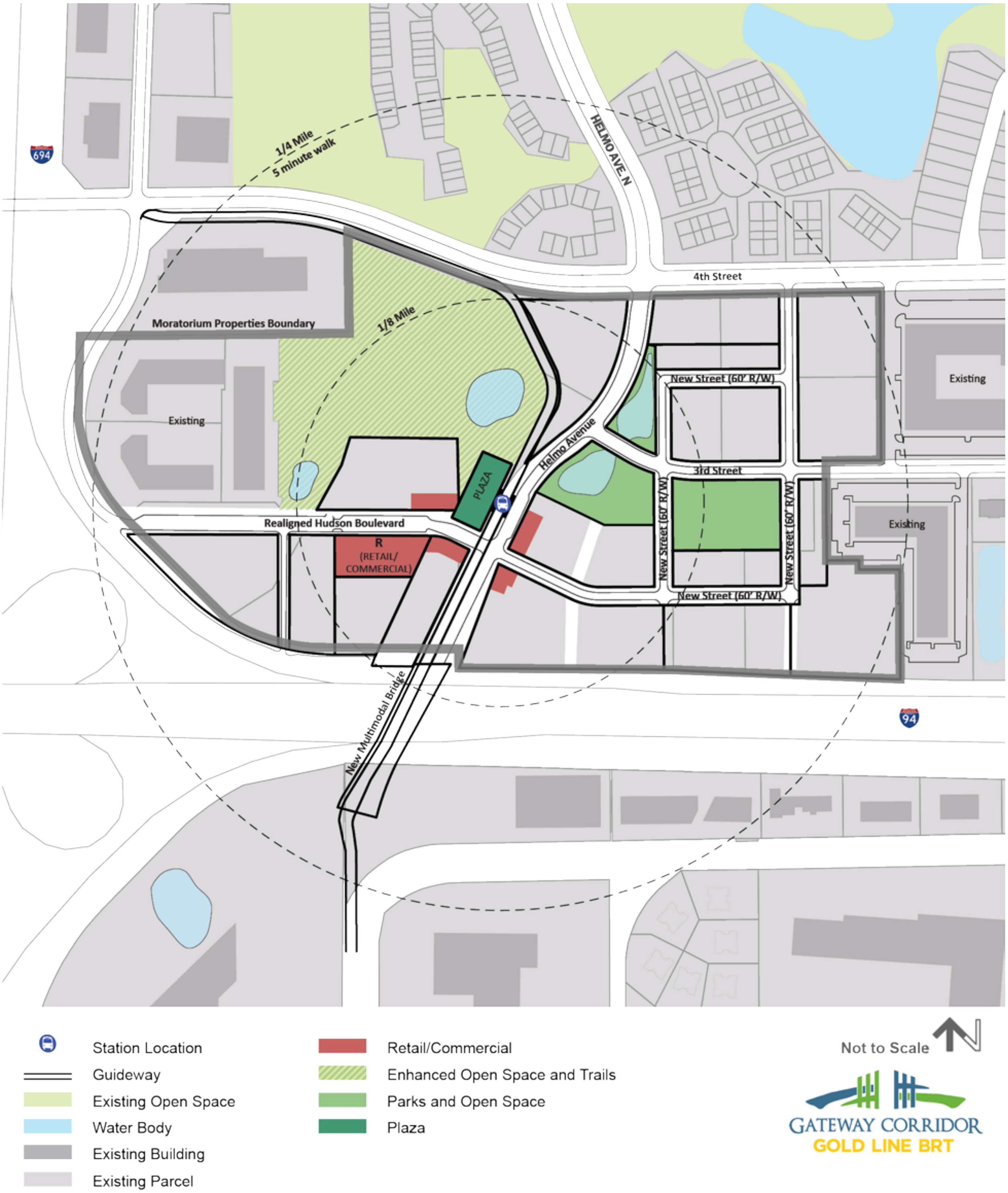
DETAIL

Table 3 indicates the recommended density, height, parking requirements for retail and commercial development. Additional design standards for development are identified in the Implementation Chapter.

TABLE 3. RETAIL DEVELOPMENT SUMMARY

USE	LAND AREA	DENSITY	HEIGHT	DEV. TOTAL	PARKING	PARKING TOTAL
	square feet (sf)	FAR | du/ac	Stories (max)	# of Units Bldg. (sf) Road (lf)	Spaces/unit Spaces/1000 sf	Spaces
EAST of BRT GUIDEWAY						
Retail	----	Bldg. Ground floor	---	5,000	2.5/1000 sf (max)	13
WEST of BRT GUIDEWAY						
Retail	38,000	.5 FAR/ Bldg. Ground floor	---	20,000 sf 5,000 sf	2.5/1000 sf (max)	63
* Totals represent an approximation of areas, units and spaces.						

FIGURE 8. RETAIL LAND USE FRAMEWORK



EMPLOYMENT

Traditional professional offices, multi-story office buildings, and flex office/light manufacturing sites allow for a range of potential future employment uses and complement the existing Oaks Business Park. Office sites meet the following essential real estate criteria:

- Proximity—Sites are located adjacent to the existing Crossroads Properties and the Oaks Business Park within a ¼ mile (five-minute) walk to/from the station.
- Good visibility—Sites are provided with good visibility from the I-94 corridor and the primary east/west auto route along 4th Street.
- Access—Sites are easily accessible from primary access routes along 4th Street, a realigned Hudson Boulevard, and Helmo Street.

GENERAL DEVELOPMENT CHARACTER

- Buildings should front primary streets such as 4th Street and the realigned Hudson Boulevard to create an urban street edge that defines a pedestrian friendly public realm. Primary building access/lobbies should be oriented to the street, green spaces, or pedestrian corridors rather than internal parking lots or structures.
- Parking should be located behind, within buildings, or in structures. Design techniques that minimize parked car visual impacts from streets and the disruption of the pedestrian environment should be fostered.
- Parking structures should be wrapped by office buildings or screened by landscaping or other means.
- Buildings are set back along 4th Street to allow for a perimeter landscape zone that complements existing development on the north side of the roadway.

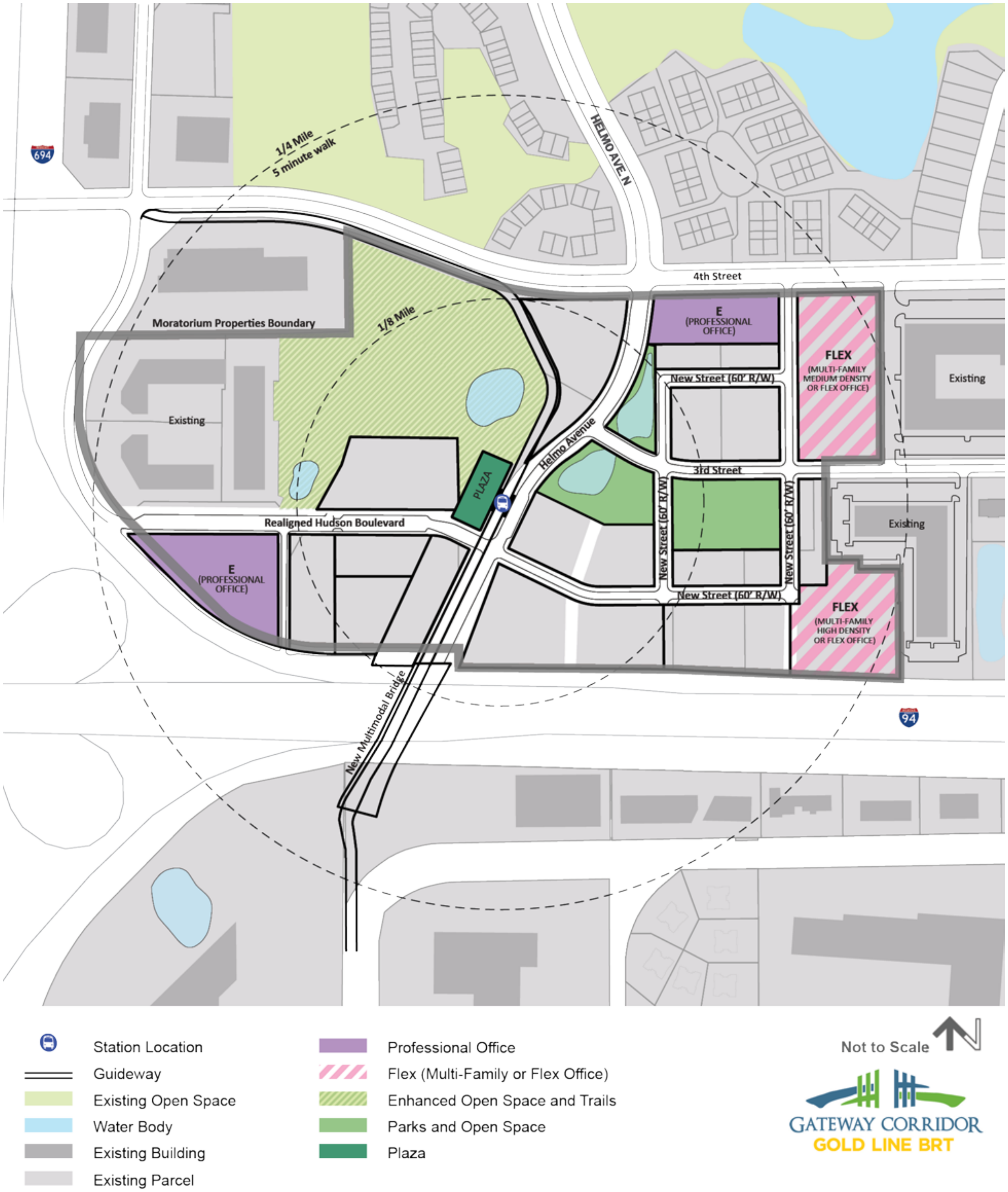
DETAIL

Table 4 indicates the recommended density, height, parking requirements for retail and commercial development. Additional design standards for development are identified in the Implementation Chapter of the plan.

TABLE 4. EMPLOYMENT DEVELOPMENT SUMMARY

USE	LAND AREA	DENSITY	HEIGHT	DEV. TOTAL	PARKING	PARKING TOTAL
	square feet (sf)	FAR | du/ac	Stories (max)	# of Units Bldg. (sf) Road (lf)	Spaces/unit Spaces/1000 sf	Spaces
EAST of BRT GUIDEWAY						
Employment	63,193 to 328,013	0.5 to 1.0 FAR	3 to 6	31,500 sf to 223,844 sf	2/1000 sf (max)	64 to 449
WEST of BRT GUIDEWAY						
Employment	94,300	1.0 FAR	6	94,300 sf	2/1000 sf (max)	189
* Totals represent an approximation of areas, units and spaces.						

FIGURE 9. EMPLOYMENT LAND USE FRAMEWORK



BRT PARK-AND-RIDE

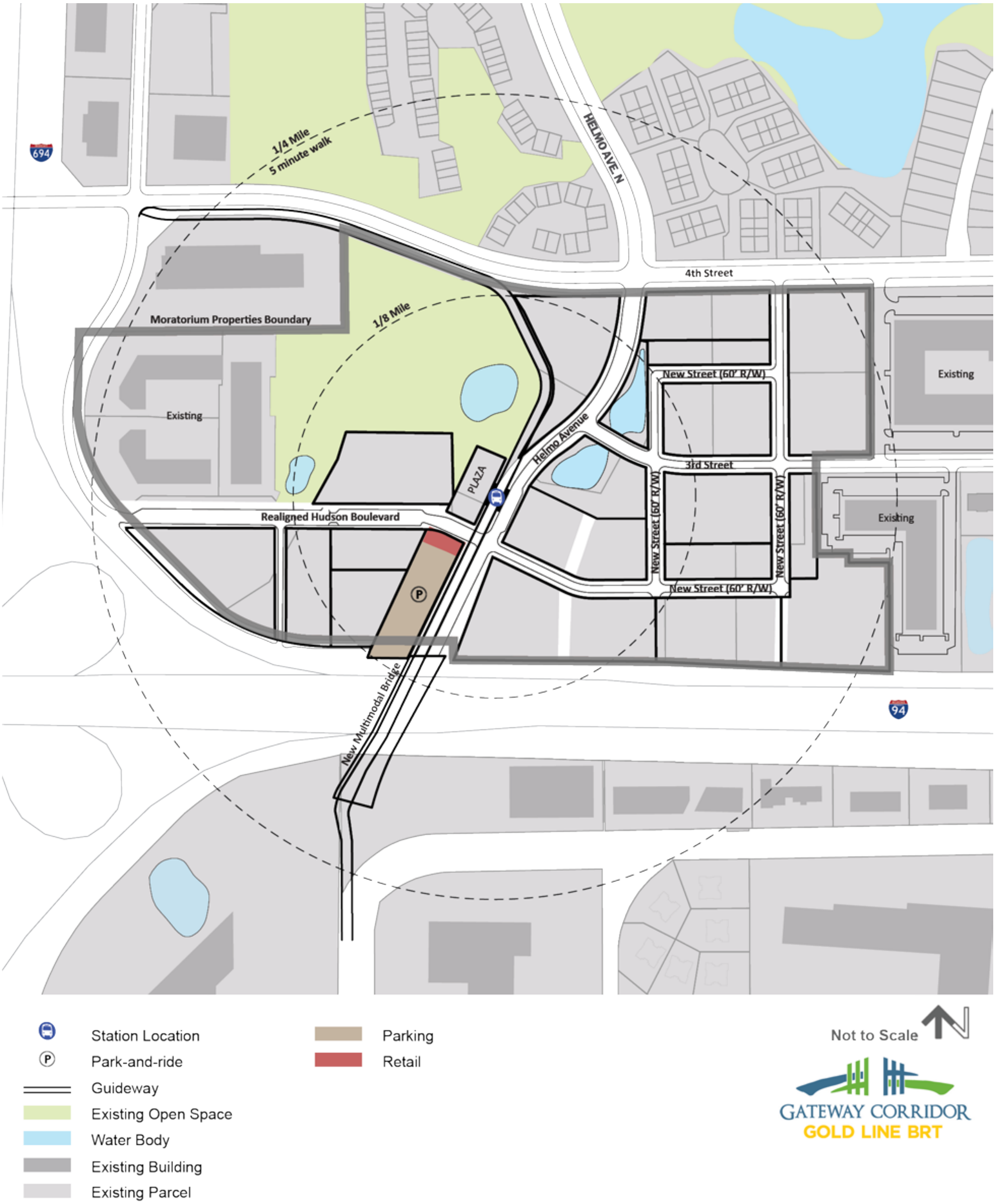
Adequate parking for transit patrons will help to discourage overflow parking in adjacent neighborhoods. The recommended location for the park-and-ride accommodates the 100 spaces identified for commuter use. The park-and-ride location and site configuration meet the following essential real estate criteria:

- Configuration—The site is large enough to support an efficient floor plate and has a significant slope from north to south that would be advantageous for structured parking. While a surface parking lot is likely to be built in the near term, future consideration of a shared-use parking structure would allow for increased development intensity on adjacent sites and ensure the long-term vitality of professional office and retail/commercial uses.
- Access—The site has direct access from the realigned Hudson Boulevard and Helmo Avenue. With multiple routes into and out of the site, traffic congestion can be dispersed rather than concentrated along Helmo Avenue.
- Proximity—The site is centrally located within the station area to serve the BRT station park-and-ride commuters and professional office and retail/commercial uses.

GENERAL DEVELOPMENT CHARACTER

- Retail and commercial sites with a minimum dimension of 30 feet and oriented to the realigned Hudson Boulevard should be reserved along the north side of the park-and-ride to ensure an active station environment and the continuation of retail and commercial storefronts along the street.
- Primary park-and-ride access should be located on the rear of the site along the existing Hudson Boulevard and below the planned future Helmo Avenue bridge. Depending on the bridge construction, additional parking could be considered underneath the span of the bridge

FIGURE 10. PARKING LAND USE FRAMEWORK



MARKET SUMMARY

The findings of the Maxfield Research market analysis indicate that the station can support transit-oriented development anchored by housing and active green space as envisioned in the plan. There is strong demand for housing in the station area, and for additional commercial opportunities.

MARKET DEMAND

The Helmo Station area is semi-developed, with townhomes to the north of 4th Street, most dating to the 1990s, and office and warehouse development south of 4th Street that dates to the 1990s and 2000s. Several acres of land remain undeveloped in the immediate station area, offering a very good opportunity to create transit-oriented development.

Multi-Family Housing

Up to 1,100 rental housing units can be divided into demand for 500 market rate apartments, 200 affordable apartments, 200 market rate senior apartments, 100 affordable senior apartments, and 100 for-sale townhomes

There is likely demand for 150 market rate apartments immediately, as shown in Table 5. In addition to proposed transit connections as part of the Gateway Corridor project, the station area has good freeway connections to Metro Area employment opportunities and good access to nearby retail amenities and parks and open space. Rents for market rate apartments would range from $1,000 per month for a studio to $2,500 for a three-bedroom unit.

Affordable rental apartment demand is relatively strong in much of the Twin Cities, and affordable apartments would perform well in the Helmo Station area, provided financing can be acquired through the tax credit program. Access to transit service adds to the potential for securing financing for affordable housing in the station area. Demand for 200 units is likely a conservative estimate. Rents for affordable apartments would vary by qualifying income level by AMI.

Senior housing is an attractive option for the site, which could support up to 200 market rate units and 100 affordable units. Market rate senior projects covering the continuum of care have performed well in Oakdale and Woodbury, including the nearby Oak Meadows. Monthly rents for independent senior living could range from $1,200 for a one-bedroom to $2,500 for a two-bedroom plus den. Assisted living rents would range from $3,500 for a studio to $5,000 for a two-bedroom. There is an undersupply of affordable senior housing in the area, and that which exists is preforming well. Rents would vary by income.

For-sale housing has rebounded and several developments in Oakdale, Woodbury, and Lake Elmo are selling townhomes, villas, and detached townhomes. There is likely demand for at least 100+ units in the Helmo Station area to round out the mix of housing. Side-by-side row townhomes could range from $300,000 to $425,000 plus buyer upgrades.

Commercial

Commercial space has demand for up to 150,000 square feet, including 30,000 square feet of retail, possibly 45,000 square feet of office and as much as 75,000 square feet of medical office space.

Station area development as shown in Table 5 will likely support the addition of as much as 30,000 square feet of retail space starting in 2020. Retail demand is likely limited to demand created by housing and office in the immediate area. Potential rents for retail space range from $22 to $30 per square foot and will primarily include national tenants who can afford these lease rates.

New office development anywhere in the Twin Cities is mostly limited to build-to-suit users, and speculative office is rare. As a result, the potential for office development at the Helmo Station area is likely limited to companies that choose the location for its transit access and likely won't exceed 45,000 square feet. Overall, the office market remains the weakest product type in the Twin Cities Metro Area.

Medical office development is a likelihood in the Helmo Station area. Several recent or proposed medical office developments in Woodbury and Lake Elmo are part of a broader trend of medical office development across the Twin Cities. Up to 75,000 square feet of development are possible on site. Achievable rents range from $22 to $28 per square foot.

TABLE 5. PRICING/RENTS BY PROPERTY TYPE

Property Type	Total Supported Units/Sq. Ft.	Initial Pricing/Rents (2017 Dollars)
Apartments - Market Rate	**600**	$1,000 for studio to $2,500 for 3BR/per month
Apartments - Affordable	**200**	Rent based on household income qualification
Senior - Market Rate	**200**	$1,200 independent living to $5,000 assisted living
Senior - Affordable	**100**	Rent based on household income qualification
Townhomes - For Sale	**100**	$300,000 to $425,000
Retail	**30,000**	National tenants; $22 to $30 PSF
Office	**45,000**	* - little multi tenant demand; demand from owner/user, build-to-suit
Medical Office	**75,000**	$22 to $28 PSF

POTENTIAL PHASING

Table 6 shows development potential in phases for the Helmo Station area. The table is broken down by development type, including market rate apartments, affordable apartments, senior apartments, affordable senior apartments, for-sale townhomes, retail space, office (multi-tenant) and medical office. Development potential for each property type is broken down in to four timeframes, including

- Current/immediate potential (years 2018-2019)
- Pre-/during construction (2020-21)
- Post-construction/early operating (2022-2024)
- Mature/long-term (2025 and beyond)

TABLE 6. DEVELOPMENT POTENTIAL BY PHASE

Property Type	Total Supported Units/Sq. Ft.	Immediate 2018-19	2020-2022 (construction)	2023-2025 (post-construction)	2025+ (mature)
Helmo Station Recommendations					
Apartments - Market Rate	**500**	150	150	150	50
Apartments - Affordable	**200**	50	50	50	50
Senior - Market Rate	**200**	0	50	50	100
Senior - Affordable	**100**	50	0	0	50
Townhomes - For Sale	**100**	0	25	25	50
Retail	**30,000**	0	5,000	15,000	10,000
Office (Multi-tenant)	**45,000**	0	0	20,000	25,000
Medical Office	**75,000**	0	25,000	25,000	25,000

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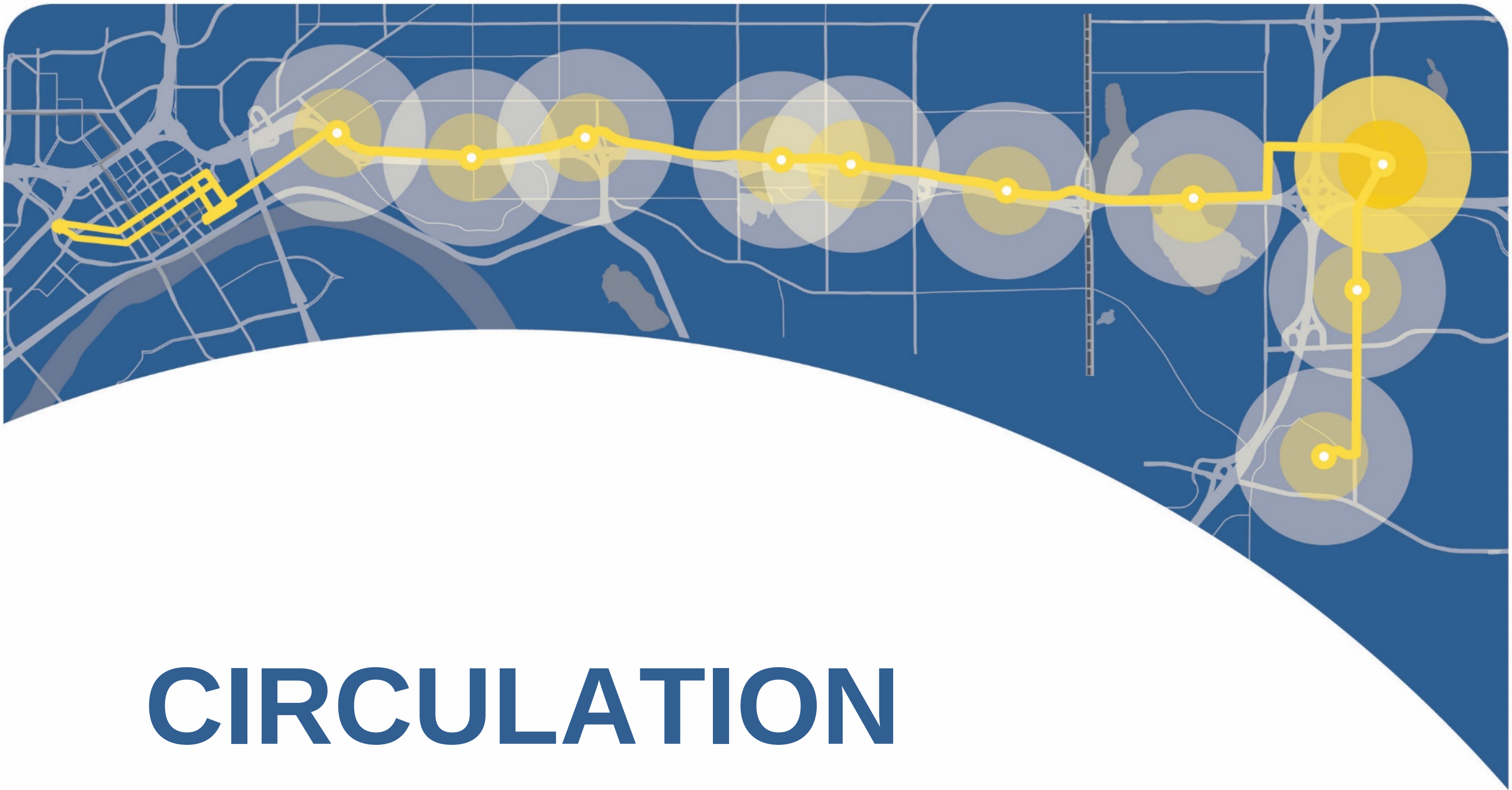


CIRCULATION

GATEWAY CORRIDOR
GOLD LINE BRT

OVERVIEW

The circulation framework identifies a complete network of circulation improvements for safe and convenient access to the Helmo Station. The proposed street network establishes an interconnected street grid that disperses traffic within the station area; improves access to development parcels; and provides the opportunity to moderate the increase in travel lanes on Helmo Avenue and 4th Street. The intent is to provide for adequate auto traffic capacity serving existing and future development while maintaining Helmo Avenue as a three-lane roadway and 4th Street as a two-lane roadway (allowing for turn lanes where necessary at key intersections).

The circulation framework consists of the following elements:

- Modification of Helmo Avenue to include a BRT guideway and multi-use trail on the west side of the street and on the I-94 bridge crossing to Bielenberg Drive.
- A realignment of Hudson Boulevard south of the Crossroads Properties building to provide a direct east/west connection to the Helmo Station/Helmo Avenue bridgehead and to the street grid east of Helmo Avenue.
- New street grid east of Helmo Avenue and south of 4th Street providing direct access to development parcels and existing Oaks Business Park.
- Additional trail segments added or expanded within existing rights-of-way along 4th Street N., 3rd Street, and Helmo Avenue N.

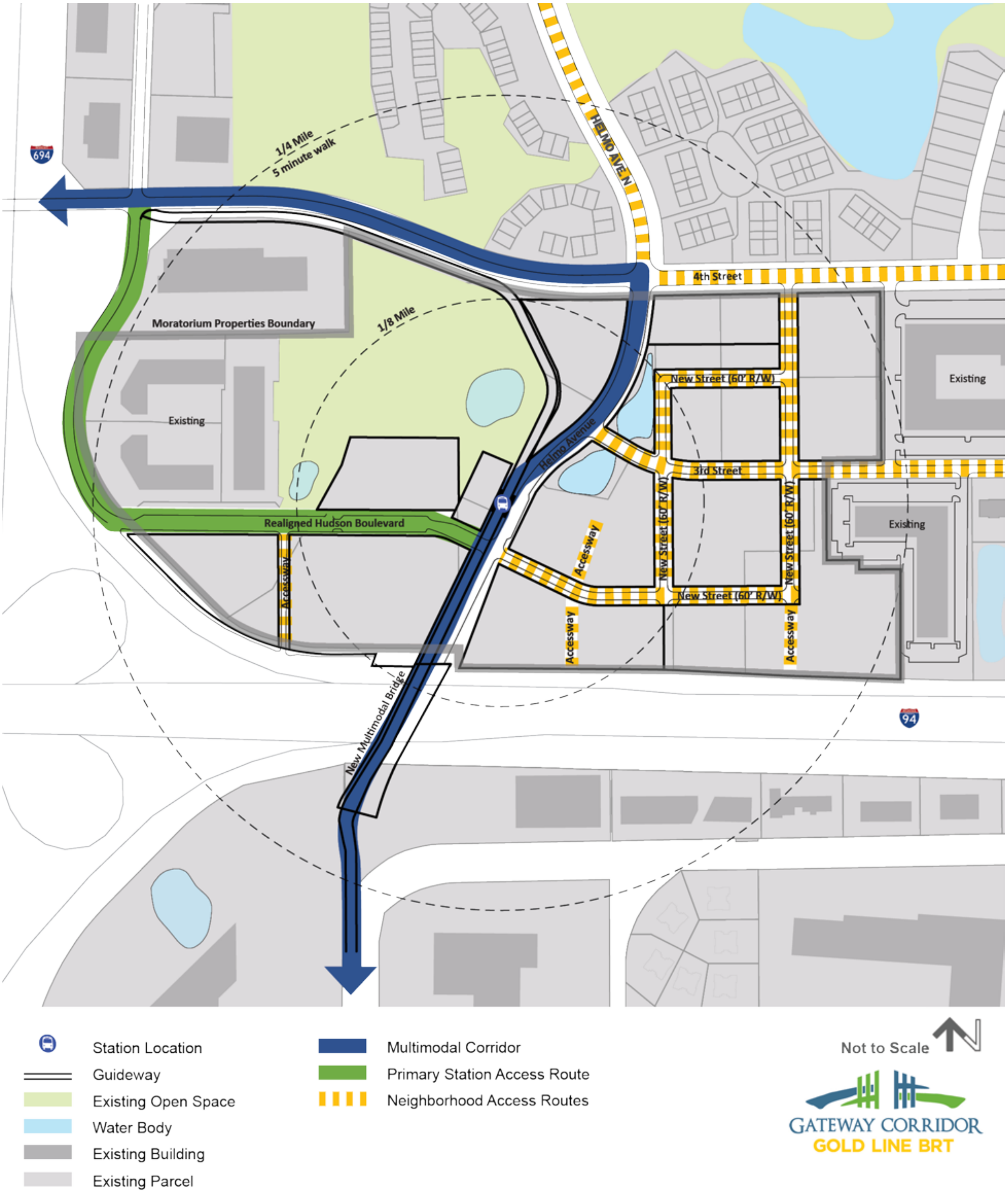
The circulation framework reinforces the Helmo Station as a hub for transit-oriented development through the creation of complete streets where facilities for all modes—auto, truck, transit, pedestrian, and bicycle—are adequately provided. These complete streets include essential auto and service access and 'right-sized' roadway travel lanes to preserve necessary mobility for existing collector and minor reliever roadways, while the new street grid provides access to development parcels on local streets that fosters pedestrian and bicycle friendly mixed-use development.

A hierarchy of streets has been established to address both mobility and adjacent land use needs. The circulation diagram illustrates the street types and locations required to provide station area and development parcel access. It establishes a development context including block scale and massing to support future land uses and a setting for placemaking. These street improvements will contribute to the creation of a distinct and attractive mixed-use transit-supportive district.

The circulation framework consists of three primary circulation components that emphasize safe and direct access to the station and connections to and from destinations outside the half-mile and beyond along the Gold Line BRT alignment. The framework includes:

- Multi-Modal Corridor—A shared walking and biking trail adjacent to the bus rapid transit route.
- Primary Access Routes—Pedestrian and bicycle emphasis streets that provide direct station access and a destination for transit-oriented development.
- Neighborhood Access Routes—A fine-grained street grid supporting pedestrian, bike, and auto access between the station, transit-oriented development sites, and destinations within a half mile.

FIGURE 11. CIRCULATION FRAMEWORK



MULTI-MODAL CORRIDOR

A primary objective of the overall corridor-wide BRTOD Plans project is to integrate walking and biking adjacent to the BRT alignment and connecting BRT stations along the entire corridor.

Within the Helmo Station planning area, a multi-use trail is incorporated into the rights-of-way along Helmo Avenue (north to south from 4th Street to the Helmo Avenue bridge and crossing I-94 to Bielenberg Drive) and 4th Street (east to west from Helmo Avenue to the bridge crossing I-694 to Hadley Avenue N.). Paralleling the BRT route, this multi-use trail will connect to the station at Greenway Avenue to the east and to the Tamarack Station to the south in Woodbury.

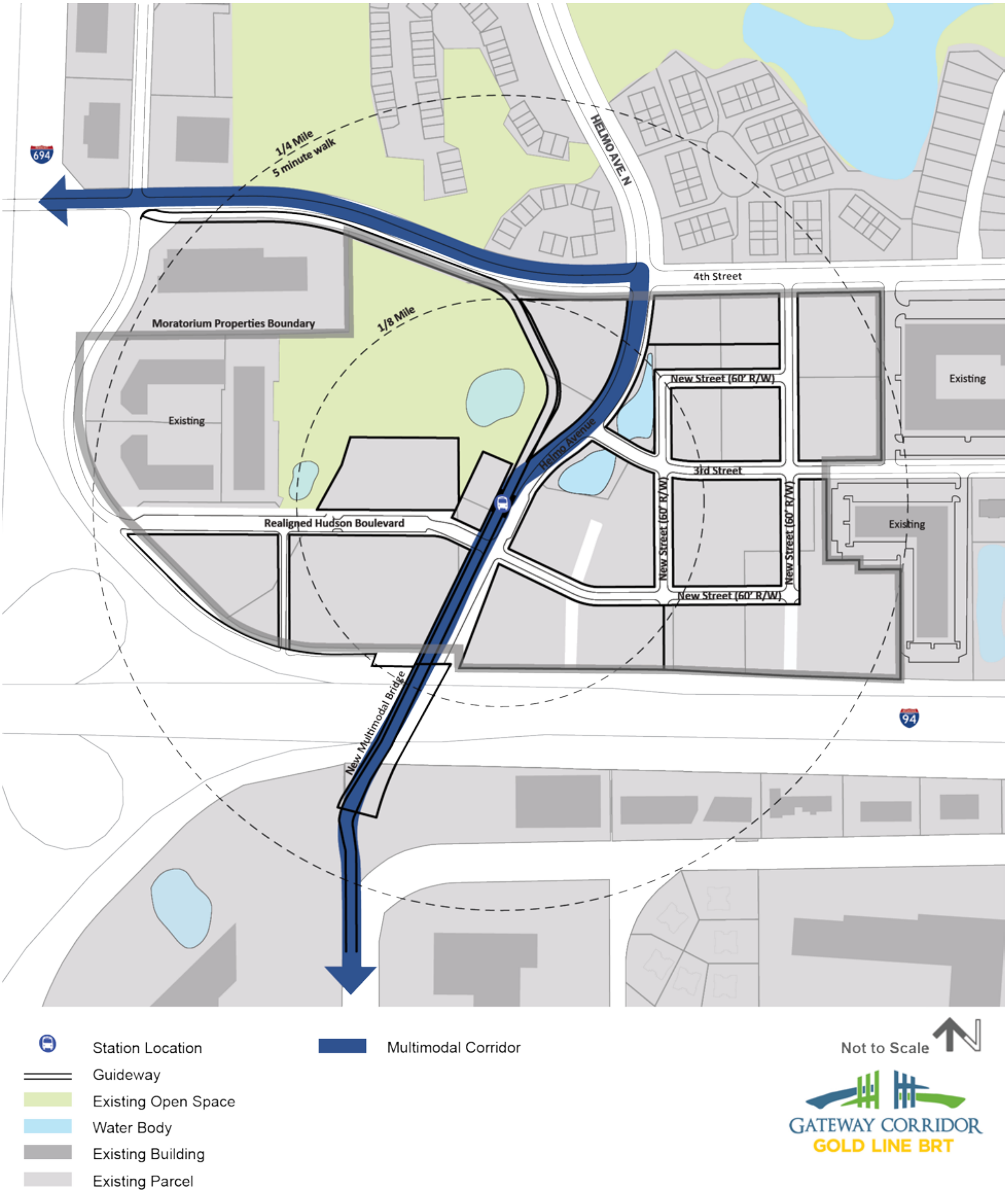
REFINEMENT OF PRELIMINARY ENGINEERING DESIGN

The preliminary design of the 4th Street BRT route included a six-foot sidewalk along the south side of the BRT guideway to the BRT station that transitioned further south to a wider mixed-use trail along the west side of Helmo Avenue and across I-94 into Woodbury. Refinement of the preliminary engineering provides a continuous multi-use trail segment through the station area and ensures direct access to existing trails and sidewalks along Helmo Avenue and 4th Street. The refinement includes the following:

- 12-foot wide multi-use trail along the west side of Helmo Avenue (widening to 16 feet south into Woodbury) connecting the planned Helmo Avenue bridge multi-use trail to an existing 8-foot multi-use trail on the north side of 4th Street.
- Expansion of the existing 8-foot wide trail to a 12-foot wide multi-use trail along the north side of 4th Street from Helmo Avenue to the 4th Street bridge.

Due to budget constraints, it will be necessary for the City of Oakdale to continue to work with Metro Transit and other BRT partners to determine which of the identified trail improvements can be included in their entirety, in part, or not included in the BRT project. Detailed description and section drawings of the multi-use trail along Helmo Avenue N. and 4th Street are shown on the subsequent pages.

FIGURE 12. MULTI-MODAL CORRIDOR FRAMEWORK



HELMO AVENUE N.

Helmo Avenue N. design modifications improve walking and biking access to the station and future development while maintaining auto circulation and vehicular access.

The existing Helmo Avenue right-of-way is 78 feet wide and includes:

- A three-lane roadway (two travel lanes and a continuous turn lane) with curbs.
- A lawn and landscaped boulevard on the west side of the roadway.
- A lawn and landscaped boulevard with a sidewalk on the east side of the roadway.

In anticipation of the BRT guideway and station and future transit-oriented development, the design for Helmo Avenue includes the following roadway modifications and design elements:

- A landscaped boulevard and paved asphalt multi-use trail on the west side of the roadway.
- Pedestrian-scaled street lighting and street trees located between the curb and the trail or sidewalk.
- Restriping of the existing three-lane roadway to include a curbside parking lane on the east side of the roadway. Existing curb-to-curb dimensions allow for addition of the parking lane while maintaining adequate travel lanes.
- A wide sidewalk with landscaping and outdoor seating area adjacent to the curb and parking, supporting future planned retail/commercial storefronts).

4^{TH} STREET N.

Design modifications to 4^{th} Street improve walking and biking access to the station by extending the existing trail on the north side of the roadway east to the 4^{th} Street bridge and to employment uses east of I-694.

The current 4^{th} Street right-of-way is 60 feet wide and includes:

- A two-lane roadway (east/west auto travel) with shoulders.
- A curb, lawn in boulevard, and a portion of an 8-foot paved asphalt multi-use trail on the north side of the roadway. The trail extends approximately 650 feet west of Helmo Avenue and connects to a northbound trail into Powerline Park.

Design for 4^{th} Street N. includes the following roadway modifications and design elements:

- Future widening of the roadway to include an additional turn lane. East/west travel lanes to remain.
- A landscaped boulevard and paved asphalt multi-use trail on the north side of the roadway from Helmo Avenue to the 4^{th} Street bridge, widening the existing trail by 4 feet and extending the trail segment an additional 1,250 feet.
- Pedestrian-scaled street lighting and trees located between the curb and the trail on the north side of the roadway.
- A landscaped boulevard on the south side between the roadway and future BRT guideway.

FIGURE 13. HELMO AVENUE N. (LOOKING NORTH)

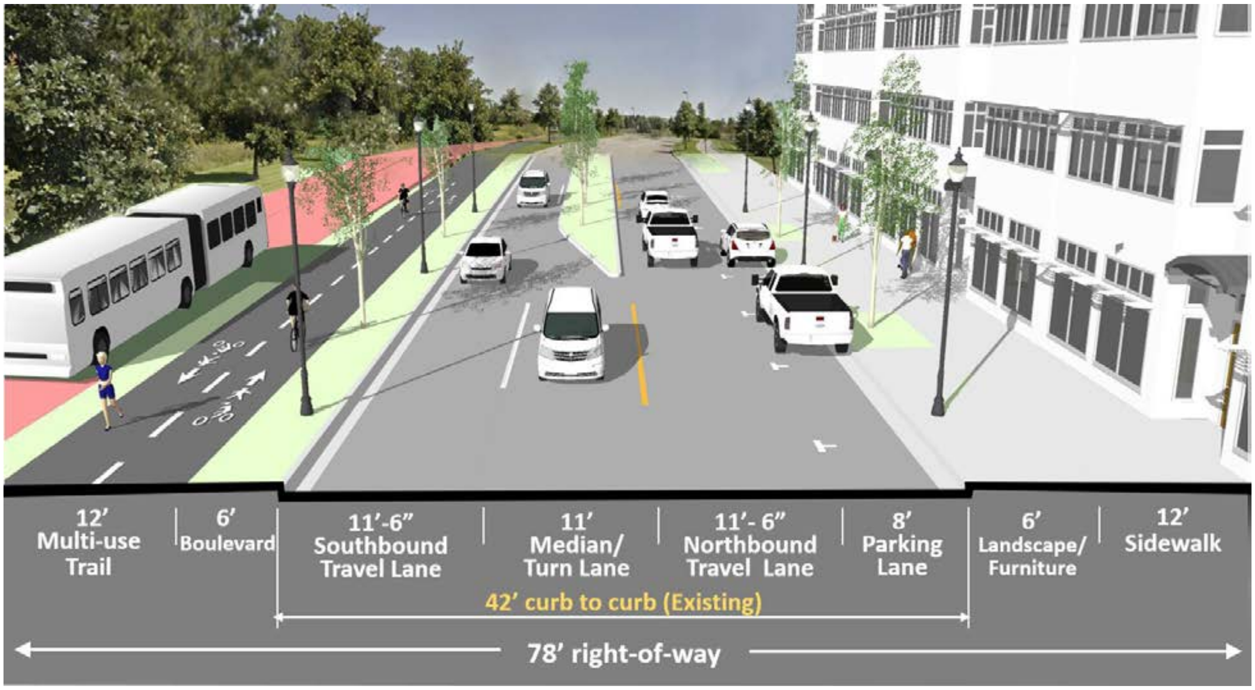
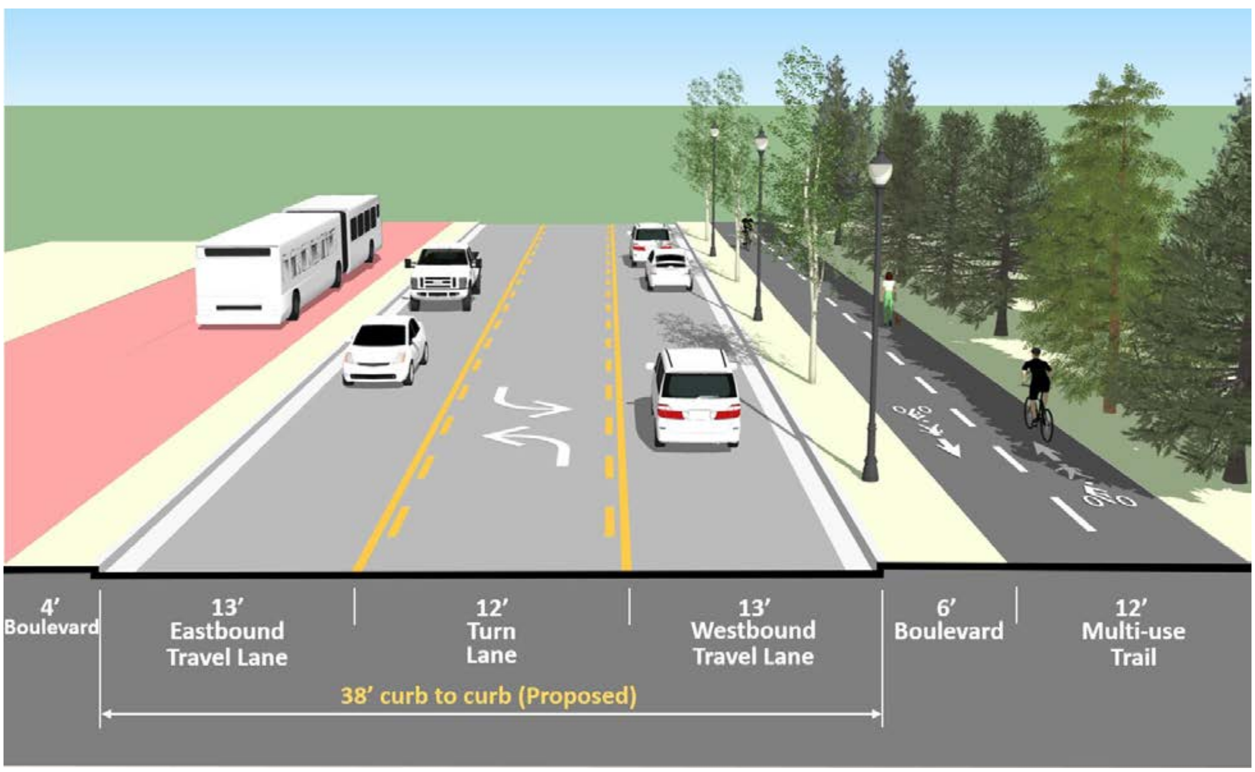


FIGURE 14. 4TH STREET (LOOKING WEST)

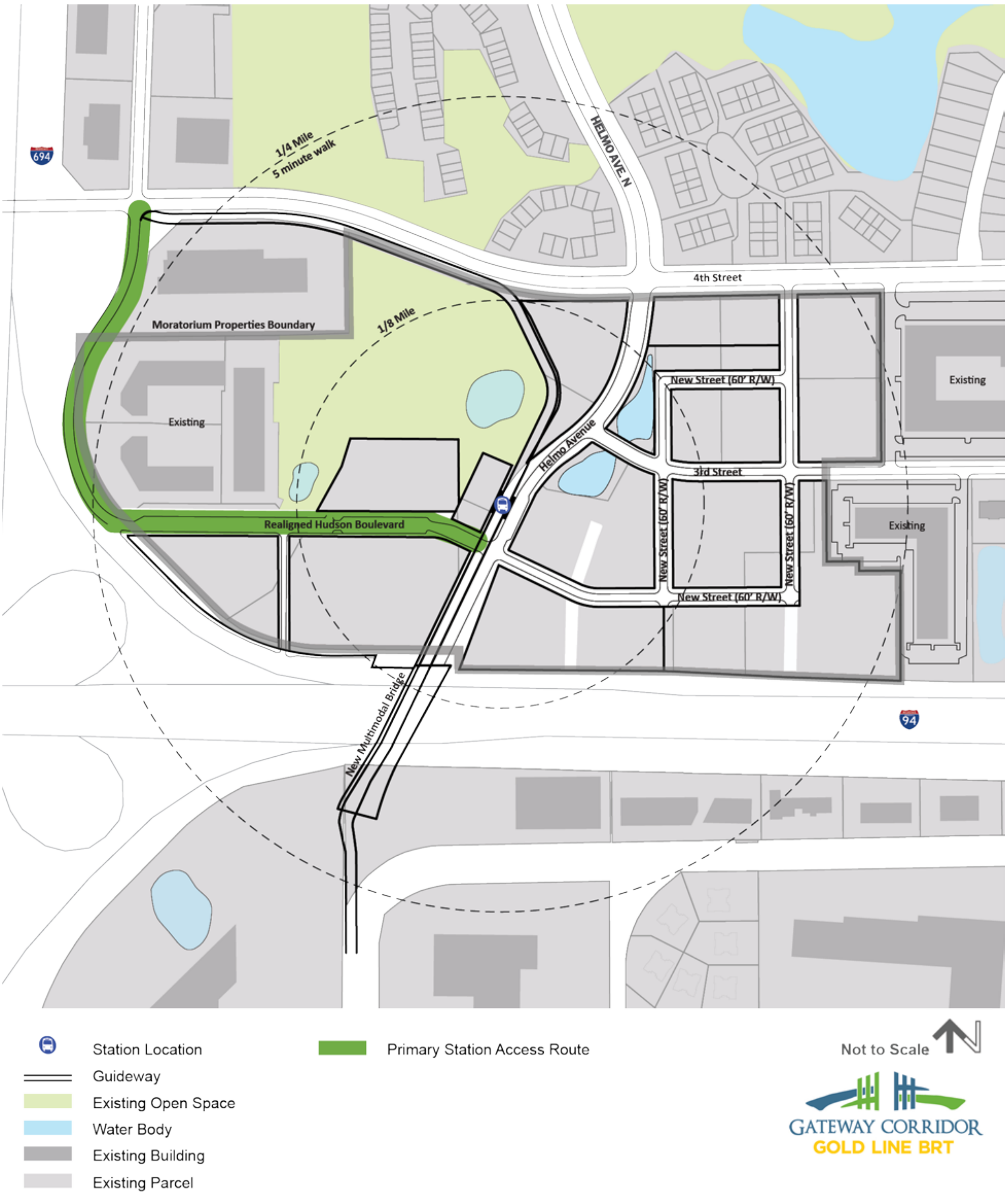


PRIMARY STATION ACCESS

The realignment of Hudson Boulevard improves access to redevelopment sites adjacent to the station and provides a setting for street-oriented development. The realigned roadway will:

- Serve as a primary pedestrian and bicycle access route to the station, linking the concentration of existing employment uses within a five-minute walk of the station with those further north and west of the station along I-694.
- Establish a destination for storefront commercial uses that support an active BRT station environment.
- Provide commuter access to park-and-ride.

FIGURE 15. PRIMARY STATION ACCESS FRAMEWORK



HUDSON BOULEVARD EXTENSION

Today, Hudson Boulevard serves a mix of office and light manufacturing uses and extends from 4th Street south, along the east side of I-694, and continues east to a dead-end between an existing multi-tenant industrial building and I-94.

The realignment of Hudson Boulevard preserves the access and function of existing uses and encourages future transit-supportive development. The existing roadway would remain from 4th Street to the driveway access at the Crossroads of Oakdale office/warehouse building. The roadway would then extend east to Helmo Avenue N. and the location of the BRT station and future bridge crossing of I-94. The existing roadway further south would remain as a service road, providing access to existing uses and future planned park-and-ride and redevelopment.

The design for the new realigned Hudson Boulevard includes the following design elements:

- Two-way roadway with curbside parking on both sides of the street.
- A multi-use trail along the north side of the street, located between curbside parking and a sidewalk with street trees and seating furniture zone.
- Pedestrian-scaled street lighting located between the curb and the multi-use trail.
- A wide sidewalk with landscaping and outdoor seating area adjacent to the curb and parking on the south side of the street.
- Design elements supportive of future planned retail/commercial storefronts.

HUDSON BOULEVARD ENHANCEMENT

Design modifications to the existing Hudson Boulevard, from the realignment north to 4th Street, will improve walking and biking access to the station and future development while maintaining vehicular access.

The current Hudson Boulevard right-of-way includes:

- A two-lane, two-way roadway with shoulders.
- A lawn boulevard on each side of the roadway.
- No sidewalks or bicycle lanes.

Roadway modifications and design elements include:

- No change to the west side roadway shoulder or existing travel lanes.
- A new curb and 6-foot landscaped boulevard on the east side of the roadway with pedestrian-scaled street lighting and street trees located between the curb and a multi-use trail.
- A new 12-foot paved asphalt multi-use trail on the east side of the roadway, located between the landscaped boulevard and the existing Crossroads of Oakdale property.

FIGURE 16. HUDSON BOULEVARD EXTENSION (LOOKING WEST)

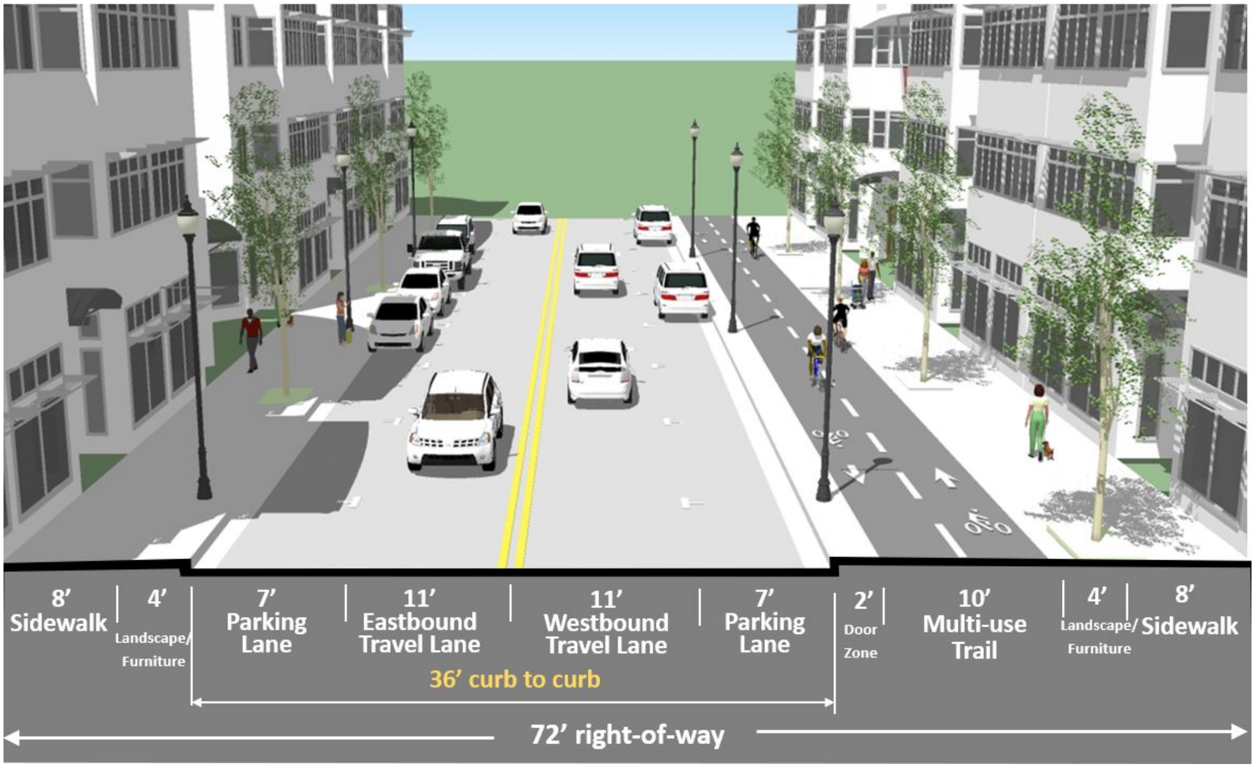
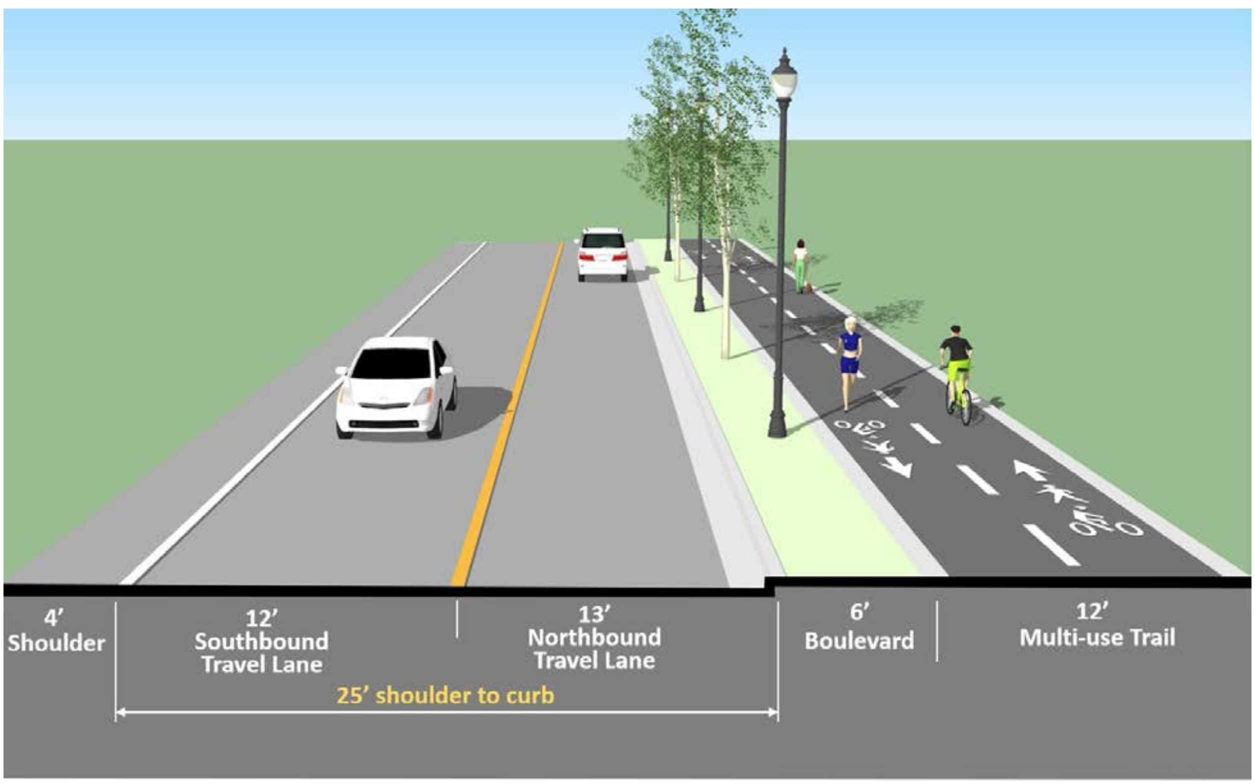


FIGURE 17. HUDSON BOULEVARD ENHANCEMENT (LOOKING NORTH)

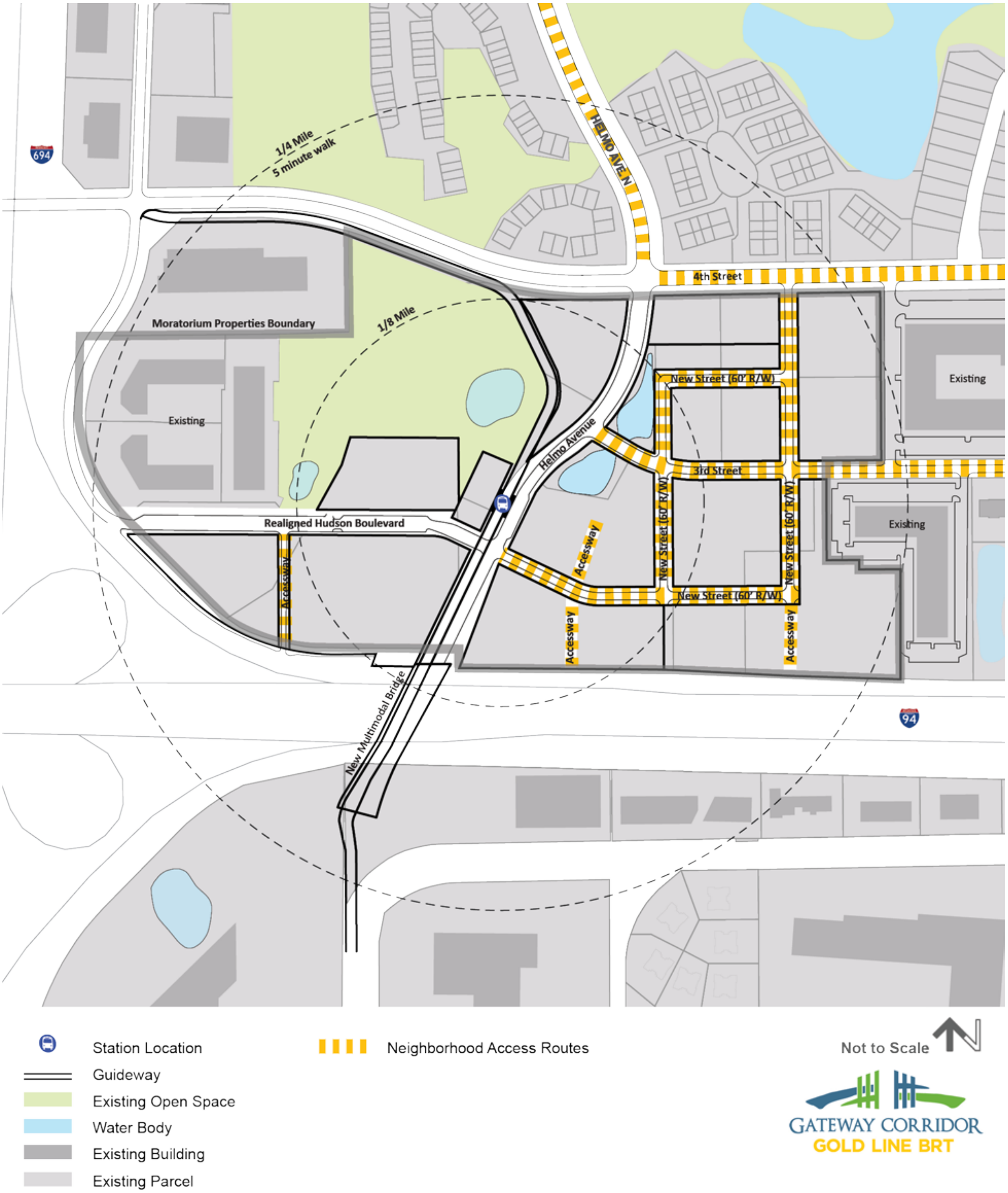


NEIGHBORHOOD ACCESS

Neighborhood access routes include new and enhanced existing streets to serve the following functions:

- Ensure that the mobility of existing arterial streets is not degraded.
- Provide alternate routes for automobiles to disperse traffic away from the intersection of 4^{th} Street and Helmo Avenue N.
- Establish intimately-scaled blocks that support walking and biking to transit, parks/open space, and commercial uses located at the BRT station.
- Minimize impacts on existing neighborhoods with improved walking and biking access to station area destinations.
- Provide direct and convenient access to the future BRT station for all transportation modes.

FIGURE 18. NEIGHBORHOOD ACCESS FRAMEWORK



GATEWAY CORRIDOR
GOLD LINE BRT

ENHANCED EXISTING STREETS

Modifications to 4th Street N. and 3rd Street N. incorporate new and enhanced multi-use trail segments.

4TH STREET N.

4th Street improvements support walking and biking access to the station by widening the existing trail on the north side of the roadway from Helmo Avenue N. east to Radio Drive. Over time, curbside parking can be provided next to future office development along the south side of the street

The current 4th Street right-of-way is 100 feet wide and includes:

- Two travel lanes with curbs and a right-turn lane to existing residential development on the north side of the street.
- A shoulder on the south side of the roadway.
- A curb, lawn in boulevard, and 8-foot trail on the north side of the roadway.

Roadway modifications and design elements include:

- A landscaped boulevard and 4-foot widened asphalt paved multi-use trail on the north side of the roadway.
- Pedestrian-scaled street lighting and street trees located between the curb and the multi-use trail.
- Consideration for restriping the existing three-lane roadway to include a curbside parking lane on the south side of the roadway. Existing shoulder-to-curb dimensions allow for addition of the parking lane and adequate travel lanes for autos.
- A sidewalk with landscaped boulevard on the south side of the roadway could be constructed with future development.

3RD STREET N.

Improvements to 3rd Street N. support walking and biking access to the station and access to neighborhood parks and open space while maintaining local vehicle access.

The current 3rd Street N. right-of-way is 60 feet wide and includes:

- A two-lane, two-way roadway with curbs.
- A boulevard with grass and street trees and a sidewalk on the south side of the street.
- A boulevard with grass and street trees only on the north side of the street.

Roadway modifications and design elements are to be located between Helmo Avenue N. and Ideal Street and include:

- Reducing existing travel lanes from 17’-6” to 11’-6” (6-foot reduction for each lane) and add a 8’ parking lane along the north side of the street.
- Relocating and replacing the north side curb, thereby reducing the curb- to-curb distance from 35 feet to 31 feet.
- A new ten-foot multi-use trail located between the boulevard and future development on the north side of the street.
- Adding pedestrian-scaled street lighting on both sides of the street.

FIGURE 19. 4TH STREET N. (LOOKING WEST)

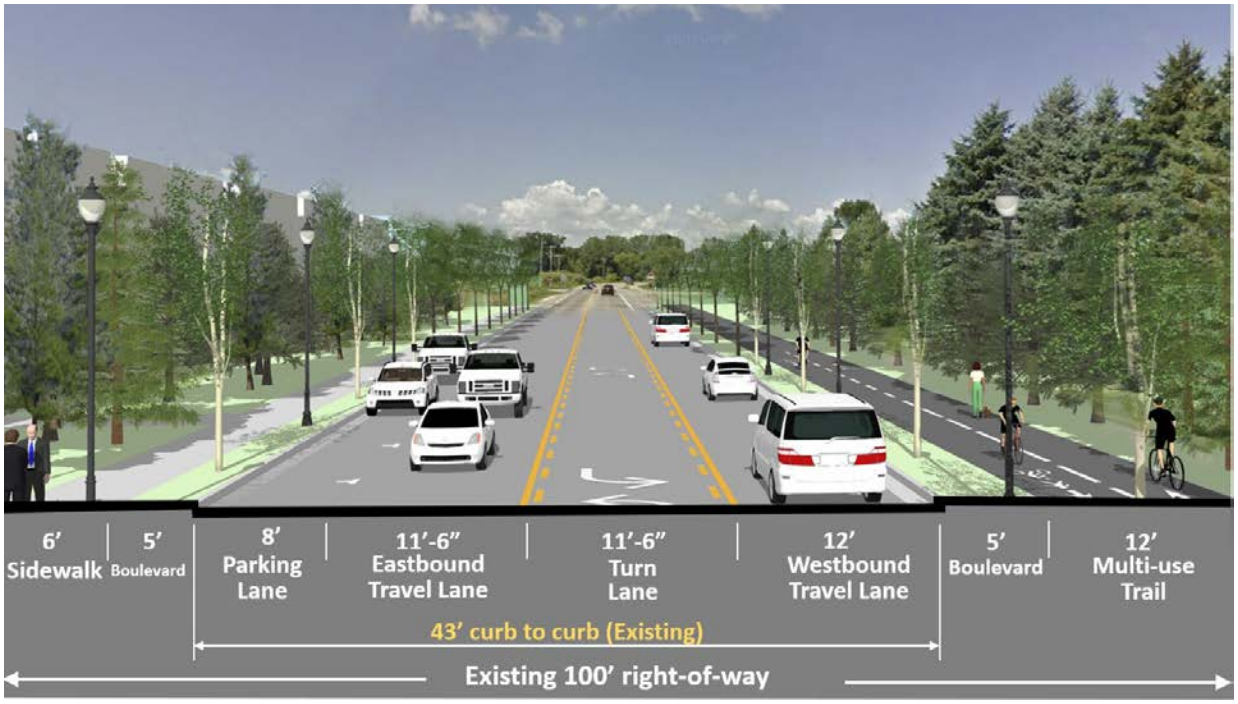
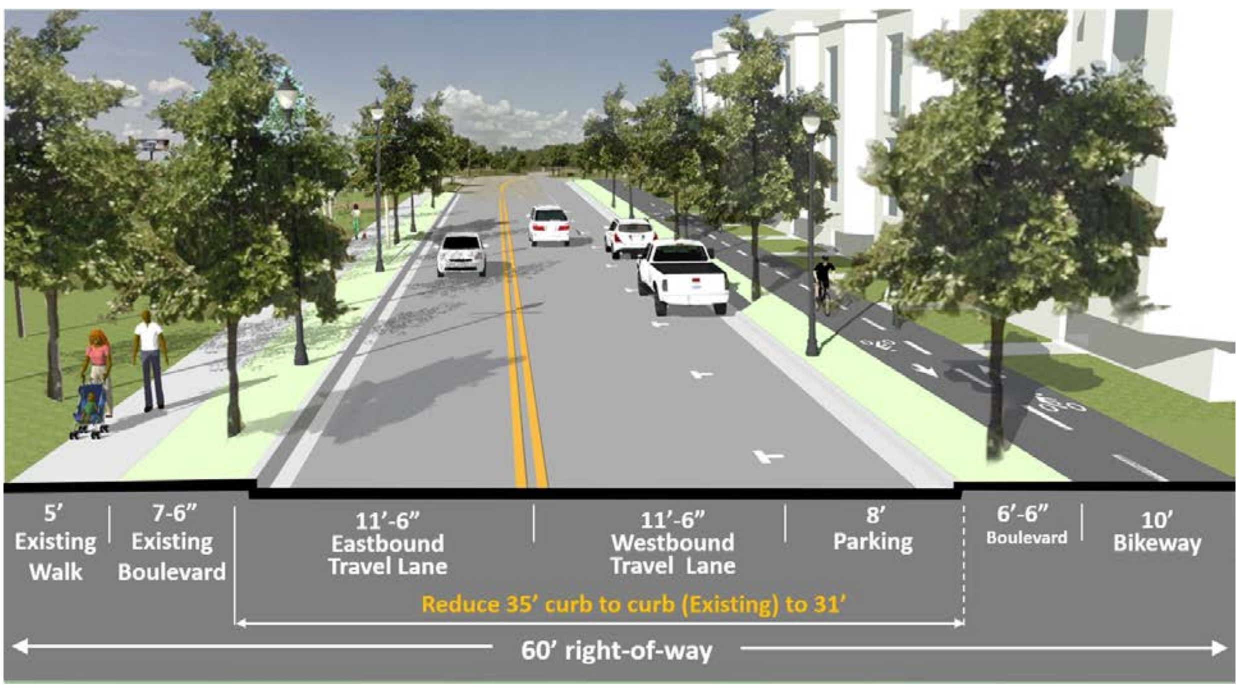


FIGURE 20. 3RD STREET N. (LOOKING WEST)



NEW STREETS AND ACCESSWAYS

New streets and accessways define a fine-grain grid of local streets that foster a walking- and biking-friendly mixed-use neighborhood.

NEW STREETS

New streets are intended to be low volume and low speed (15 mph) streets serving multi-family housing and office uses. New street design elements include:

- A two-lane roadway with curbside parking on both sides of the street.
- Sidewalks and boulevards with street trees located adjacent to curbside parking on both sides of the street.
- Pedestrian-scaled street lighting located between the curb and sidewalk

ACCESSWAYS

Accessways are to be provided where long block frontages exist to ensure that monolithic buildings are not constructed and to provide for pedestrian, bicycle, and limited vehicle access within a narrower profile.

Accessways extend through a development parcel providing both physical and visual access through the parcel. Accessways provide attractive passive open spaces for adjacent housing and employment uses while accommodating limited vehicle access for vehicle loading, drop-off and deliveries, and on-site private parking facilities as needed for development sites. Building entries and individual unit doorways and windows are encouraged along accessways.

Accessway design elements include:

- A maximum overall width of 40 feet.
- A maximum 20-foot paved shared-use pathway for autos, pedestrians and bicycles, and fire vehicle access.
- 10-foot wide landscaped plantings beds located between the building and the shared-use pathway that may include paved seating areas for outdoor activity and gathering.

FIGURE 21. NEW STREET

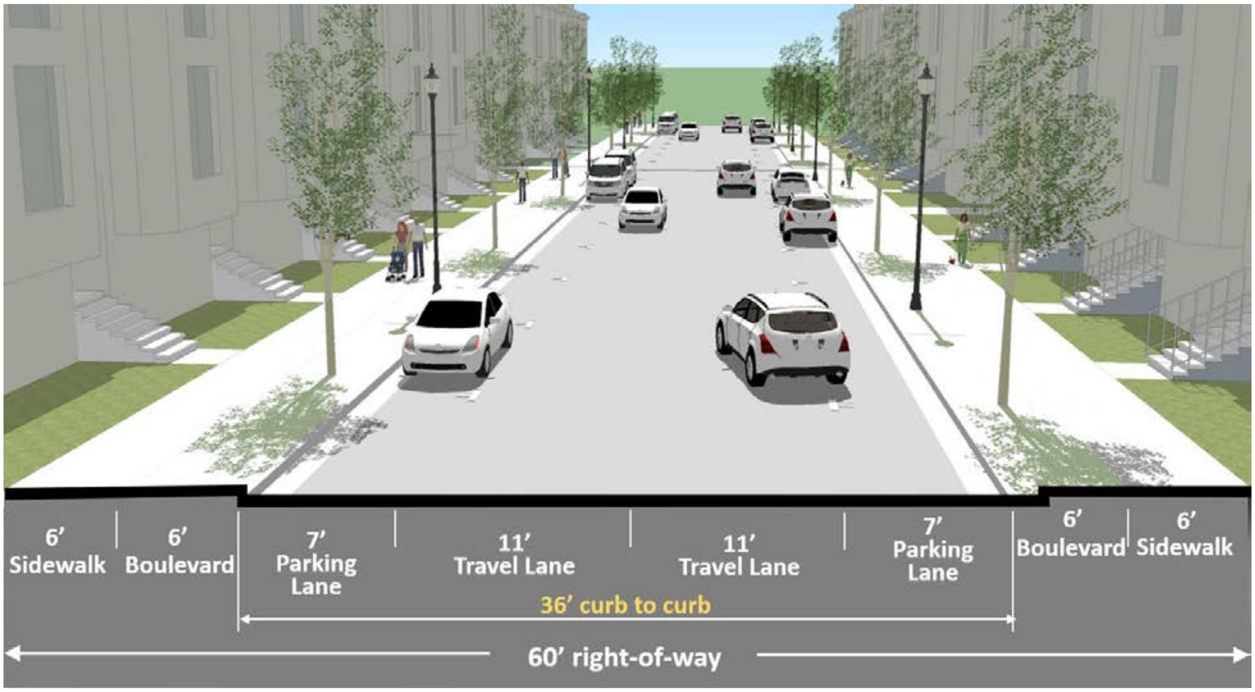
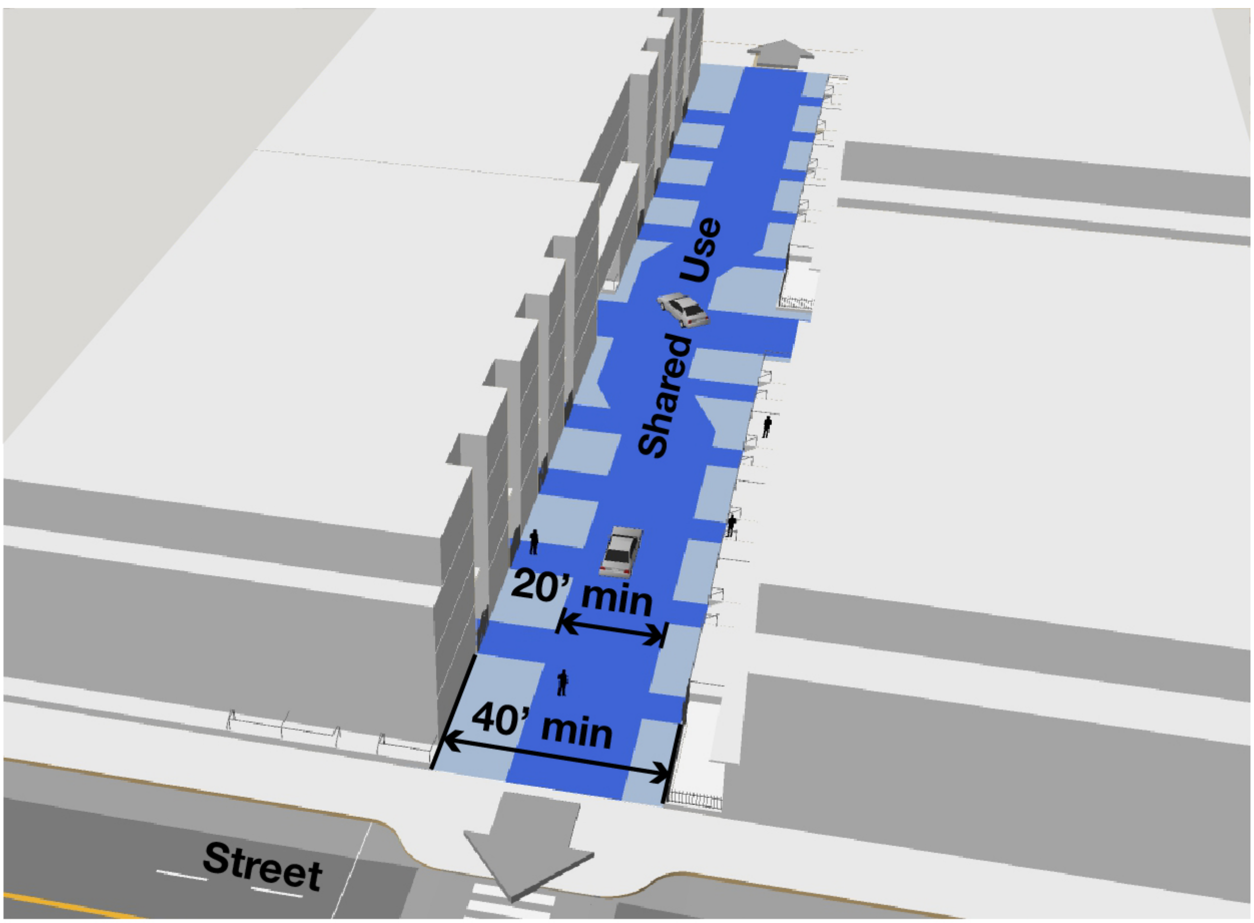


FIGURE 22. ACCESSWAY



FUTURE TRAFFIC CONDITIONS

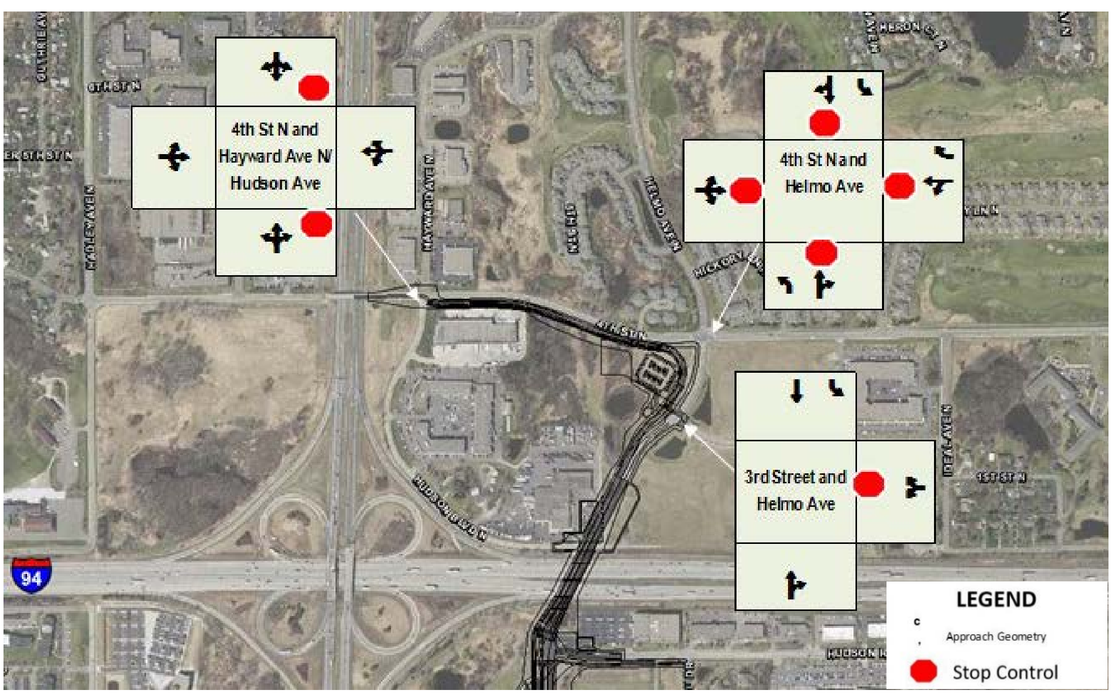
Analysis was prepared to identify expected traffic impacts of the transit-oriented development proposed around the Helmo Station on the local roadway network, specifically impacts to the following intersections in the vicinity of the proposed development:

- Hudson Boulevard and 4th Street N.
- Realigned Hudson Boulevard and Helmo Avenue
- Helmo Avenue and 4th Street N.
- Helmo Avenue and 3rd Street N.
- New roadway (east of Helmo Avenue) and 4th Street N.

The site for the proposed development is presently undeveloped green space to the east of Helmo Avenue and commercial to the west of Helmo Avenue. The project site is bounded on the west by I-694, on the north by 4th Street N. and multi-family residential uses, on the east by The Oaks Tech Center and The Oaks Office Center, and on the south by I-94. The lane configuration at the study intersections is shown in Figure 23.

- Helmo Avenue is a A-minor reliever and 4th Street N. is classified as a major collector according to the Metropolitan Council's July 2017 Functional Classification System. An A-minor reliever (2-lane undivided) approaches capacity when the ADT reaches 10,000 vpd (vehicles per day), while a major collector (2-lane with turn lanes) approaches capacity when the ADT reaches 19,000 vpd. The speed limit for Helmo Avenue is 35 miles per hour (mph) and 4th Street N. has a speed limit of 45 mph. Both roadways are two-lane undivided roadways.
- An off-street bicycle and pedestrian trail is located parallel to 4th Street and Helmo Avenue. Sidewalks are present on the south side of 3rd Street from Helmo Avenue to Ideal Avenue and along the west side of Ideal Avenue from 3rd Street to 4th Street.
- There are currently no local or express transit routes that directly serve the project area. Four express routes and one local route travel through the station area along I-94.

FIGURE 23. EXISTING INTERSECTION LANE CONFIGURATION AND CONTROL



ANALYSIS

A new bridge connecting Helmo Avenue to Bielenberg Drive over I-94 will be constructed as part of the BRT project and new streets will establish a street network to access development. The analysis evaluated existing conditions and horizon years 2028 and 2040 and included:

- Traffic growth rates that were determined using the regional travel demand model.
- The impact of the proposed development on the local roadway network at the following intersections Helmo Avenue and 4th Street; Hudson Boulevard and 4th Street; Hudson Boulevard and Helmo Avenue; 3rd Street and Helmo Avenue; New roadway and 4th Street.

SUMMARY

- Under the 2028 No-Build scenario, the level of service (LOS) at the intersection of Helmo Avenue and 4th Street becomes unacceptable with all-way stop control (stop sign). A signal is needed at this intersection to provide acceptable LOS in 2028 in the No-Build scenario.
- Under the 2028 Build Scenario, the intersections on Helmo Avenue perform at an unacceptable LOS and additional improvements are needed to achieve acceptable LOS.

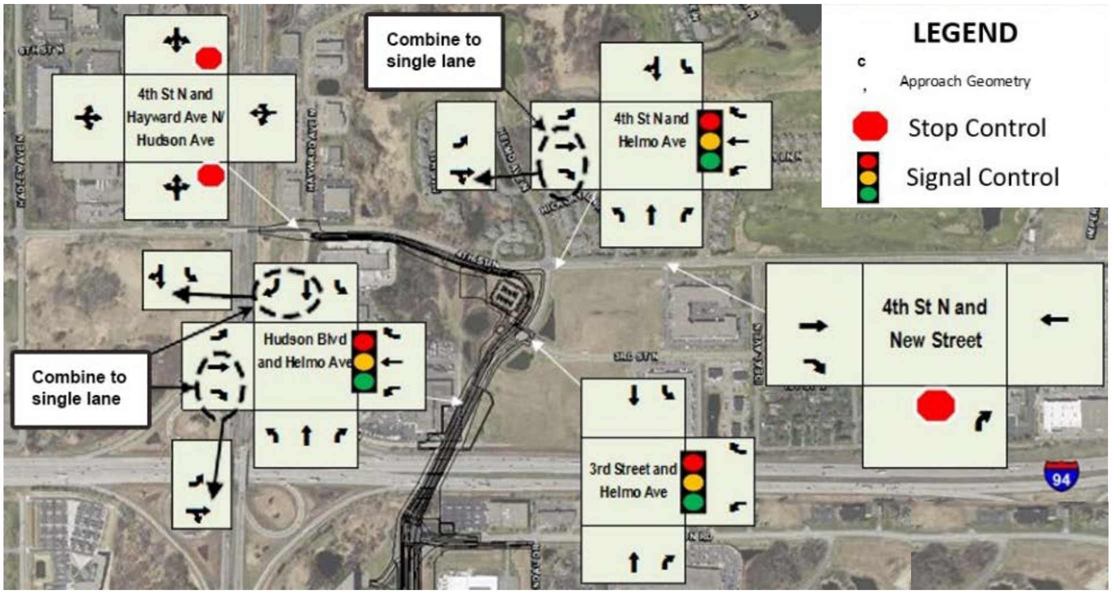
RECOMMENDATIONS

To minimize the impacts of the new development through 2028, the following improvements are recommended:

- Longer turn lanes at Helmo Avenue and 4th Street signal.
- Signal at 3rd Street and Helmo Avenue with turn lanes.
- Signal and the realigned Hudson Boulevard and Helmo Avenue with turn lanes
- Turn lanes on all approaches at the new connection to 4th Street on the east

Removing some of the dedicated right turn lanes in the 2028 Build scenario (Figure 24) will create delay and queuing issues in the PM peak hour at the 4th Street and Helmo Avenue intersection and at the Hudson Boulevard and Helmo Avenue intersection. While some vehicle delays will occur, pedestrian and bicycle access are greatly improved, thereby supporting transit ridership. An added benefit of eliminating dedicated right-turn lanes on the west side of the street at the Helmo Avenue N. and Hudson Boulevard intersection is the ability to provide curbside parking necessary to support storefront retail and commercial development at the station.

FIGURE 24. BUILD 2028 RECOMMENDED INTERSECTION CONFIGURATION AND CONTROL



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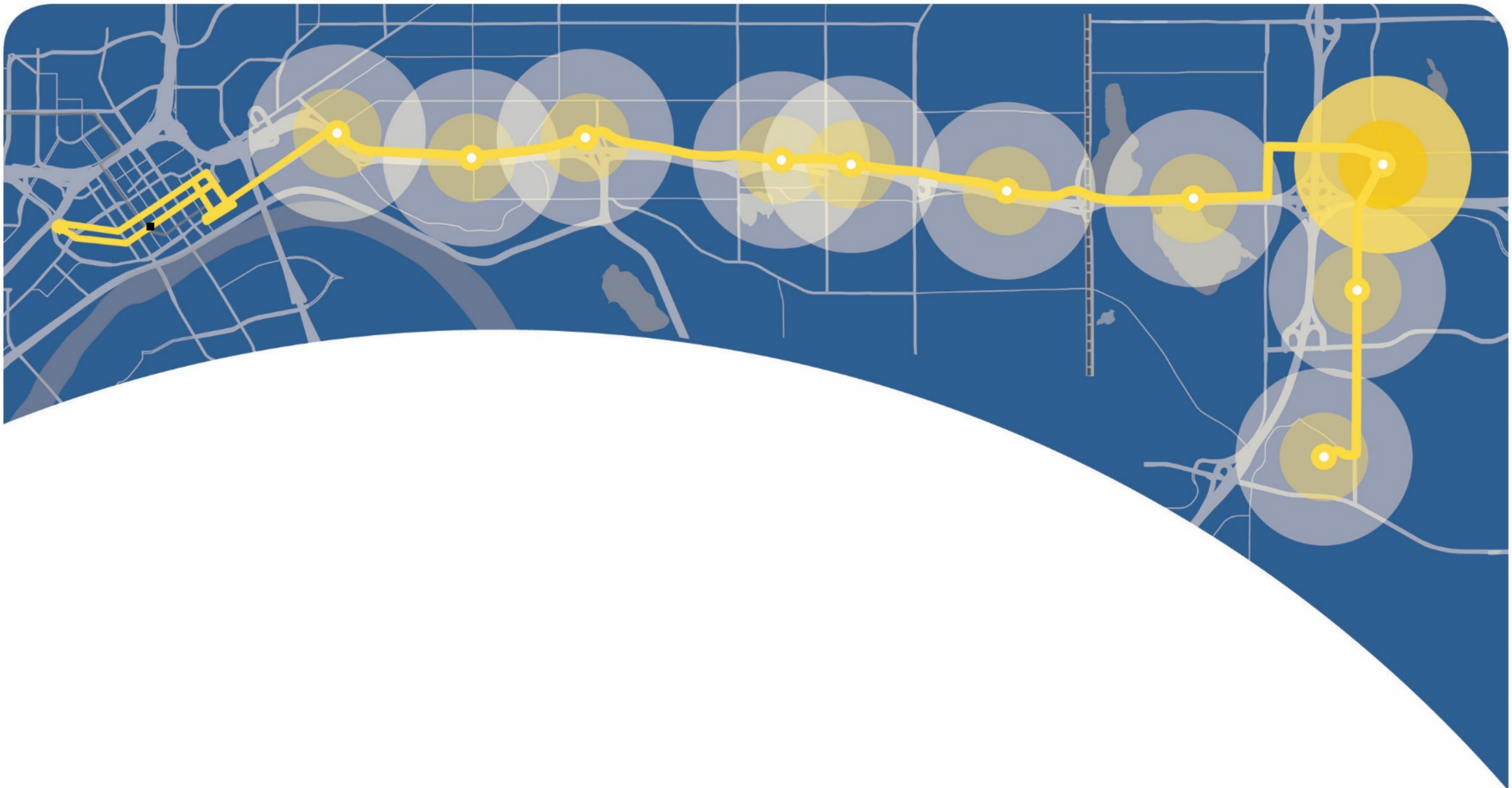


INFRASTRUCTURE

GATEWAY CORRIDOR
GOLD LINE BRT

An infrastructure analysis and resulting plans indicate the ability to adequately provide the utilities necessary to serve existing and future development within the Helmo BRT station area.

WATER

The existing water distribution system consists of a network of mainline pipes ranging from 8 inches in diameter to 12 inches in diameter. The site is supplied by a 1.5-million-gallon water tower located at 2347 Hallmark Avenue and another 1.5-million-gallon water tower located at 1265 Helmo Avenue. The City's water supply originates from eight groundwater wells.

The conceptual water distribution network shown on Figure 25 includes water supply mains sized to accommodate the BRTOD conceptual land uses. The peak daily water demand (calculated for existing and future development) conservatively includes irrigation and other uses which may or may not be applicable to the Helmo Station BRTOD area but are representative of existing water usage by surrounding lands. The existing water supply of 1,445 gallons per minute (gpm) at 78 pounds per square inch (psi) via the existing 12-inch DIP water main will meet a peak daily demand of 665 gpm at 60 psi for the study area. Therefore, the existing water supply and water main has excess capacity and is able to adequately serve the Helmo Station conceptual land use framework.

STORMWATER

Offsite stormwater run-off from surrounding development is conveyed via a combination of storm sewer and drainage ditches to the existing stormwater management basins and wetland system. The two (2) stormwater management basins drain to the existing central wetland system via a 48-inch storm sewer that crosses under Helmo Avenue. The wetland system then drains to the I-94 drainage system via a 36-inch piped outlet located at the southwest corner of the system.

The conceptual stormwater infrastructure Figure 26 includes a regional stormwater treatment system designed in accordance with the agency requirements for water quality, rate, and volume control and includes a combination of wet retention basins, infiltration basins, vegetated swales, and a subsurface stormwater sewer network; all sized to accommodate the Helmo Station conceptual land use framework.

WASTEWATER

Sanitary sewer service is provided via a network of existing pipes that drain to a 15-inch PVC pipe at the southwest corner of the site. This pipe provides service to existing businesses and residential developments within and adjacent to the BRTOD concept area.

Subtracting the wastewater flow discharged by the existing land use for the Helmo Station area of 18,300 gallons per day (GPD) from the total District 13 flows of 325,000 GPD leaves an existing total wastewater flow, including offsite flows through the Helmo Station area, of 306,700 GPD or approximately 213 gallons per minute (GPM).

Assuming the existing 15-inch PVC sewer pipe is sloped at a minimum of 0.15% in accordance with the City Engineer's Association of Minnesota standard, it currently has the capacity to convey approximately 1,123 gallons per minute (GPM) which exceeds the cumulative flow of 973 GPM including the existing 213 GPM and the projected flow of 760 GPM for the BRTOD Helmo Station conceptual land use framework.

FIGURE 25. CONCEPTUAL WATER DISTRIBUTION INFRASTRUCTURE

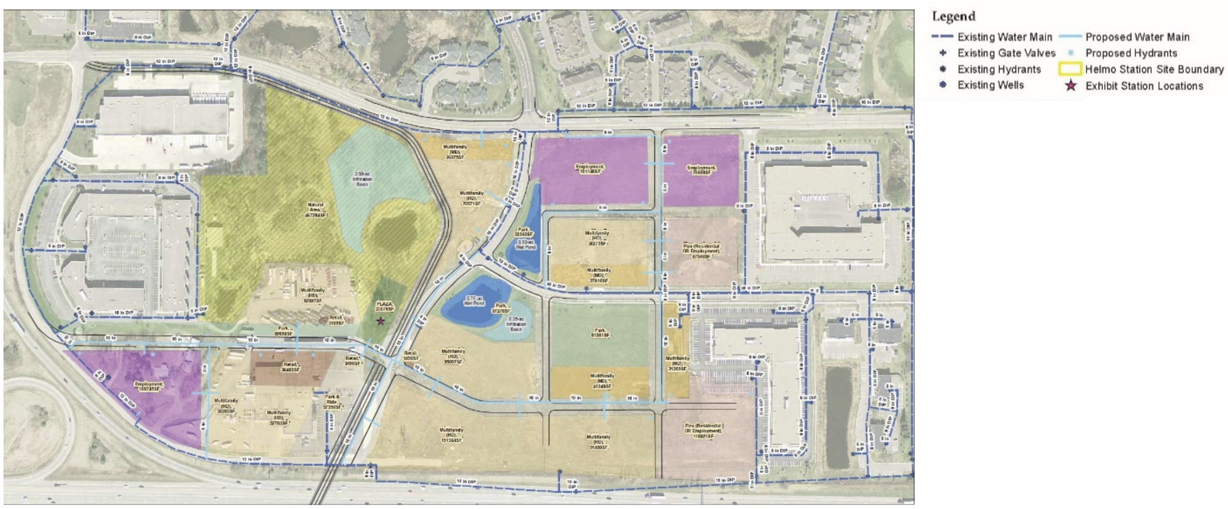


FIGURE 26. CONCEPTUAL STORMWATER INFRASTRUCTURE

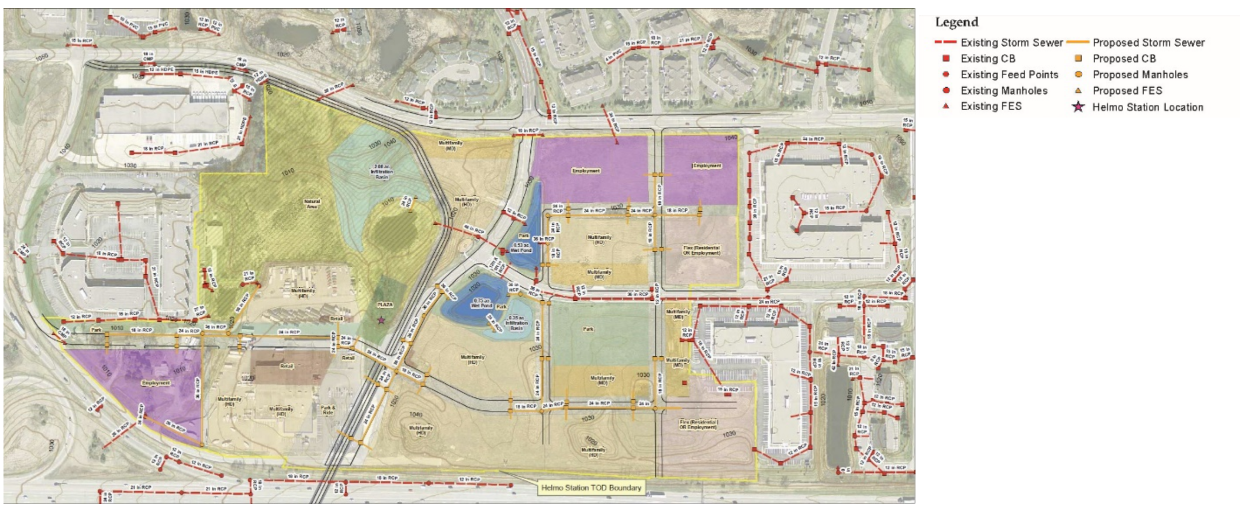
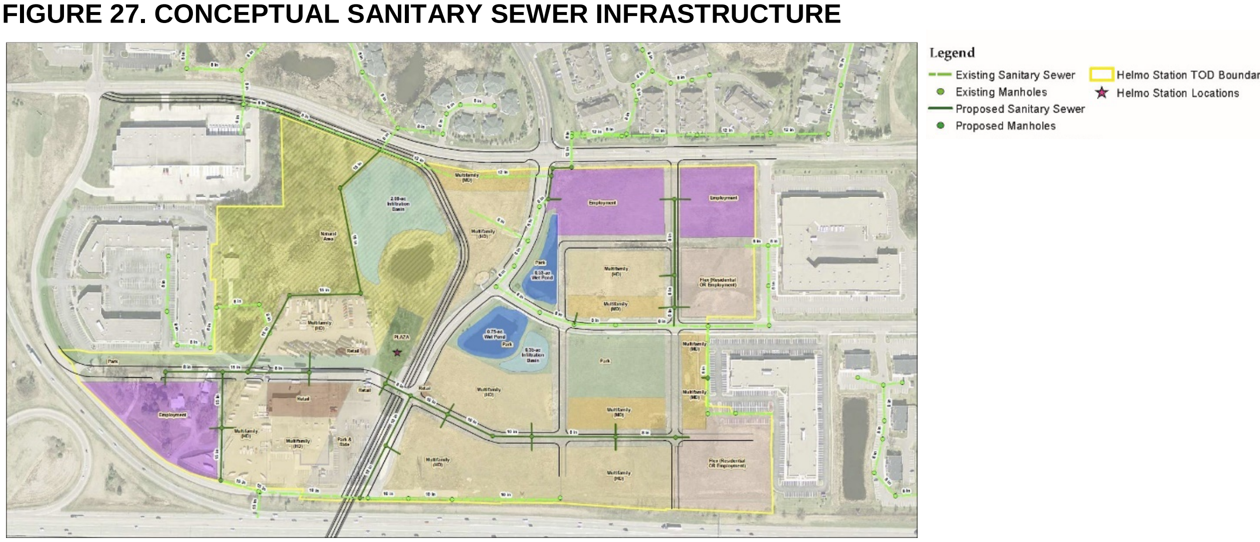


FIGURE 27. CONCEPTUAL SANITARY SEWER INFRASTRUCTURE



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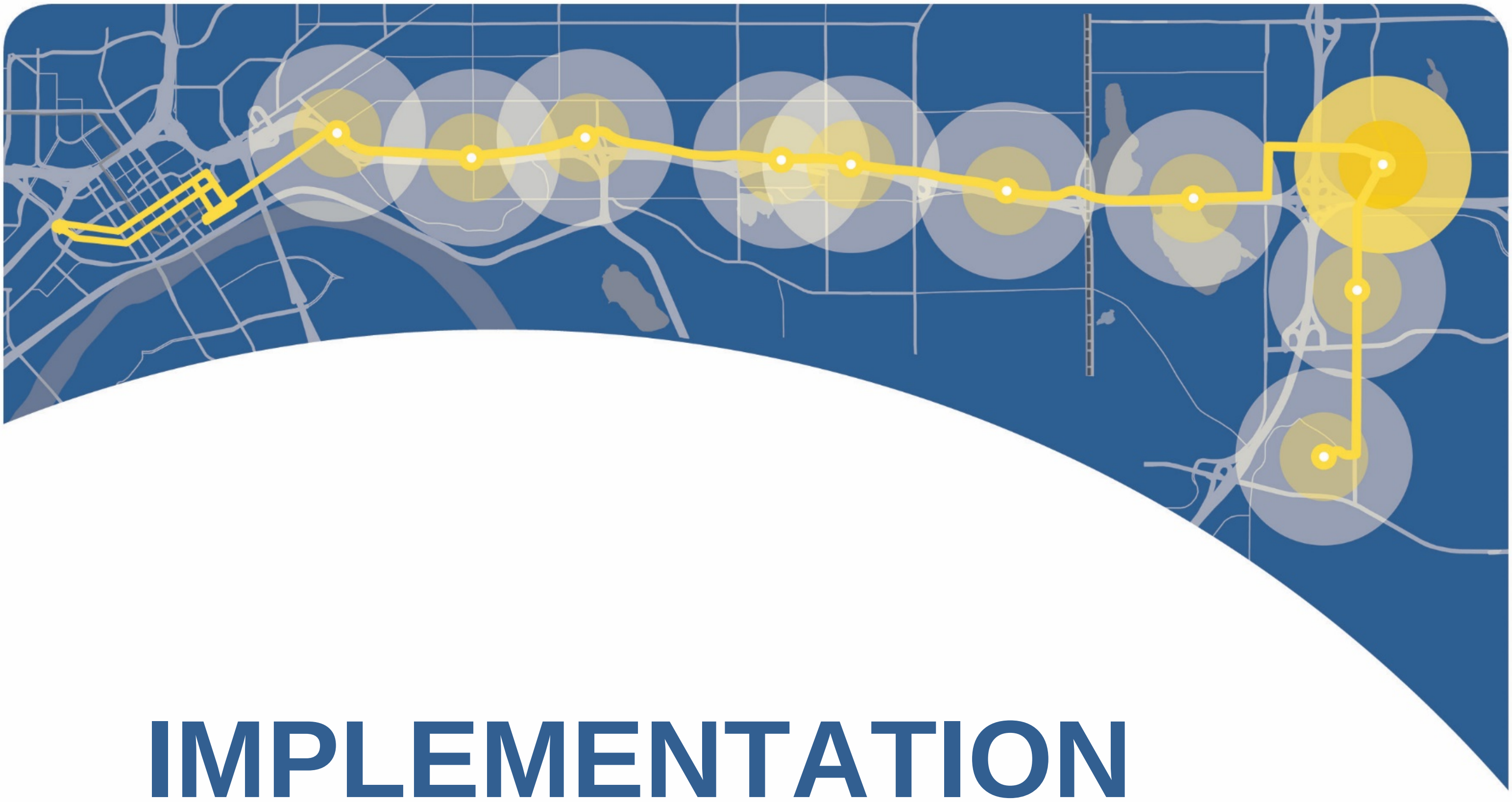


IMPLEMENTATION

GATEWAY CORRIDOR
GOLD LINE BRT

REGULATORY AMENDMENTS

COMPREHENSIVE PLAN

As an outcome of station area planning for the Helmo Station, the City of Oakdale is proposing to amend the 2030 Comprehensive Plan to facilitate transit-oriented development around the station area. The proposed amendment will change the future land use classification for ten parcels and incorporate the Bus Rapid Transit Oriented Development Plan as an implementation tool for the amended 2030 Comprehensive Plan. There are approximately 30 acres of vacant developable land and approximately 11 acres proposed for redevelopment in the subject area.

POLICY GOALS

The proposed Comprehensive Plan amendment will meet a number of 2030 Comprehensive Plan goals including the following:

- **Community Goal 2:** Provide a diversity of land use opportunities within the city, to ensure a wide range of employment, consumer, and housing choices.
- **Land Use Goal 3:** Promote and encourage a diverse array of housing types, styles, and price points to serve a diverse population.
- **Transportation Goal 3:** Promote a multi-modal transportation plan that is fully integrated with land use planning.

FUTURE LAND USE

The current 2030 Future Land Use classification for the subject parcels did not anticipate the development of a bus rapid transit facility in this location. The area had been planned for office-industrial and flex office uses due to proximity to Interstates 94, 494, and 694.

The existing future land use classification is described in the 2030 Comprehensive Plan as the following:

- **Office/Limited Business:** Provide for offices, office buildings, and Class One restaurants.
- **Business Campus:** Provide for corporate development primarily in the form of offices and incidental storage and light manufacturing uses.
- **Open Space:** Publicly owned land that does not have any development on it. Typically, open space is land not subject to active use and includes wetlands, woodlands, or pasture/crop land that has been retired.

The proposed future land use classification applying to all subject parcels is described as the following:

- **Bus Rapid Transit Oriented Development :** where a mix of transit-supportive development (multi-family medium density residential; multi-family high density residential; office-industrial; professional office; and commercial/retail uses) along with park and open space amenities all come together in the form of one cohesive development. Residential densities shall be 15-24 dwelling units per acre (DU/Ac) for Medium Density Residential land uses and 30-50 DU/Ac for High Density Residential land uses. Non-residential land uses shall have a 0.5-1.0 FAR (floor area ratio). Densities may be adjusted by the City Council on a project specific basis and in accordance with detailed development plans.

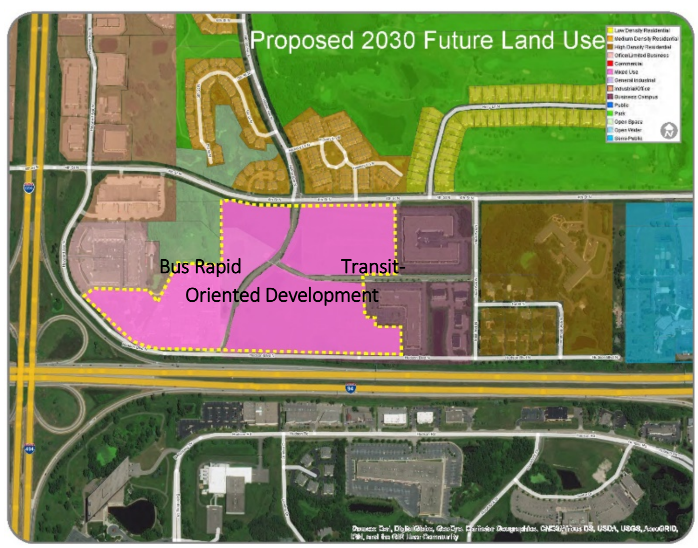
ANALYSIS

The proposed Comprehensive Plan amendment will allow for housing in addition to employment in the subject area.

- **Forecasts**—The proposed Comprehensive Plan amendment will result in a change in the adopted Metropolitan Council population, household, and employment forecasts for this specific area. However, the proposed amendment and associated forecasts are in alignment with the community-level forecasts for the 2040 Comprehensive Plan update.
- **Transportation**—A traffic study has been completed for the subject area as part of the station area planning process. The study recommends signalization and roadway enhancements and concludes that there is sufficient roadway capacity to accommodate the proposed future land use changes.
- **Wastewater**—An analysis was completed of the wastewater needs for the subject area and concluded that there is sufficient capacity in the existing system to accommodate the proposed land use changes.
- **Regional Parks**—The subject area is not within 1/2-mile of an existing or planned regional park facility. The subject area is within ½ mile of the outer limits of a Regional Bike Trail Network identified in the 2040 Regional Parks Policy Plan. There is an existing City trail along Helmo Avenue North that can connect the subject area to a future regional trail.
- **Stormwater**—A stormwater analysis has been completed for the subject area and concluded that there is existing capacity in the stormwater ponding system and areas suitable for additional regional stormwater management to accommodate the change in land use. Development proposals will be subject to permitting standards and requirements of the South Washington Watershed District and the Ramsey Washington Metro Watershed District.
- **Water Use**—Review of the water supply to the subject area has concluded that there is sufficient capacity accommodate the change in land use.

CONCLUSION

The proposed Comprehensive Plan map amendment will change the future land use of the subject parcels to implement the BRTOD plan and accommodate a greater range of uses to support transit-oriented development. The existing transportation, stormwater, waste water, and water distribution systems, with some enhancements, can support the development of the BRTOD plan.



The proposed future land use change will allow for additional housing units in the subject area at densities to support transit ridership while also accommodating additional employment. The proposed change in land use is consistent with the community-wide 2040 forecasts for population, households and employment for Oakdale.

The Helmo Station BRTOD Plan will serve as a traditional small area plan and policy guide for development of the area within approximately ½ mile radius of the planned bus rapid transit (BRT). The Helmo BRTOD Plan provides the land use, circulation, and park and open space framework for development of a new mixed-use neighborhood in the subject area.

PLANNED UNIT DEVELOPMENT ORDINANCE

In addition to the Comprehensive Plan amendment and in advance of the lifting of the moratorium, the City will prepare a new planned unit development (PUD) ordinance for the unbuilt portions of the Oaks Business Park and the Crossroads Properties as indicated on Figure 28.

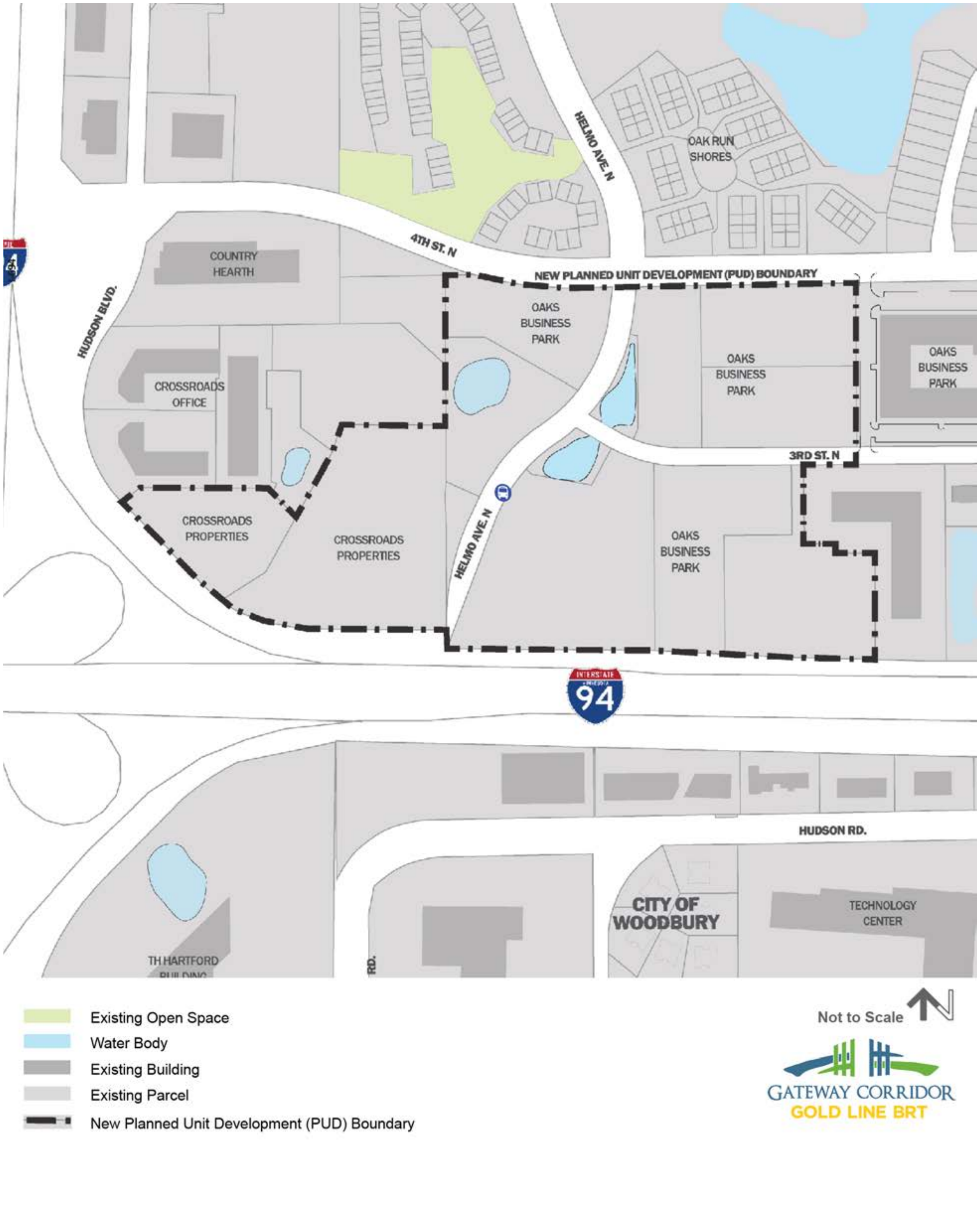
The Helmo Station BRTOD Plan including the land use, circulation, development and infrastructure frameworks, will establish the directive for the new planned unit development (PUD) ordinance.

The PUD will address the following development and public right-of-way design standards:

- Permitted uses within the mixed-use designation
- Requirements for building setbacks and heights
- Building materials and design standards
- Building design elements regarding placement, orientation and transparency of windows and doors
- Parking design and location
- Site amenities
- Screening of loading and utilities
- Signage
- Parks, and trails
- New Streets

Specific standards for transit-oriented development will also be incorporated into the new PUD ordinance and are identified on the following pages.

FIGURE 28 NEW PLANNED UNIT DEVELOPMENT BOUNDARY



BRTOD STANDARDS

BRTOD design standards regulate the pedestrian realm, create a sense of enclosure, foster an active environment and promote safety. Within ¼ mile of the Helmo Station, essential design standards ensure a safe and inviting station environment with activity and 'eyes on the station and support the use and function of the neighborhood park and open spaces. The essential development standards for the station area include the following:

GROUND-FLOOR USES

Ground-floor commercial and retail uses are essential components of an active and vital station area. The ground-floor uses diagram identifies the viable locations for ground-floor retail and commercial uses ensuring that retail and commercial storefronts are provided for and strategically located to serve residents, employees, and visitors

The ground-floor uses diagram identifies the locations critical for ground-floor retail and commercial uses. At a minimum, retail and commercial uses are required where indicated. Additional locations for retail and commercial uses are encouraged but not required.

Retail

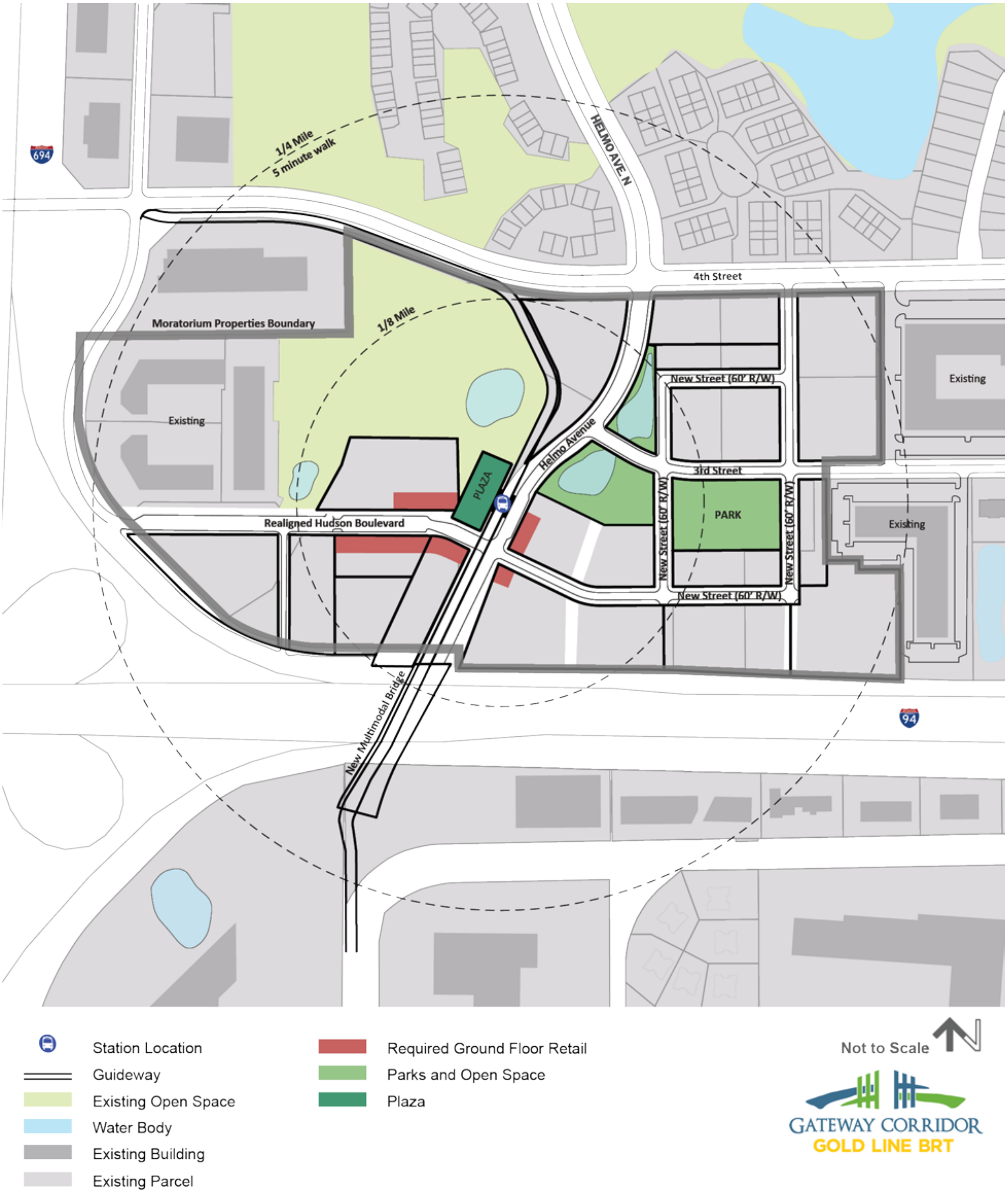
Retail uses include businesses that engage in the sale of merchandise, food, drink and entertainment. These uses have the potential to activate the station area by providing 18-hours of daily activity and to increase safety by improving passive surveillance or 'eyes on the station area.'

Commercial

Commercial uses are primarily businesses that engage in the sale of services. Commercial uses are proposed to serve as additional neighborhood-serving amenities in the station area. These businesses may include:

- Offices
- Medical services
- Hotels/restaurants
- Convenience services such as hair salons, dry cleaners, and banks

FIGURE 29. GROUND-FLOOR USES



GROUND FLOOR BUILD-TO LINES

Zero-foot Building Setback

Where zero-foot building setbacks are required, ground-floor building facades must be built directly to the property line and abut the edge of the sidewalk, trail or public use area. Build-to lines are identified in the same locations where ground-floor retail and commercial uses are required or recommended.

Exceptions to the build-to lines criteria are:

- Ground-floor entrances to buildings may be recessed up to five feet behind the build-to line.
- Windows and walls may be recessed up to 18 inches from the build-to line to accommodate columns or other architectural elements that engage the build-to line.
- Interruptions to the build-to line created by passageways to courtyards, parking or other private spaces.

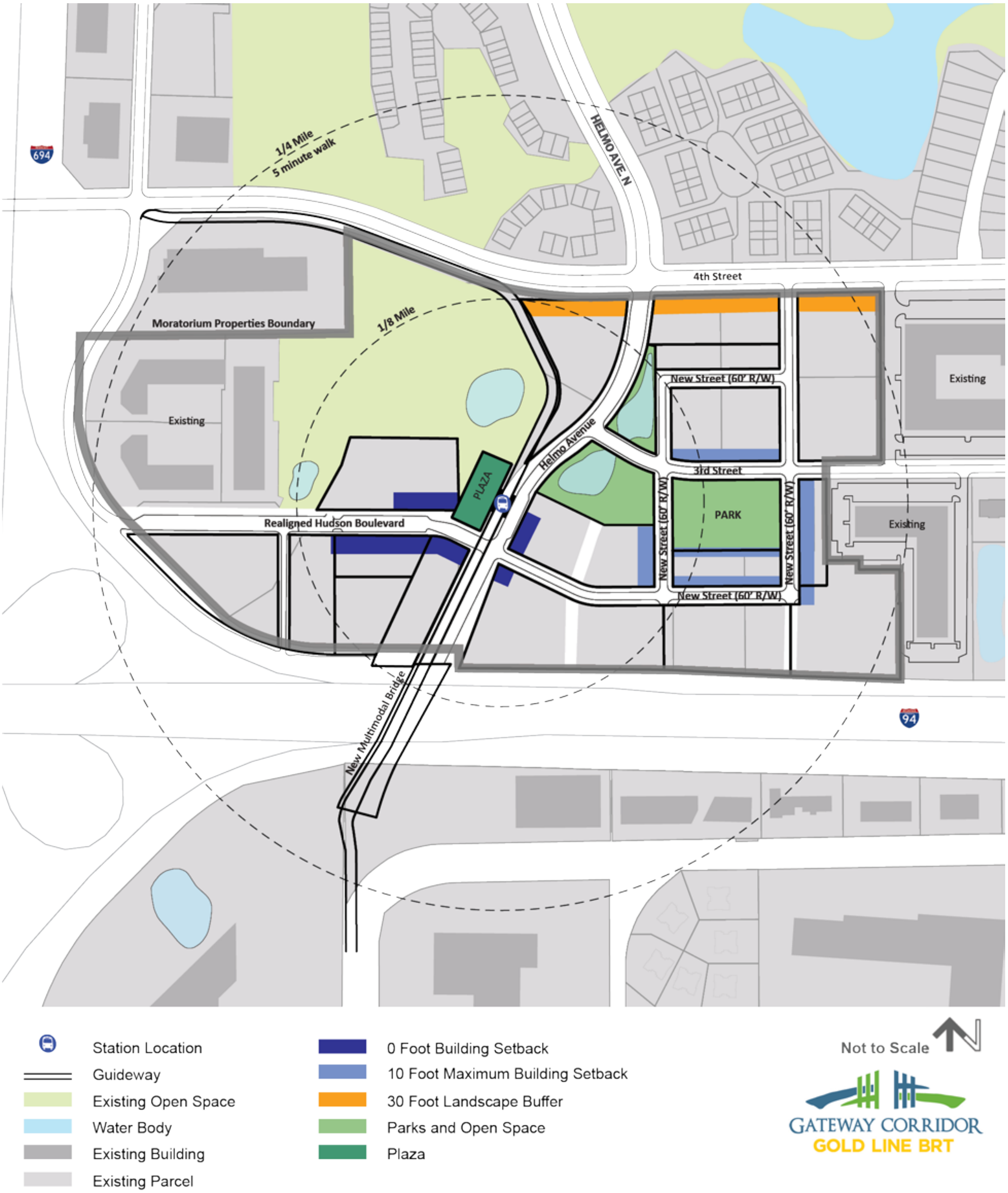
Maximum 10-foot Building Setback

A maximum 10-foot ground-floor building setback is required where residential front doors and windows are oriented to the sidewalk, park, or public right-of-way as indicated. The limited setback from the sidewalk or public areas allows for landscaping, stoops, patios or other semi-public areas that support a safe and inviting public realm and a degree of separation.

30-foot Landscape Setback

A 30-foot landscape setback is required between the edge of the curb and building frontages along 4th Street to maintain and enhance the character of the landscaped roadway and compatibility with existing development. A layering of dense evergreen and deciduous plantings is required in the setback and should be of similar variety and characteristics to the existing roadway plantings.

FIGURE 30. GROUND-FLOOR BUILD-TO LINES



ACTIVE EDGES

Active edges are characterized as building frontages with direct entries from the sidewalk and a high degree of transparency. Active edges increase visual and physical interaction between people inside and outside of the buildings, creating a safe and vibrant pedestrian environment. Access to service/loading bays and parking lot/garage entrances are prohibited along designated active edge frontages.

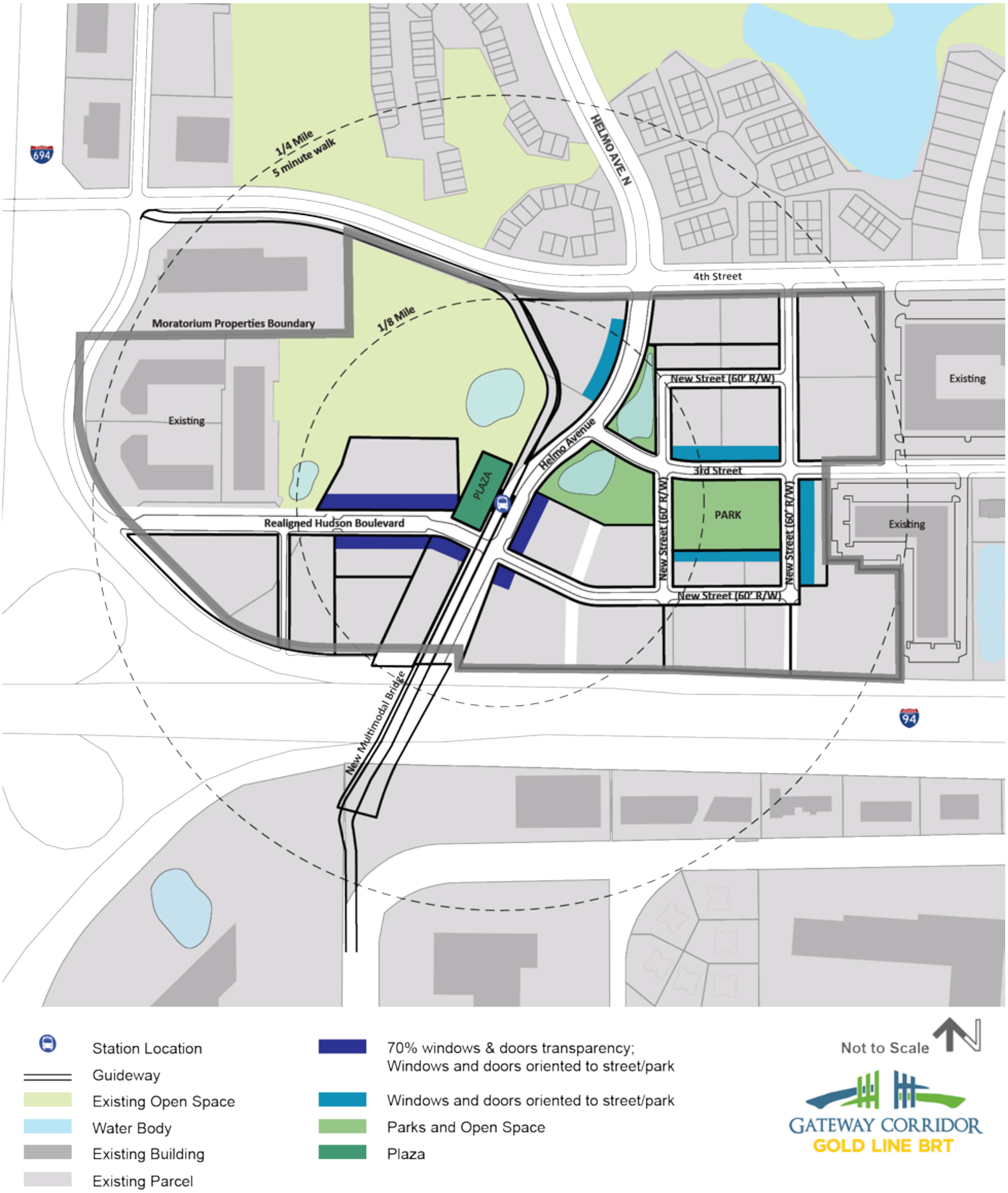
The following active edge criteria should be met for all ground floor-retail and commercial uses where indicated:

- A minimum of 70 percent transparent glass or screens along ground-floor facades, measured from datum line five feet from the ground extending from building edge to building edge; frosted, tinted, reflective glass or other types of glass that diminish transparency should be prohibited.
- Primary entrances to all ground-floor uses should be oriented to the public right-of-way.

The following active edge criteria should be met for all other uses where indicated:

- Primary entrances must be oriented toward the street. Quasi-public terraces, stoops or porches are appropriate, but not essential.
- Windows should be provided along facades, but no minimum percentage of transparency or minimum opening size should be required.

FIGURE 31. ACTIVE EDGES



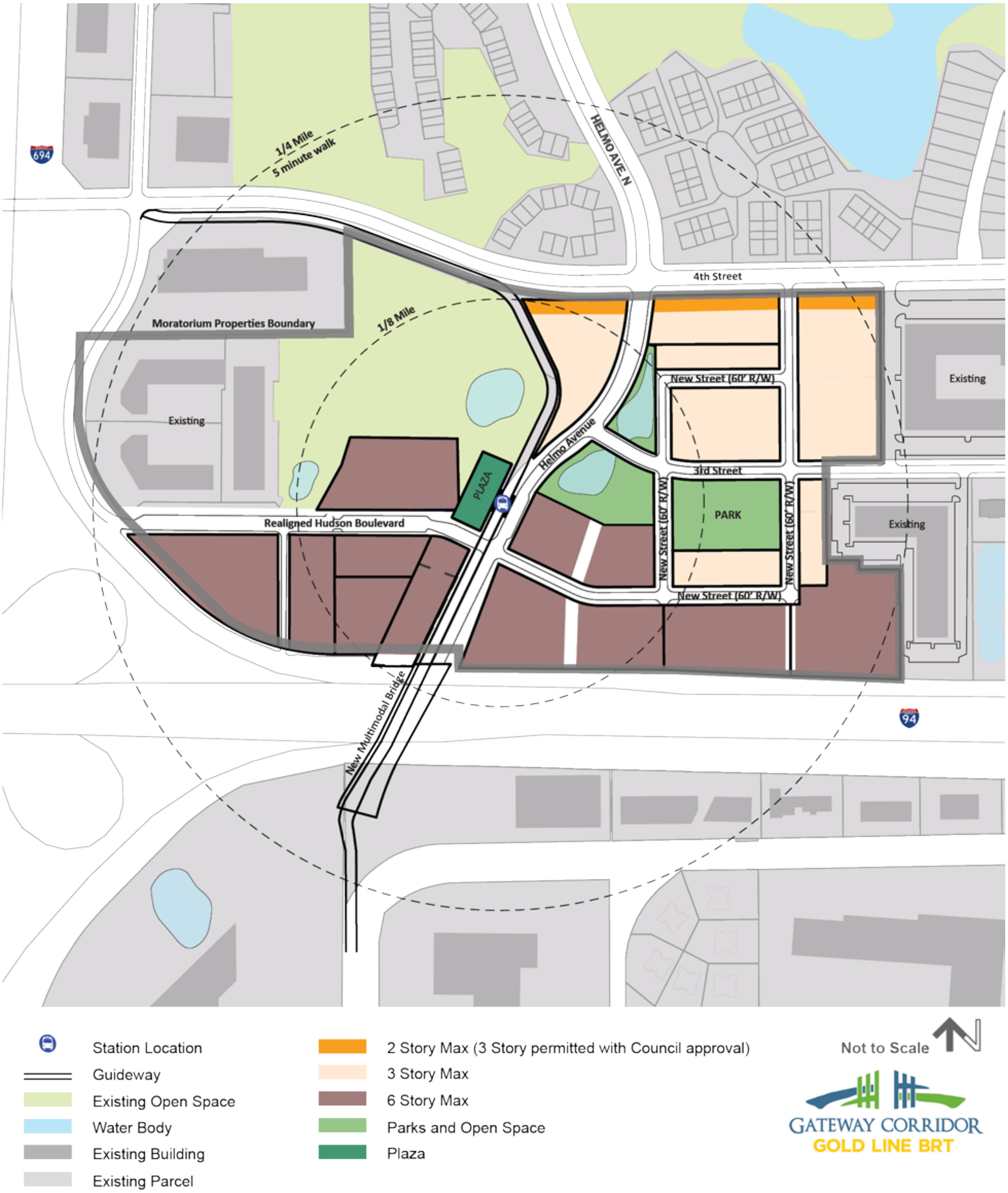
BUILDING HEIGHTS

Building heights should maximize transit-oriented development opportunities while respecting the scale and massing of adjacent neighborhoods.

The building heights diagram illustrates the minimum and maximum building height recommendations for the block areas as indicated.

- Building heights should transition from adjacent small-scale neighborhoods.
- Building heights range from three to six floors throughout the station area.
- The tallest buildings, six floors, are located in proximity to the station platform.
- Three- floor (max) buildings are generally located in the transition zone near adjacent neighborhoods.
- Buildings are limited to two-floor (max) along the 4^{th} Street frontage (three-floor (max) permitted with Council approval).

FIGURE 32. BUILDING HEIGHTS



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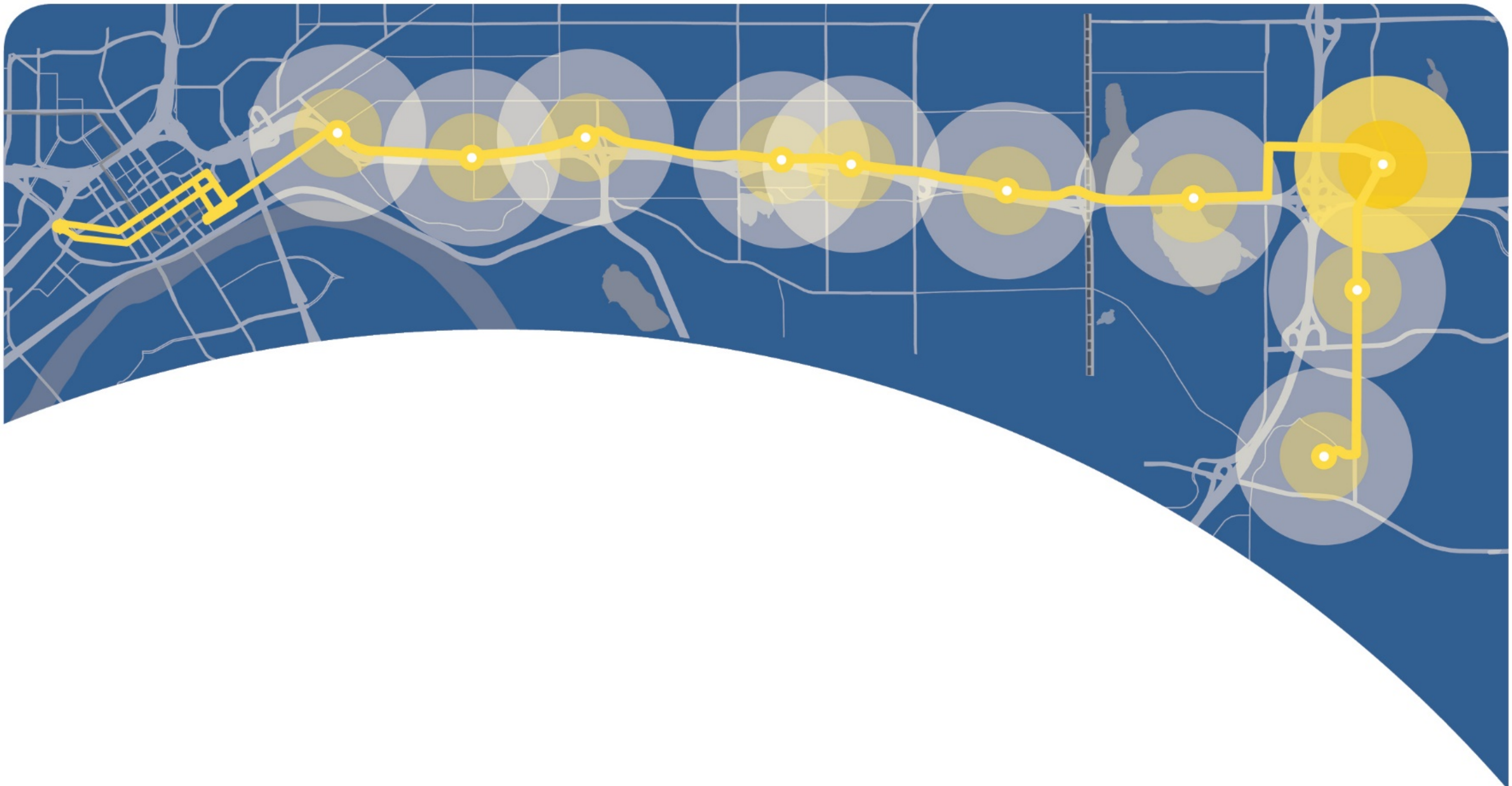


GATEWAY CORRIDOR

METRO Gold Line

City of Oakdale Chapter **25** *of the Zoning Code*

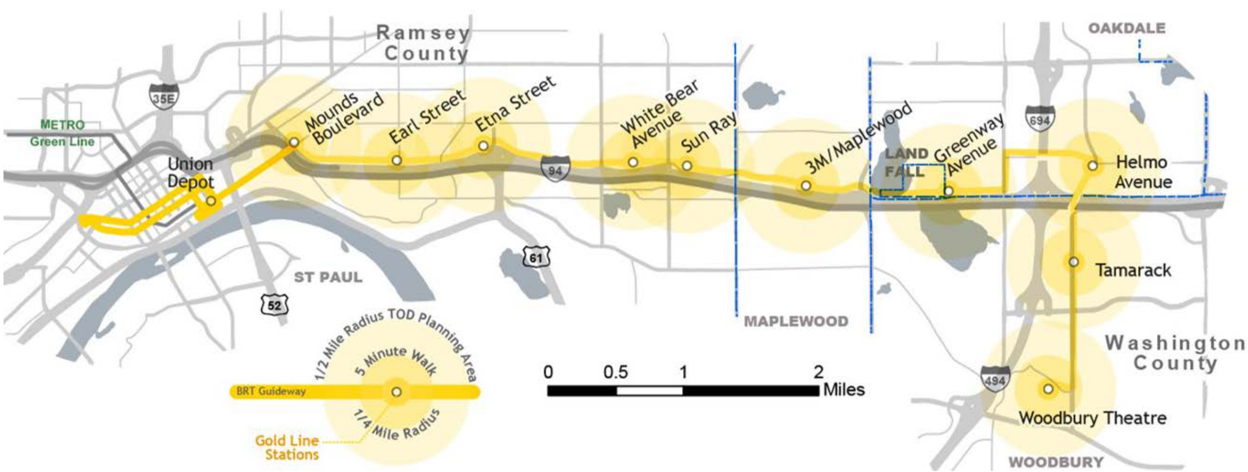
APPENDIX B. HELMO STATION-PUD
HELMO STATION PLANNED UNIT DEVELOPMENT

Helmo Station Planned Unit Development

1. **PURPOSE**
   A. The purpose of the Helmo Station Planned Unit Development (PUD) is to:
      1. Provide the background regarding the planning process that resulted in the Helmo Station Area Plan and PUD; and
      2. Specify the regulations for Land Use, Circulation, and Parks and Open Space that shall apply to all property in the Helmo Station-PUD area.
   B. All submittals for platting, subdivision, and site development shall be in substantial conformance, as determined by the City Council, with the regulations in the Helmo Station Planned Unit Development.

2. **INTRODUCTION**
   A. Gold Line Bus Rapid Transit
   The Gold Line Bus Rapid Transit facility is an eleven-mile dedicated guideway that will run from downtown St. Paul to Woodbury (Figure 1). The corridor alignment in Oakdale will follow Hudson Boulevard North, turn onto Hadley Avenue North, follow 4th Street North across Interstate Highway 694, and then turn on Helmo Avenue South to cross a new bridge over Interstate Highway 94 to Bielenberg Drive in Woodbury. There will be two transit stations serving Oakdale: one at Greenway Avenue North and one at Helmo Avenue North.

FIGURE 1. METRO GOLD LINE BRT SYSTEM AND PLANNING AREA



   B. Station Area History and Context
   The Helmo Station area is located north and east of Interstate Highways 94 and 694; south of 4th Street North; and extends to the west edge of The Oaks Business Center (Figure 2). The area is bisected by Helmo Avenue North and 3rd Street North. There are residential townhomes and twin homes north of 4th Street North; an industrial/office park is located to the northwest; and Oak Marsh Golf Course is to the northeast.

   Approximately 30 acres on the east and west side of Helmo Avenue North are currently undeveloped. This area was planned and approved for future phases of The Oaks Business Center.

The development was approved in 2006 and was to provide a total of approximately 640,000 square feet of office and flex-office space at full build out. By 2018, five buildings on the eastern edge of the campus have been constructed totaling approximately 186,000 square feet. Roadways, stormwater ponding areas, and utility infrastructure have been installed in anticipation of the planned development. The Oaks Business Center was planned in this location to take advantage of access to and visibility from Interstate Highway 94. However, market conditions have not been favorable for the construction of the remaining planned buildings on the campus and the majority of the site remains vacant. Beginning in 2015, the owner of the business park initiated conversations with the City to develop a new plan for the area to potentially include other uses such as multi-family residential buildings, retail, and a hotel. The discussions corresponded with the beginning of the small area planning process that began in 2016.

On the west side of Helmo Avenue North is an existing office/light industrial business park and two legally non-conforming properties – one with residential uses (7468 Hudson Blvd N) and the other with a number of commercial and industrial tenants (7500 Hudson Blvd N).

FIGURE 2. STATION AREA AND CONTEXT

C. Small Area Planning Process

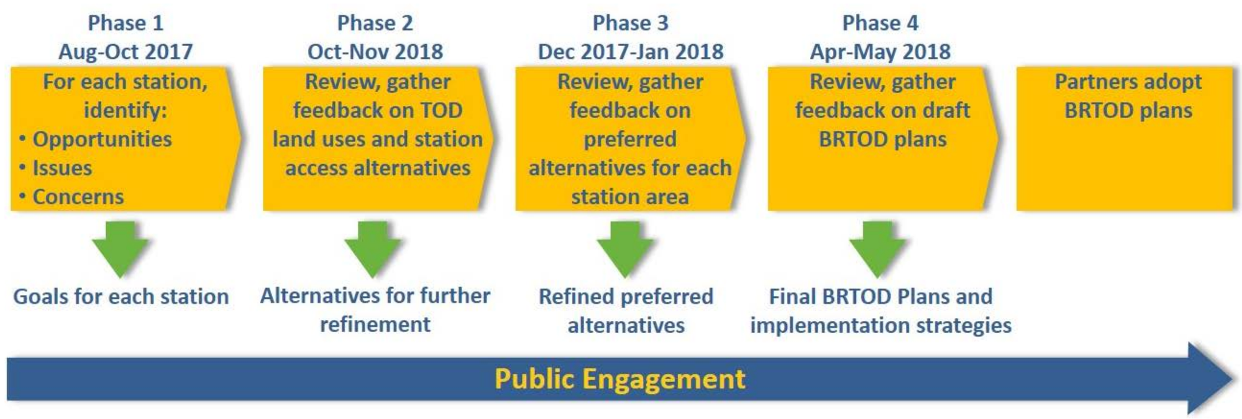
The Gold Line Bus Rapid Transit alignment has created an opportunity to reimagine the land use in this area in a way that will support transit ridership. The Helmo Station Area presents the only large green field development opportunity along the Gold Line as well as significant redevelopment opportunities. Strategic land use planning that leverages the transit infrastructure investment and reflects market conditions will create a unique development for this area of Oakdale.

In 2017 Washington County received a grant to fund station area planning along the eleven-mile Gold Line BRT corridor. In June 2017, the City Council initiated Oakdale's participation in a four-phase station area planning process (Figure 3):

- Phase 1: Identify Opportunities, Issues, and Concerns; Establish Specific Station Area Objectives
- Phase 2: Review Preliminary BRTOD Alternatives; Identify Alternatives for Further Refinement
- Phase 3: Review Preferred Alternative; Identify Preferred Alternative Refinements
- Phase 4: Review, Finalize, and Adopt BRTOD Plan and Implementation Strategies

The process included several community open houses, online community engagement, meetings with affected property owners in the subject area, and regular City Council work sessions at each phase of the process.

FIGURE 3. STATION AREA PLANNING PROCESS



D. Project Vision and Concept Plan:

The Helmo Station area Concept Plan has been developed to achieve specific goals identified during the planning process. The following goals have been adopted by the City Council for the Helmo Station BRTOD:

1. Establish a multi-modal corridor (for walking, biking, transit & auto)
2. Increase potential ridership (through transit access & new development)
3. Enable station areas to achieve their development potential
4. Identify infrastructure investments and policy changes
5. Maintaining and enhancing open space and trails
6. Preserve existing neighborhoods and quality of life
7. Manage traffic and congestion
8. Create a safe station environment
9. Ensure safe walking and biking
10. Promote compatible development

These goals are embodied in the Helmo Station vision through the following essential elements of Transit Oriented Development:

Station Hub—The Station Hub is an area around the station platform with street-oriented retail within or adjacent to high-density multi-family buildings at the intersection of the planned Helmo Avenue bridge. These uses will create an animated 18-hour environment of activity surrounding the station platform. As a result of this activity and eyes-on-the-station, the transit platform will be safer at all times of the day.

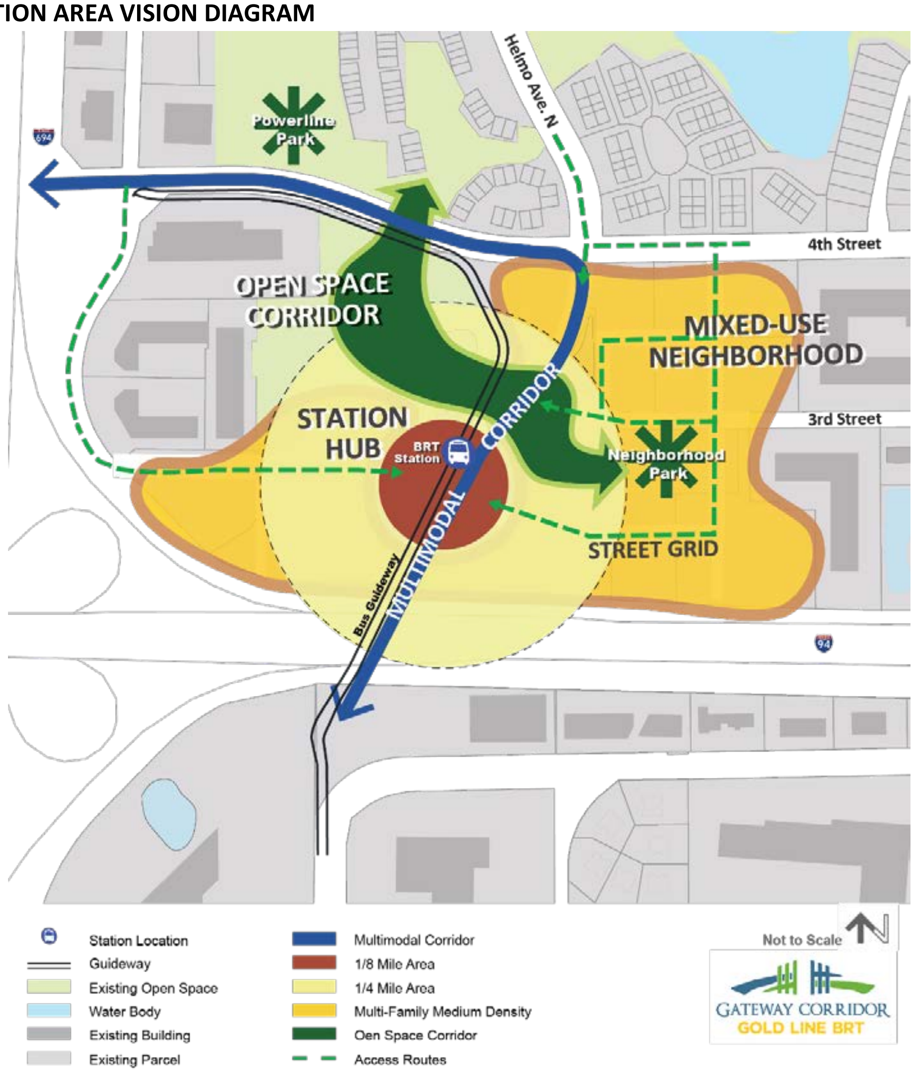
Mixed Use Neighborhood—The Helmo Station area is a complete neighborhood with multi-family housing surrounding a new neighborhood park and employment (professional and flex office) uses adjacent to the existing Oaks Business Park.

Connected Parks, Trails, and Open Space—Open space enhancements and new trail connections create a green setting with recreational amenities for residents and employees in the Station Area and surrounding neighborhoods.

Street Grid—Existing streets provide a circulation framework that will be enhanced by a realignment of Hudson Boulevard west of Helmo Avenue and a new street grid east of Helmo Avenue. These complete streets provide many ways into and out of the neighborhood and improve access to the station, retail, and employment areas.

Multimodal Corridor—A multi-use walking and biking trail adjacent to the BRT line links station to station along the entire corridor. A new I-94 bridge crossing will provide improved access for transit, walking, biking, and auto traffic between Oakdale and Woodbury to the south.

FIGURE 4. STATION AREA VISION DIAGRAM



E. Consistency with the Comprehensive Plan

The City's 2030 Comprehensive Plan was amended on April 24, 2018 guiding the future land use of the project area toward a mixed-use, transit-supportive development that includes multi-family medium and high density residential housing; office-industrial; professional office; and commercial/retail uses along with park and open space amenities to create one cohesive development.

The Helmo Station PUD includes the parcels highlighted on the following map (Figure 5):

FIGURE 5. HELMO STATION PUD PARCELS

The Helmo Station BRTOD plan achieves a number of Comprehensive Plan goals:

Land Use Goal 1: The City shall facilitate the redevelopment and development of certain property.

Policy 3. Prepare small area development plans for the following areas to guide public and private investment to achieve a transit oriented development pattern.

a. Helmo Avenue North and 4th Street North (Bus Rapid Transit Station Area) Transportation

Land Use Goal 3: The City's visual appearance shall incorporate streetscaping and public art.

Policy 1. Identify and prioritize areas to enhance streetscaping at major intersections and along key corridors.

Policy 2. Develop streetscape design standards for landscaping, lighting, street furniture, sidewalks, and public art in priority areas.

Transportation Goal 4: Sidewalks, trails, and bikeways shall be connected within the city and between adjacent cities.

Policy 3. Support the construction of new sidewalk and trail connections identified in the Gold Line Station Area Plans.

Policy 6. Support the rehabilitation and reconstruction of complete streets that enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities.

Policy 7. Support the rebuilding of the 4th Street Bridge over I-694 to include space for a dedicated pedestrian walkway and bus rapid transit guideway.

Policy 8. Support the addition of a pedestrian walkway adjacent to the 4th Street Bridge over I-694 to improve access to the Helmo transit station from the west side of I-694.

Transportation Goal 5: Transit service shall improve mobility options for residents, workers, businesses and transit dependent persons.

Policy 1. Collaborate with Metro Transit to assess current transit service and improve transit service for residents, workers, businesses and transit dependent residents.

Policy 2. Collaborate with Metro Transit to assess and improve transit facilities and sidewalk and trail connections to and from transit facilities.

Policy 3. Collaborate with Metro Transit to develop bus connections between employment and residential areas in the City and the Gold Line bus rapid transit station areas.

Parks and Trails Goal 2: Recreational programming, park facilities and open space shall be accessible to all physical abilities and incomes.

Policy 1. Develop a plan to ensure programming, parks and open spaces are accessible for all abilities and incomes.

Policy 2. Develop a plan to ensure the public use of open space, including wetlands, is open to all pedestrians and bicyclists.

Housing Goal 1: All people, regardless of age, income, family status, ability, race or ethnicity, shall have realizable choices and access to a safe, stable, and affordable home.

Housing Choice Policies

Policy 1. Guide and zone land to facilitate and promote the construction of a full range of housing choices to include single-family detached homes, twinhomes, townhomes, duplexes-fourplexes, and multifamily buildings.

Policy 2. Promote the development of a variety of housing types within close proximity and safe pedestrian access to shopping and services, including transit, and schools, parks, trails, and open space.

F. Consistency with Livable Communities Act

The Helmo Station BRTOD project is consistent with the following Livable Communities Act goals established by the Metropolitan Council:

- Interrelating development or redevelopment and transit;
- Interrelating affordable housing and employment growth areas;
- Intensifying land use that leads to more compact development or redevelopment;
- Involving development or redeveloping that mixes incomes of residents in housing, including introducing or reintroducing higher value housing in lower income areas to achieve a mix of housing opportunities; and/or
- Encouraging public infrastructure investments which connect urban neighborhoods and suburban communities, attract private sector development investment in commercial and residential properties adjacent to the public improvement, and provide project area residents with expanded opportunities for private sector employment.

The Helmo Station PUD allows for the development of a new transit oriented mixed use neighborhood centered on the Helmo Station BRT hub and an enhanced open space corridor. The Helmo Station PUD replaces a previous office warehouse PUD, effectively intensifying the land use of the project area into a more compact, efficient development pattern. The new mixed use neighborhood will allow a density of development that supports a range of housing types and price points, as well as opportunities for employment and commerce. The project area infrastructure provides a multimodal corridor supporting the BRT line, walking, biking, and auto traffic. The Helmo Station BRTOD area will connect suburban residents to employment opportunities and additional transit connections in downtown St. Paul via the new Gold Line BRT and connect residents along the Gold Line to employment opportunities in Oakdale.

3. **LAND USE**

The land use framework diagram (Figure 6) illustrates the new development patterns and identifies the types of station area uses. On many parcels, a mix of vertical uses is permitted. Where parcels contain a vertical mix of uses, the predominant land use is indicated.

A. Land Use Goals

1. Maximize development potential based upon existing adjacent uses and site attributes.
2. Maximize utilization of existing and planned improvements such as planned BRT within street rights-of-way, stormwater, and other utilities.

FIGURE 6. LAND USE FRAMEWORK

B. Residential Land Use Areas

The Helmo Station area offers the opportunity for a significant amount of multi-family development with direct access to the BRT station. Multi-family housing types, include apartments and townhomes, providing development flexibility and arranged with the highest density nearest the station (generally within 1/8 mile) and lower density adjacent to existing neighborhoods (generally within 1/4 mile of the BRT station).

1. Development shall avoid an institutional, repetitive, 'apartment complex' character and shall have varied architecture.
2. Development shall front the BRT station or the neighborhood park to create an urban street edge that defines and creates a vibrant pedestrian friendly public space. Primary building access/lobbies shall be from the street, green spaces, or pedestrian corridors rather than solely from internal parking lots or structures.
3. Parking shall be located behind, within buildings, or in structures. Design techniques that minimize parked car visual impacts from streets and the disruption of the pedestrian environment shall be utilized.
4. Along Helmo Avenue and the realigned Hudson Boulevard, buildings shall be oriented with windows, doors and lobby entries facing toward the street and BRT station.

TABLE 1. RESIDENTIAL DEVELOPMENT SUMMARY, PERMITTED USES, AND PARKING STANDARDS

PERMITTED USES	DENSITY	HEIGHT	DEV. TOTAL	PARKING	PARKING TOTAL
	Dwelling units per acre	Stories (max)	# of Units	Spaces/unit	Approx. Spaces
EAST of BRT GUIDEWAY					
Multi-family High Density (HD): Multifamily Buildings	30-50 du/ac	3 to 6*	484-594 units	1.5/unit (max)	726 to 891
Multi-family Medium Density (MD): Townhomes; 3-8 Unit Multifamily Buildings	15-24 du/ac	2 to 3*	69-119 units	2/unit (max)	138-238
WEST of BRT GUIDEWAY					
Multi-family High Density (HD): Multifamily Buildings	30-50 du/ac	4 to 6	232	1.5/unit (max)	348
* See Sec. 3C.c. (p.10)					

C. Residential Development Performance Standards

a. Setbacks

1) Maximum 10-foot Building Setback

A maximum 10-foot ground-floor building setback is required where residential front doors and windows are oriented to the sidewalk, park, or public right-of-way. The limited setback from the sidewalk or public areas allows for landscaping, stoops, patios or other semi-public areas that support a safe and inviting public realm and a degree of separation.

2) Along 4th Street North, buildings shall be set back at least 30 feet from the curb line to allow for a perimeter landscape zone that complements existing development on the north side of the roadway.

3) Buildings on the parcel at the southwest corner of 4th Street North and Helmo Avenue North shall be oriented to Helmo Avenue North

b. Active Edges
   1) Primary entrances shall be oriented toward the street. Quasi-public terraces, stoops or porches are encouraged.
   2) Windows shall be provided along facades.

c. Building Height
   1) Multifamily Medium Density buildings (including townhomes) are limited to two-floor (maximum) along the 4th Street frontage (three-floor (max) permitted with Council approval).
   2) Multi-family High Density buildings along the 4th Street frontage are limited to three residential stories.
   3) Other areas: Multi-family High Density buildings may be up to six stories in height.

d. Building Materials and Architectural Standards
   1) Exterior surface materials of residential buildings shall be subject to the standards for Office and Commercial buildings in Sec. 25-175(c).
   2) All building fronts shall include a minimum of four (4) from the following:
      i. Architectural detailing, such as cornice, awning, parapet, or columns.
      ii. A visually pleasing primary front entrance that, in addition to doors, shall be accented a minimum of one hundred fifty (150) square feet around the door entrance for single occupancy buildings and a minimum of three hundred (300) square feet for the front of multi-tenant buildings. Entrances shall be clearly articulated and obvious from the street or sidewalk.
      iii. Contrasting, yet complementary material colors.
      iv. A combination of horizontal and vertical design features.
      v. Irregular building shapes.
      vi. Horizontal offsets of at least 4 feet in depth.
      vii. Vertical offsets in the roofline of at least four feet.
      viii. Fenestration at the first floor level which is recessed horizontally at least 1 foot into the façade.
      ix. Varying roof lines and roof accents.
      x. Other similar architectural features in the overall architectural concept.
   3) Multi-story buildings shall have the ground floor distinguished from the upper floors by having one or more of the following:
      i. Awning
      ii. Trellis
      iii. Arcade
      iv. Window lintels
      v. Intermediate cornice line
      vi. Brick detailing such as quoins or corbels

D. Retail Land Use Areas

A limited amount of retail concentrated at the Helmo Station serves existing area residents, new multi-family and employment uses, with direct, convenient auto access from Helmo Avenue and the future Helmo Avenue/BRT bridge. Ground-floor retail uses are located within single-use and mixed-use buildings oriented to the Helmo Station.

1. Buildings shall front primary streets, such as the realigned Hudson Boulevard and Helmo Avenue, to create an urban street edge that defines a pedestrian friendly public space. Primary building access shall be oriented to the street, green spaces, or pedestrian corridors rather than to internal parking lots or structures.
2. Parking shall be located behind or within buildings, or in structures. Design techniques that minimize parked-car visual impacts from streets and the disruption of the pedestrian environment shall be utilized.
3. Retail shall be pedestrian-oriented. Curbside parking is required along the realigned Hudson Boulevard and portions of Helmo Avenue where ground-floor retail uses occur. This will require careful consideration of 'right-sized' travel lane widths and the exclusion of dedicated right-turn lanes.

TABLE 2. RETAIL DEVELOPMENT SUMMARY, PERMITTED USES, AND PARKING STANDARDS

PERMITTED USES*	DENSITY	HEIGHT	DEV. TOTAL	PARKING	PARKING TOTAL
	FAR	Stories (max)	Bldg. (sf)	Spaces/1000 sf	Spaces
EAST of BRT GUIDEWAY					
Retail: Sale of Merchandise and Services	Bldg. Ground floor	---	5,000	2.5/1000 sf (max)	13
WEST of BRT GUIDEWAY					
Retail: Sale of Merchandise and Services	.5 FAR/ Bldg. Ground floor	---	20,000 sf 5,000 sf	2.5/1000 sf (max)	63
* See Sec. 3.E. for complete list of permitted uses					

E. Permitted Uses:

1. Animal hospitals, excluding establishments with outside runs.
2. Antique shops.
3. Art galleries.
4. Bakeries.
5. Banks and financial institutions, excluding drive-in tellers.
6. Barber shops.
7. Beauty parlors.
8. Book and stationary stores.
9. Business machine sales and service shops.
10. Camera and photographic supply stores.
11. Catering establishments.
12. Candy and ice cream stores.
13. Clothes pressing and tailoring shop.
14. Clothing and costume rental.
15. Convenience stores.
16. Day Care Centers.
17. Drug stores.

18. Dry cleaning and laundering business of less than 5,000 square feet of floor area.
19. Electrical and household appliance stores, including radio and television sales and service.
20. Employment agencies.
21. Exercise spas or clubs.
22. Fabric stores.
23. Florist shop.
24. Furniture stores, including upholstering when conducted as an incidental part of the principal use.
25. Garden supply, tool, and seed stores.
26. Grocery stores.
27. Hardware stores.
28. Household furnishings, fixtures, appliances, and accessory stores.
29. Interior decorating stores and shops.
30. Jewelry stores.
31. Launderettes and dry cleaning establishments which provide automatic, self-service facilities.
32. Liquor stores, off sale.
33. Locksmith shops.
34. Musical instrument stores and repair shops.
35. Optical stores.
36. Paint and wallpaper stores.
37. Pet shops.
38. Phonograph record and sheet music stores.
39. Photography studios.
40. Picture framing and picture stores.
41. Repair stores and "fix-it" shops which provide services for the repair of home, garden, yard and personal use appliances.
42. Restaurants, including convenience food types and brew pubs.
43. Sporting and camping goods stores, excluding on-site sales of recreational vehicles and trailers.
44. Tailor shops.
45. Taverns.
46. Toy shops.
47. Travel bureaus and transportation ticket offices.

F. Prohibited Uses:
   1. Any use which emits an obnoxious odor, fumes, noise, or sound which can be heard or smelled outside of any building.
   2. Any operation primarily used as a warehouse operation, manufacturing, distilling, refining, smelting, agricultural, industrial, or mining operation; provided however, the foregoing distilling restriction shall not prohibit the brewing of beer or other brewed malt beverages in connection with a brewpub.
   3. Pawn shop, precious metal dealer, flea market, salvage store, or auction house.
   4. Manufactured home park, trailer court, labor camp, junkyard or stockyard.
   5. Mortuary or funeral home.
   6. Adult use establishments as defined and regulated in City Code Chapter 25, Article 21.
   7. Tattoo parlor.

8. Any unlawful or illegal purpose.
9. Any use that is a public or private nuisance.
10. Second hand stores.
11. Any use that has its primary business an auto service and repair or body shop repair operation.
12. Any fire sale, bankruptcy sale (unless pursuant to a court order) or auction house operation.
13. Automobile and other vehicle sales including used vehicle sales.
14. Drive-through lanes (serving permitted uses).
15. Motor fuel sales.
16. Motor fuel station car washes.
17. Vending machines.
18. Game rooms.
19. Self-storage.
20. Kennels.
21. Car washes.
22. Kiosk sales

G. Retail Performance Standards
 a. Setbacks
  1) Ground floor build-to lines
   i. Zero-foot Building Setback
    1. Ground-floor building facades must be built directly to the property line and abut the edge of the sidewalk, trail or public use area.
    2. Exceptions to the build-to line criteria are as follows:
     a. Ground-floor entrances to buildings may be recessed up to five feet behind the build-to line.
     b. Windows and walls may be recessed up to 18 inches from the build-to line to accommodate columns or other architectural elements that engage the build-to line.
     c. Interruptions to the build-to line created by passageways to courtyards, parking or other private spaces are permitted.
 b. Active Edges

 Active edges are characterized as building frontages with direct entries from the sidewalk and a high degree of transparency. Active edges increase visual and physical interaction between people inside and outside of the buildings, creating a safe and vibrant pedestrian environment. Access to service/loading bays and parking lot/garage entrances are prohibited along designated active edge frontages.
  i. A minimum of 70 percent transparent glass or screens is required along ground-floor facades, measured from datum line five feet from the ground extending from building edge to building edge; frosted, tinted, reflective glass or other types of glass that diminish transparency are prohibited.
  ii. Primary entrances to all ground-floor uses shall be oriented to the public right-of-way.
 c. Building Materials and Architectural Standards
  1) Exterior surface materials shall be subject to the standards for Office and Commercial buildings in Sec. 25-175(c).
  2) All building fronts shall include a minimum of four (4) from the following:
   i. Architectural detailing, such as cornice, awning, parapet, or columns.

ii. A visually pleasing primary front entrance that, in addition to doors, shall be accented a minimum of one hundred fifty (150) square feet around the door entrance for single occupancy buildings and a minimum of three hundred (300) square feet for the front of multi-tenant buildings. Entrances shall be clearly articulated and obvious from the street or sidewalk.
iii. Contrasting, yet complementary material colors.
iv. A combination of horizontal and vertical design features.
v. Irregular building shapes.
vi. Horizontal offsets of at least 4 feet in depth.
vii. Vertical offsets in the roofline of at least four feet.
viii. Fenestration at the first floor level which is recessed horizontally at least 1 foot into the façade.
ix. Varying roof lines and roof accents.
x. Other similar architectural features in the overall architectural concept.

3) Multi-story buildings shall have the ground floor distinguished from the upper floors by having one or more of the following:
   i. Awning
   ii. Trellis
   iii. Arcade
   iv. Window lintels
   v. Intermediate cornice line
   vi. Brick detailing such as quoins or corbels

H. Employment Land Use Areas

Employment uses consist of traditional professional office (where commercial or professional activities take place but where goods are not produced, sold, or repaired) and flex office (such as office/research and development/light manufacturing), on sites visible from 1-94 and adjacent to existing office uses with direct access and visibility from drive-by traffic from 4th Street.

1. Buildings shall front primary streets such as 4th Street and the realigned Hudson Boulevard and local streets to create an urban street edge that defines a pedestrian friendly public space. Primary building access/lobbies shall be oriented to the street, green spaces, or pedestrian corridors rather than internal parking lots or structures.
2. Parking shall be located behind, within buildings, or in structures. Design techniques that minimize parked car visual impacts from streets and the disruption of the pedestrian environment shall be utilized.
3. Parking structures shall be wrapped by office buildings or screened by landscaping or other means.

TABLE 3. EMPLOYMENT DEVELOPMENT SUMMARY

PERMITTED USES*	DENSITY	HEIGHT**	DEV. TOTAL	PARKING	PARKING TOTAL
	FAR	Stories (max)	Bldg. (sf)	Spaces/1000 sf	Spaces
EAST of BRT GUIDEWAY					
Flex Parcels Employment: Office/Industrial; Professional Office	0.5 to 1.0 FAR	2 to 6	31,500 sf to 223,844 sf	2/1000 sf (max)	64 to 449
4th Street North Employment: Professional Office	0.5 to 1.0 FAR	2	10,000 sf	2/1000 sf (max)	63
WEST of BRT GUIDEWAY					
Employment: Office/Industrial; Professional Office	1.0 FAR	6	94,300 sf	2/1000 sf (max)	189
*See Sec.3.I. ** See Sec. 3.J.c.					

I. Permitted Use Definitions:

1. Office/Industrial:
   a. Light Manufacturing: Any operation which assembles, improves, treats, compounds, and/or packages goods or materials in a manner which does not create a noticeable amount of noise, dust, odor, smoke, glare, or vibration outside of the building in which the activity takes place, which does not require outside storage of goods or materials and which does not generate objectionable amounts of truck traffic.
   b. Offices: Structures, or portions of structures, in which commercial or professional activities take place but where goods are not produced, sold, or repaired.
   c. Research and Development and Laboratory Uses: Medical, chemical, electrical, metallurgical or other scientific research conducted in accordance with the provisions of this Ordinance.
2. Professional Office: Structures, or portions of structures, in which commercial or professional activities take place but where goods are not produced, sold, or repaired.

J. Employment Performance Standards

a. Setbacks

1) Along 4th Street North, buildings shall be set back at least 30-feet from the curb line to allow for a perimeter landscape zone that complements existing development on the north side of the roadway.

2) Where Employment uses are located across the street from Residential uses, buildings shall be set back at least 20 feet from the property line to allow for a landscaped yard.

b. Site and Building Design

1) Primary entrances to all ground-floor uses shall be oriented to the public right-of-way.

2) Access to service/loading bays shall not be located on a street frontage across from Residential land uses.

3) Windows shall be provided along facades.

c. Building Height

1) Buildings are limited to two-floor (maximum) along the 4th Street frontage (three-floor (max) permitted with Council approval).

d. Building Materials and Architectural Standards

1) Exterior surface materials shall be subject to the standards for Office and Commercial buildings in Sec. 25-175(c).

2) All building fronts shall include a minimum of four (4) from the following:

i. Architectural detailing, such as cornice, awning, parapet, or columns.

ii. A visually pleasing primary front entrance that, in addition to doors, shall be accented a minimum of one hundred fifty (150) square feet around the door entrance for single occupancy buildings and a minimum of three hundred (300) square feet for the front of multi-tenant buildings. Entrances shall be clearly articulated and obvious from the street or sidewalk.

iii. Contrasting, yet complementary material colors.

iv. A combination of horizontal and vertical design features.

v. Irregular building shapes.

vi. Horizontal offsets of at least 4 feet in depth.

vii. Vertical offsets in the roofline of at least four feet.

viii. Fenestration at the first floor level which is recessed horizontally at least 1 foot into the façade.

ix. Varying roof lines and roof accents.

x. Other similar architectural features in the overall architectural concept.

3) Multi-story buildings shall have the ground floor distinguished from the upper floors by having one or more of the following:

i. Awning

ii. Trellis

iii. Arcade

iv. Window lintels

v. Intermediate cornice line

vi. Brick detailing such as quoins or corbels

K. Parks and Open Space Land Use Goals
   1. Neighborhood Park Goals
      a. A 1.93-acre park located south of 3rd Street and west of the existing Oaks Business Park stormwater pond is envisioned to include passive areas with a large open lawn and walkway with perimeter landscaping; small plaza/seating area.
      b. 2.21 acres of existing stormwater ponds (3rd Street and Helmo Avenue) are envisioned as a passive setting with increased tree cover, benches, perimeter landscaping and pathways.
   2. Open Space Goals
      a. The natural area west of the transit station provides an opportunity for nearby nature and passive recreation for the new neighborhood.
      b. A portion of Battle Creek runs through the area and varied topography may allow for the creation of spaces for intimate wildlife viewing areas as well as broad vistas looking to the north and south.
      c. This area may be managed to improve the ecological function of the various plant communities while providing trails, boardwalks, and gathering spaces.

L. Station Plaza Land Use Goals
   1. The Station Plaza shall consist of a primarily paved area to allow for pass through and flexibility for assembly of staged events/activities and daily use gathering and social interaction.
   2. Amenities will be provided such as fixed or moveable seating, tables, and lighting; canopy trees to provide shade and tree cover and possible perimeter plantings or planters to increase visual interest and quality of the public space.
   3. Public art may be integrated with the BRT station and shelter design.
   4. Consolidated bicycle parking and/or a bike station (covered or enclosed building) with secure bike parking, possibly showers/restrooms, lockers and ancillary uses such as repair services or a café may be provided.

M. BRT Park-and-Ride Land Use Goals
   1. Retail and commercial sites with a minimum dimension of 30 feet and oriented to the realigned Hudson Boulevard should be reserved along the north side of the park-and-ride to ensure an active station environment and the continuation of retail and commercial storefronts along the street.
   2. Primary park-and-ride access should be located on the rear of the site along the existing Hudson Boulevard and below the planned future Helmo Avenue bridge.

N. Performance Standards for all Uses
   1. Screening of Utilities
      a. All mechanical equipment located on the roof or around the perimeter shall be screened from ground level view with materials that are comparable and compatible with that of the exterior building materials. Mechanical equipment located on the roof shall be screened at a distance of 2.5 times the height of the building.
         1) A raised parapet or other architectural feature that is an integral part of the building is encouraged as a method of screening for rooftop mechanical equipment or to soften the rooftop view.

2) Screening for rooftop mechanical equipment shall incorporate similar architectural features of the building and/or be constructed of a material and color compatible with other elements of the building.

b. All ground mechanical equipment shall be one hundred percent (100%) screened from view by opaque landscaping or a screen wall shall be provided to be compatible with the architectural treatment of the principle building.

2. Trash Handling
    a. All trash, recycling and related handling equipment shall be stored within the principal structure, within an attached structure accessible from within the principal structure, or within an unattached structure. Such attached storage area shall be separated from the principal structure by a firewall. Recycling areas shall also be provided. Trash, recycling, and rubbish receptacles shall be totally screened from eye level view from public streets and adjacent residential properties. Such structure shall be of the same material and architecturally harmonious with principal structure and shall be enclosed by a roof and readily served through a door or gate system properly designed and constructed for abusive use.
3. Loading Areas
    a. The perimeter views of all external loading and service areas and any areas of outdoor storage must be screened from residential uses and adjacent public streets and the public front and office sides of all commercial and industrial uses, except at access points. Such screening can be accomplished through:
        1) The placement of the building on the lot or the placement of a building on an adjacent lot.
        2) Through the use of berming and landscaping (80% opaque at the time of maturity). Planting screens shall consist of healthy, hardy plant materials at least 6 feet in height.
        3) If screen walls are proposed, the materials used shall be of similar type, quality, and appearance as that of the principal structure. Such screens shall be at least 6 feet in height and provide a minimum opaqueness of 80 percent.
        4) Screen walls that are in disrepair shall be repaired. Planting screens shall be maintained in a neat and healthful condition. Plantings that have died shall be promptly replaced.
4. Site Amenities
    a. All development shall incorporate at least three of the following:
        1) Patterned materials on walkways (on-site)
        2) Bicycle racks
        3) Trash receptacles (decorative)
        4) Pedestrian lighting
        5) Fountains, sculptures, mobiles, kiosks, or banners
        6) Flower boxes, or container landscaping
5. Parking Lots and Circulation
    a. All development shall conform to the standards in Chapter 25, Article 18 Sec. 25- 161(b).
    b. Within private development, walkways shall be provided to separate pedestrians and vehicles, and shall link ground level uses within the site to the main building entry point, parking lot, and public sidewalks.

c. Where pedestrian walks cross drive aisles, they shall be clearly marked with signage, special paving, landscaping or similar methods.
d. All parking areas within the Helmo Station PUD shall be subject to the following standards for landscaping of islands, medians, and parking lot edges:
    1) Landscaping shall be distributed throughout the parking lot to define major vehicle and pedestrian routes, provide shade, and break-up large paved areas.
    2) A minimum of 1 deciduous shade tree shall be provided for each parking island.
    3) A landscaped area to include a mix of deciduous shade trees and understory plantings shall be provided in required parking lot setback areas.
    4) Landscaping shall incorporate a variety of deciduous and coniferous trees and shrubs for year-round interest, texture, shape, and seasonal color.
    5) Edge treatments should visually screen parked vehicles, but not completely obstruct views into and out of the parking lot. The following landscaping shall be provided:
        i. At least one row of shade trees spaced evenly at 15 to 20 foot intervals (or appropriate to the selected species) for the length of the parking lots edge. Trees can be clustered.
        ii. Screening, consisting of continuous planting, alone or in combination with a decorative fence/wall or a landscaped berm.

6. Landscaping
    a. All development shall conform to the standards for site landscaping in Chapter 25, Article 18 Sec. 25-175 (h) items (1)-(9).
7. Lighting
    a. All exterior lighting shall be designed and arranged to direct illumination away from adjacent properties. All exterior lighting shall be arranged and designed to illuminate directly below or inboard of the property lines of the property such that the point source of light is not directly discernable by pedestrian or vehicular traffic in the public right of way. Site lighting shall have a maximum height of 30’ to the illumination source. Lighting shall be designed such that there is a maximum 0.5 foot – candles at any property line. No offsite glare will be allowed. A photometric plan inclusive of all site lighting and specification sheets for each lighting fixture shall be submitted for review.
8. Signage
    a. Signage shall conform to the standards in Chapter 25, Article 19: Signs.

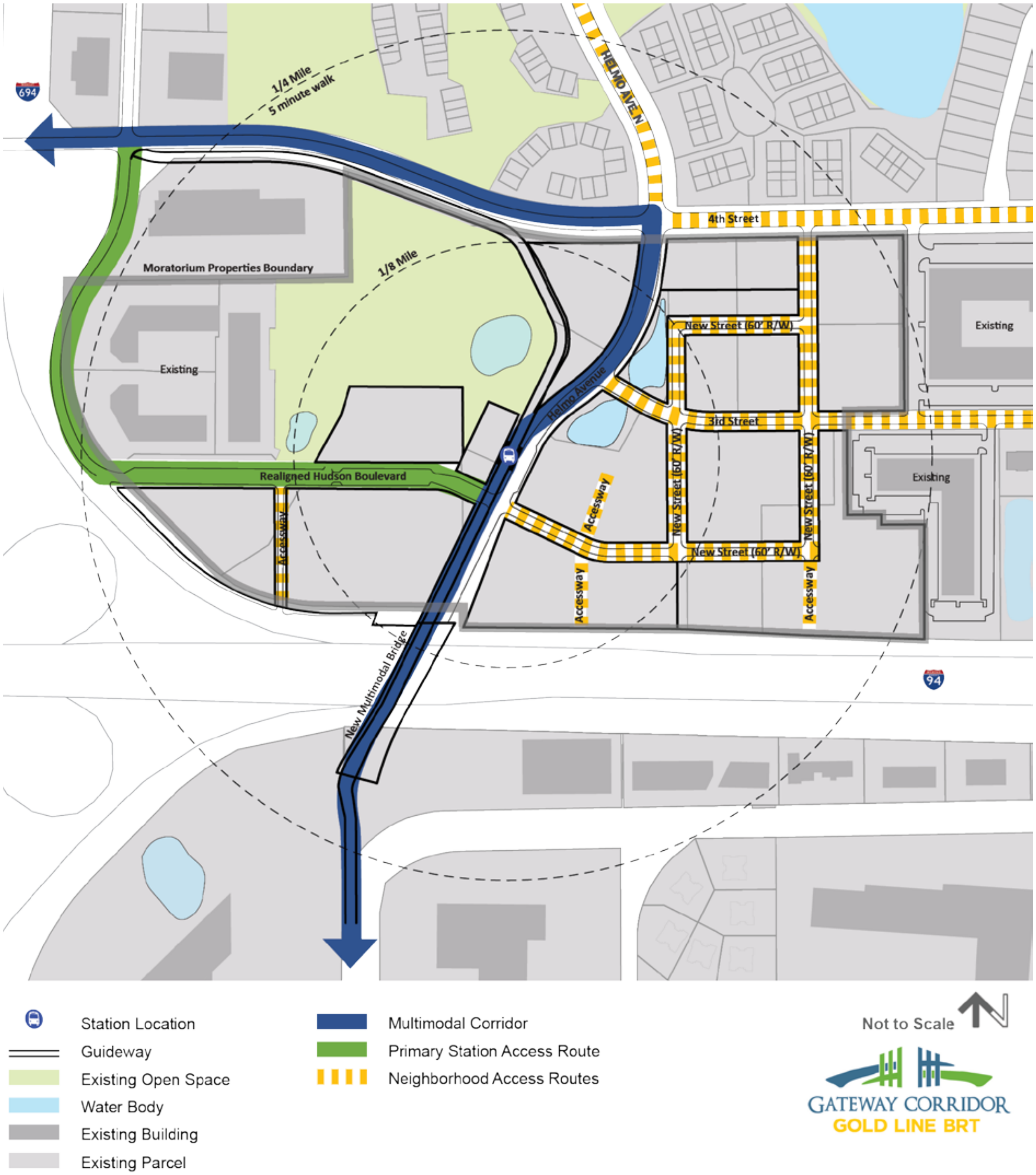
4. **CIRCULATION**

The goal of the circulation framework is to establish the Helmo Station as a hub for transit-oriented development through the creation of complete streets where facilities for all modes—auto, truck, transit, pedestrian, and bicycle—are adequately provided. These complete streets include essential auto and service access and 'right-sized' roadway travel lanes to preserve necessary mobility for existing collector and minor reliever roadways, while the new street grid provides access to development parcels on local streets that fosters pedestrian and bicycle friendly mixed-use development. A primary objective of the overall corridor-wide BRT is to integrate walking and biking adjacent to the BRT alignment and connecting BRT stations along the entire corridor.

A. Overall Circulation Improvements
   1. Include a BRT guideway and multi-use trail on the west side of Helmo Avenue North and on the I-94 bridge crossing to Bielenberg Drive.
   2. Realign Hudson Boulevard south of the Crossroads Properties building to provide a direct east/west connection to the Helmo Station/Helmo Avenue bridgehead and to the street grid east of Helmo Avenue.
   3. Construct a new street grid east of Helmo Avenue and south of 4th Street providing direct access to development parcels and existing Oaks Business Park.
   4. Add or expand trail segments within existing rights-of-way along 4th Street N., 3rd Street, and Helmo Avenue N.

A hierarchy of streets has been established to address both mobility and adjacent land use needs. The circulation diagram (Figure 7) illustrates the street types and locations required to provide station area and development parcel access. It establishes a development context including block scale and massing to support future land uses and a setting for placemaking. These street improvements will contribute to the creation of a distinct and attractive mixed-use transit-supportive district.

FIGURE 7. CIRCULATION FRAMEWORK DIAGRAM



MULTIMODAL CORRIDOR

B. Multi-Modal Corridor Goal

1. A primary objective of the overall corridor-wide BRTOD Plan is to integrate walking and biking adjacent to the BRT alignment and connecting BRT stations along the entire corridor.

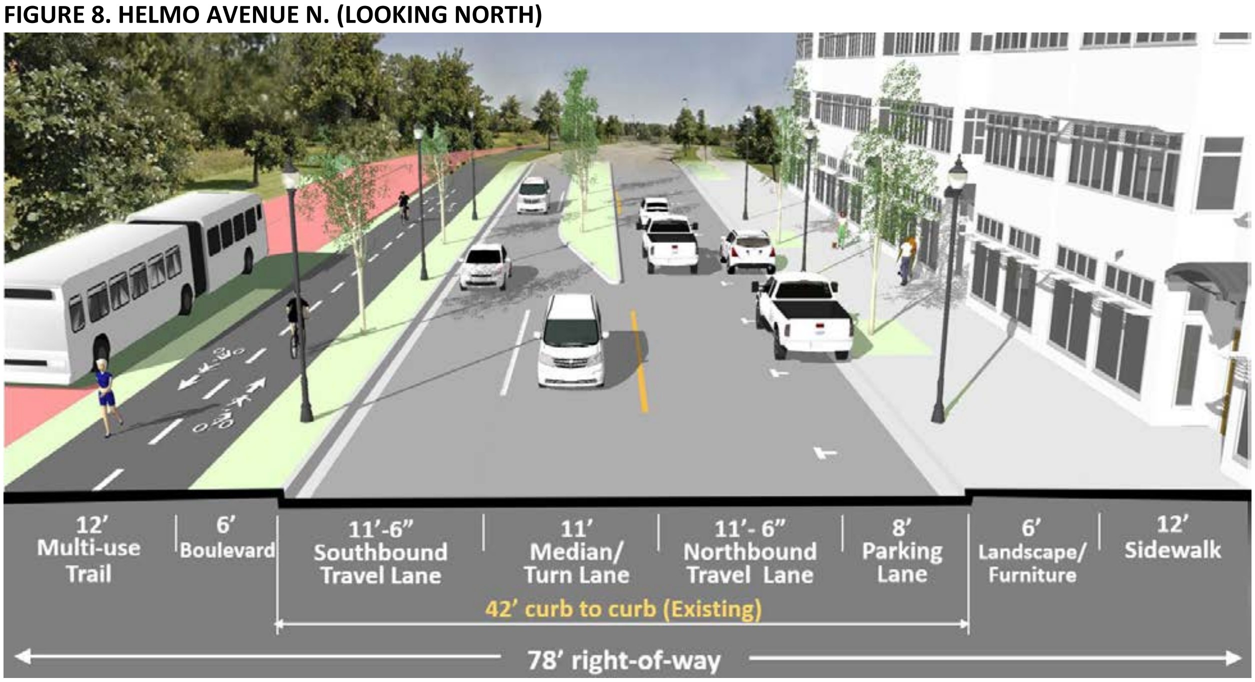
C. Multi-Modal Corridor Performance Standards

1. Incorporate a multi-use trail into the rights-of-way along Helmo Avenue (north to south from 4th Street to the Helmo Avenue bridge and crossing I-94 to Bielenberg Drive) and 4th Street

(east to west from Helmo Avenue to the bridge crossing I-694 to Hadley Avenue N.). Paralleling the BRT route, this multi-use trail will connect to the station at Greenway Avenue to the east and to the Tamarack Station to the south in Woodbury.

2. Add a 12-foot wide multi-use trail along the west side of Helmo Avenue (widening to 16 feet south into Woodbury) connecting the planned Helmo Avenue bridge multi-use trail to an existing 8-foot multi-use trail on the north side of 4th Street.
3. Expand the existing 8-foot wide trail to a 12-foot wide multi-use trail along the north side of 4th Street from Helmo Avenue to the 4th Street bridge.
4. Helmo Avenue North (Figure 8).
    a. A 6-foot landscaped boulevard and 12-foot paved asphalt multi-use trail shall be located on the west side of the roadway.
    b. Pedestrian-scaled street lighting and street trees shall be located between the curb and the trail or sidewalk.
    c. The existing three-lane roadway shall be re-striped to include a curbside parking lane on the east side of the roadway. Existing curb-to-curb dimensions allow for addition of the parking lane while maintaining adequate travel lanes.
    d. A wide sidewalk with landscaping and outdoor seating area shall be located adjacent to the curb and parking on the east side of the roadway, to support retail/commercial storefronts.

FIGURE 8. HELMO AVENUE N. (LOOKING NORTH)



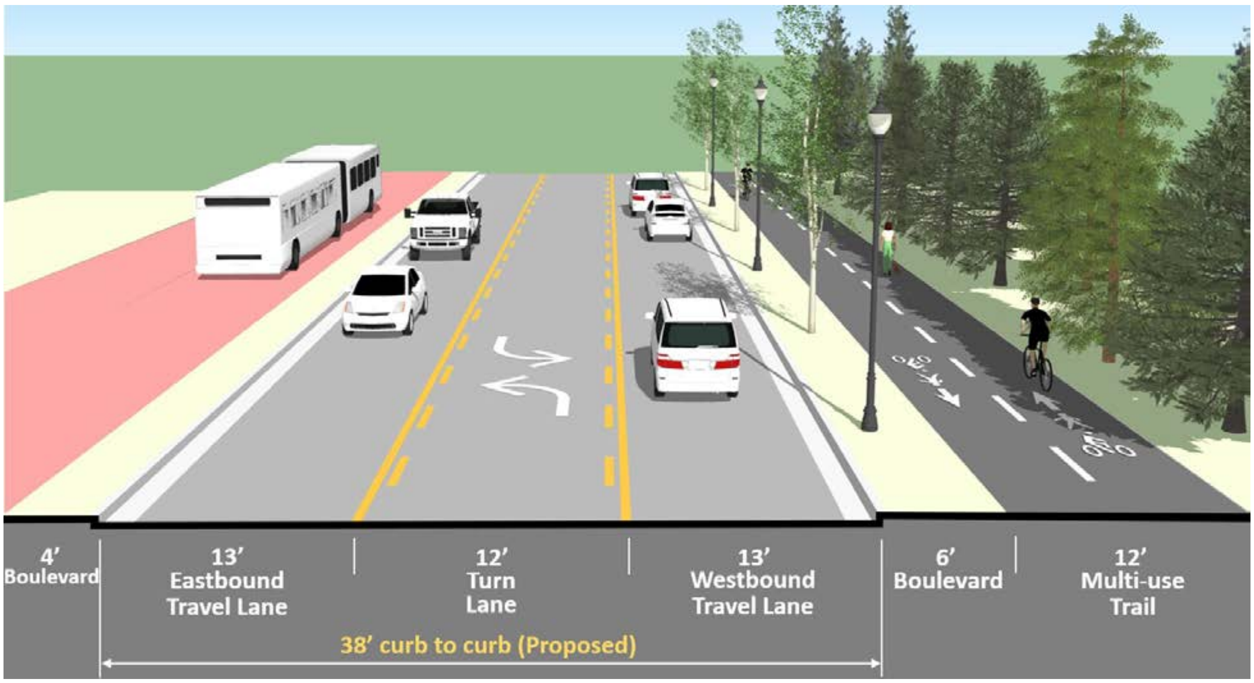
5. 4th Street North (Figure 9)
    a. The roadway may be widened to include an additional turn lane. Existing east/west travel lanes to remain.
    b. A landscaped boulevard and paved asphalt multi-use trail shall be located on the north side of the roadway from Helmo Avenue to the 4th Street bridge. The existing trail shall be widened by 4 feet and extended an additional 1,250 feet.

c. Pedestrian-scaled street lighting and trees shall be located between the curb and the trail on the north side of the roadway.

d. A landscaped boulevard that provides screening of the guideway with continuous plant material (up to three feet in height) shall be located on the south side of 4th Street North between the roadway and the BRT guideway.

e. A 30-foot landscape setback is required between the edge of the curb and building frontages along 4th Street to maintain and enhance the character of the landscaped roadway and compatibility with existing development. A layering of dense evergreen and deciduous plantings is required in the setback and shall be of similar variety and characteristics to the existing roadway plantings.

FIGURE 9. 4TH STREET NORTH (LOOKING WEST)



PRIMARY ACCESS ROUTES

D. Primary Access Route Goals

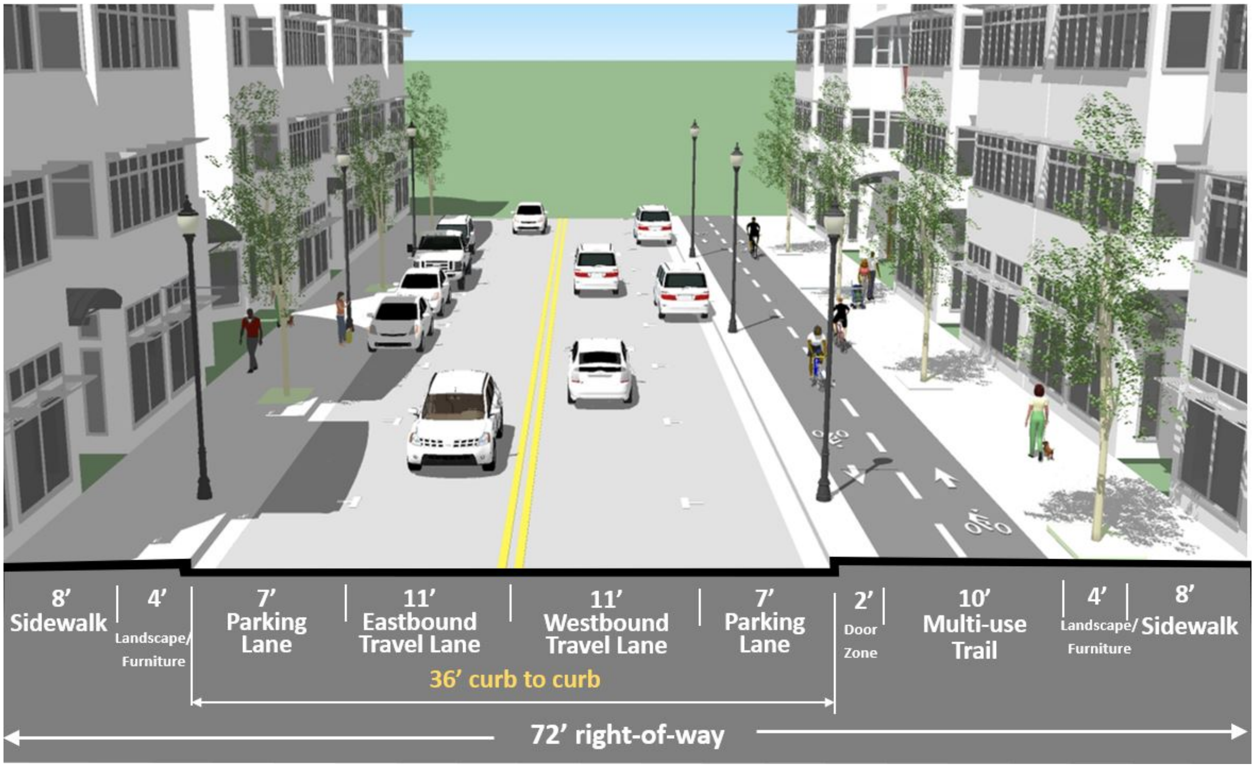
1. Serve as a primary pedestrian and bicycle access route to the station, linking the concentration of existing employment uses within a five-minute walk of the station with those further north and west of the station along I-694.
2. Establish a destination for storefront commercial uses that support an active BRT station environment.
3. Provide commuter access to park-and-ride.

E. Primary Access Route Performance Standards

1. Hudson Boulevard Extension (Figure 10)
   a. The Hudson Boulevard Extension shall be a two-way roadway with curbside parking on both sides of the street.
   b. A multi-use trail shall be located along the north side of the street between curbside parking and a sidewalk with street trees and seating furniture zone.
   c. Pedestrian-scaled street lighting shall be located between the curb and the multi-use trail.

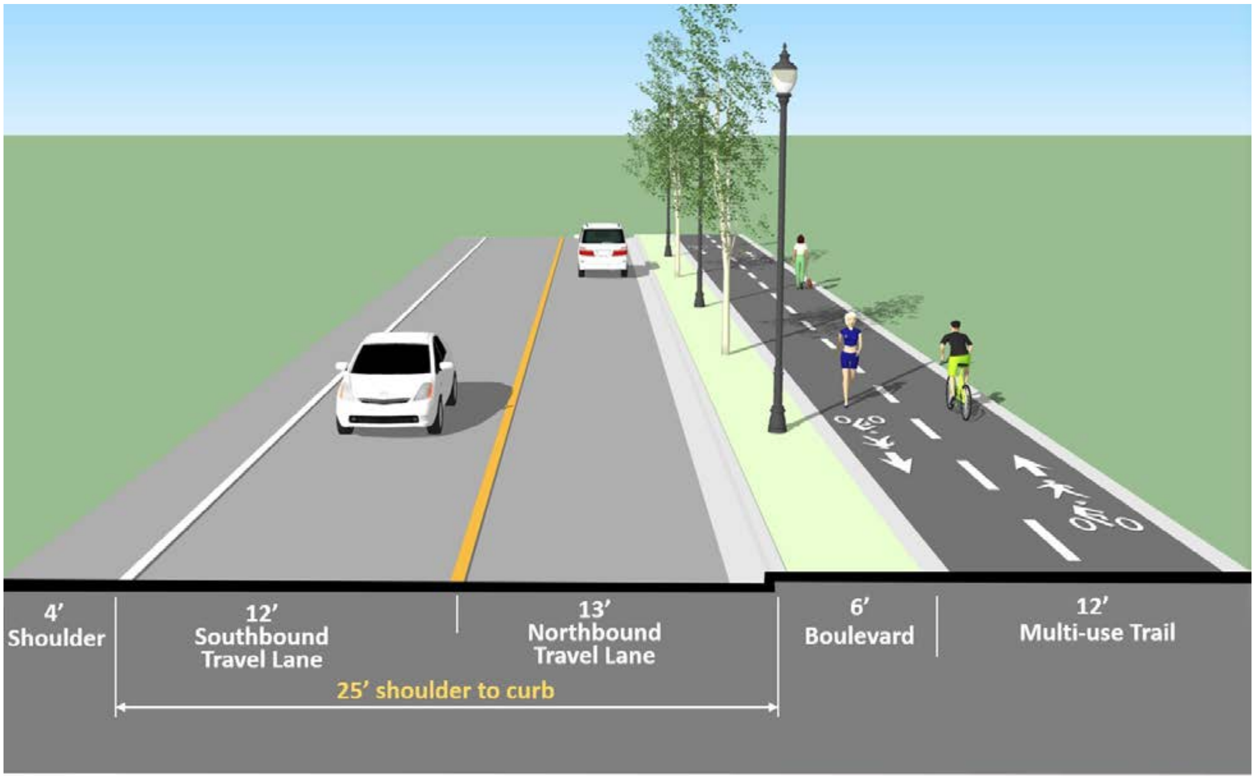
d. A wide sidewalk with landscaping and outdoor seating area shall be located adjacent to the curb and parking on the south side of the street.
e. Additional design elements may be incorporated to support retail/commercial storefronts.

FIGURE 10. HUDSON BOULEVARD EXTENSION (LOOKING WEST)



2. Hudson Boulevard Enhancement (Figure 11)
   a. Existing conditions on the west side roadway shoulder and existing travel lanes to remain.
   b. A new curb and 6-foot landscaped boulevard shall be located on the east side of the roadway with pedestrian-scaled street lighting and street trees located between the curb and a multi-use trail.
   c. A new 12-foot paved asphalt multi-use trail shall be located on the east side of the roadway between the landscaped boulevard and the existing Crossroads of Oakdale property.

FIGURE 11. HUDSON BOULEVARD ENHANCEMENT (LOOKING NORTH)



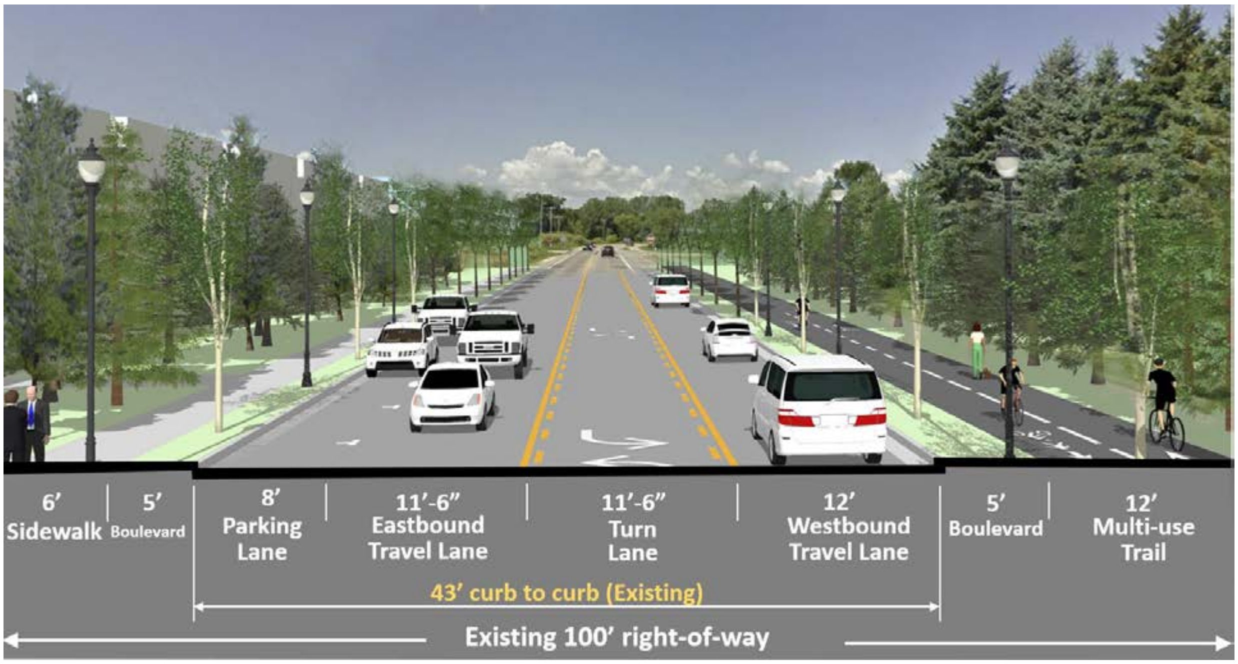
NEIGHBORHOOD ACCESS ROUTES

F. Neighborhood Access Route Goals
   1. Ensure that the mobility of existing arterial streets is not degraded.
   2. Provide alternate routes for automobiles to disperse traffic away from the intersection of 4th Street and Helmo Avenue N.
   3. Establish intimately-scaled blocks that support walking and biking to transit, parks/open space, and commercial uses located at the BRT station.
   4. Minimize impacts on existing neighborhoods with improved walking and biking access to station area destinations.
   5. Provide direct and convenient access to the future BRT station for all transportation modes.

G. Neighborhood Access Route Performance Standards
   1. 4^{th} Street North (Figure 12)
      a. A landscaped boulevard and 4-foot widened asphalt paved multi-use trail shall be located on the north side of the roadway.
      b. Pedestrian-scaled street lighting and street trees shall be located between the curb and the multi-use trail.
      c. The existing three-lane roadway may be re-striped to include a curbside parking lane on the south side of the roadway. Existing shoulder-to-curb dimensions allow for addition of the parking lane and adequate travel lanes for autos.
      d. A sidewalk with landscaped boulevard on the south side of the roadway shall be constructed with future development.

e. A 30-foot landscape setback is required between the edge of the curb and building frontages along 4th Street to maintain and enhance the character of the landscaped roadway and compatibility with existing development. A layering of dense evergreen and deciduous plantings is required in the setback and shall be of similar variety and characteristics to the existing roadway plantings.

FIGURE 12. 4TH STREET N. (LOOKING WEST)

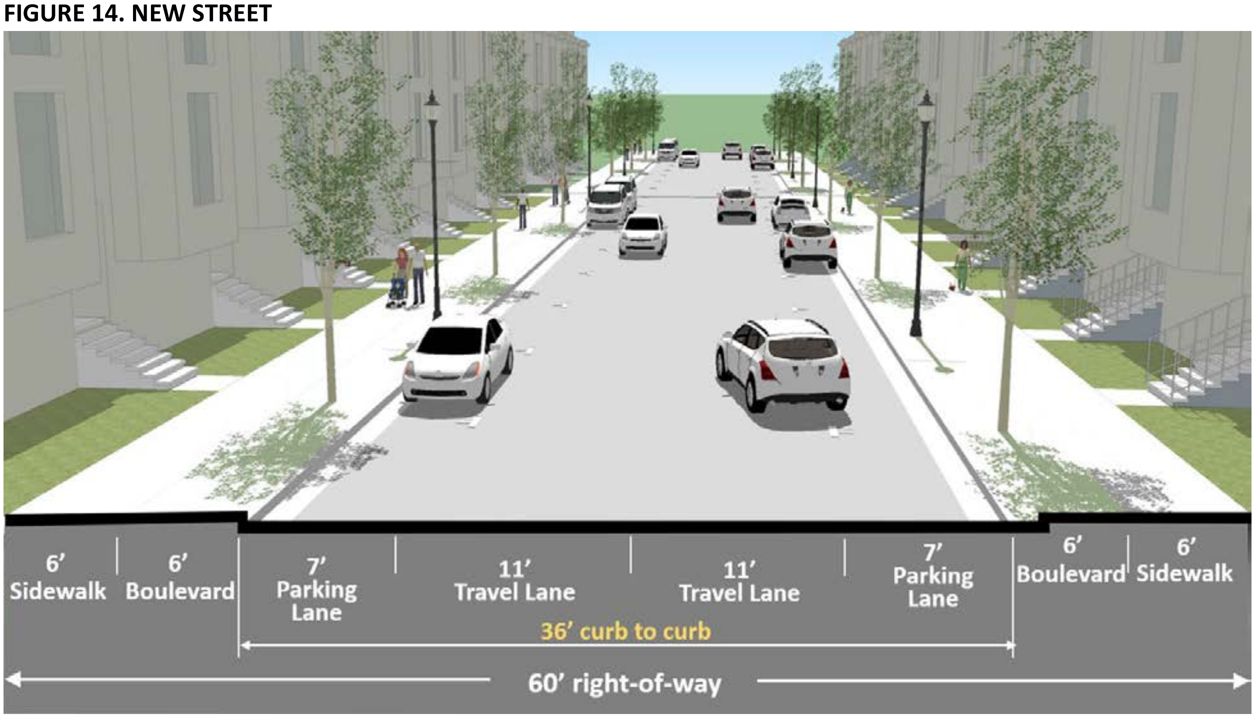


2. 3rd Street North (Figure 13)
   a. The existing travel lanes shall be reduced from 17'-6" to 11'-6" (6-foot reduction for each lane) and an 8-foot parking lane shall be added along the north side of the street.
   b. The north side curb shall be relocated and replaced, thereby reducing the curb- to-curb distance from 35 feet to 31 feet.
   c. A new ten-foot multi-use trail shall be located between the boulevard and residential development on the north side of the street.
   d. Pedestrian-scaled street lighting shall be added on both sides of the street.

FIGURE 13. 3RD STREET N. (LOOKING WEST)

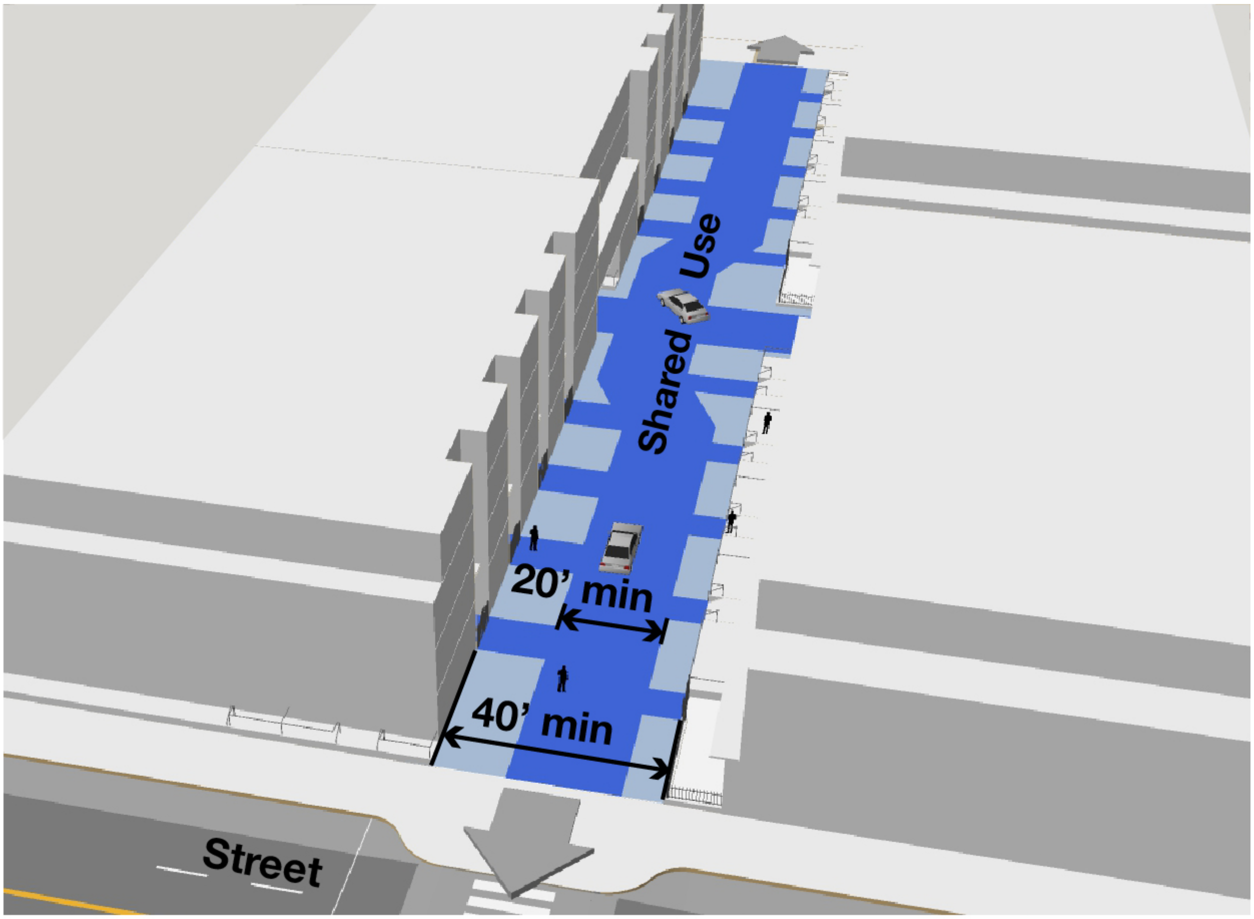
3. New Streets 2nd Street N., etc. (Figure 14)
    a. New streets shall consist of a two-lane roadway with curbside parking on both sides of the street.
    b. Sidewalks and boulevards with street trees shall be located adjacent to curbside parking on both sides of the street.
    c. Pedestrian-scaled street lighting shall be located between the curb and sidewalk

FIGURE 14. NEW STREET



4. Access Ways (Figure 15)
   a. Access ways shall have a maximum overall width of 40 feet.
   b. Access ways shall consist of a maximum 20-foot paved shared-use pathway for autos, pedestrians and bicycles, and fire vehicle access.
   c. 10-foot wide landscaped plantings beds shall be located between the building and the shared-use pathway; this area may include paved seating areas for outdoor activity and gathering.

FIGURE 15. ACCESS WAY



MnDOT Metro District
1500 West County Road B-2
Roseville, MN 55113

June 20, 2018

Wayne Sandberg, P.E.
Washington County Engineer
Public Works Department
11660 Myeron Road N.
Stillwater, MN 55082

Re: Letter of Support for Washington County Metro Council/Transportation Advisory Board 2018 Regional Solicitation Funding Request for Helmo/Bielenberg Bridge Project

Dear Mr. Sandberg,

This letter documents MnDOT Metro District's support for Washington County's funding request to the Metro Council for the 2018 regional solicitation for 2022-23 funding for the Helmo/Bielenberg Bridge project.

As proposed, this project would impact MnDOT right-of-way on Interstate 94. As the agency with jurisdiction over I-94, MnDOT will support Washington County and will allow the improvements proposed in the application for the Helmo/Bielenberg Bridge project. Details of a future maintenance agreement with Washington County will need to be determined during project development to define how the improvements will be maintained for the project's useful life.

No funding from MnDOT is currently programmed for this project. In addition, the Metro District currently does not anticipate any available discretionary funding in years 2022-23 that could fund project construction, nor do we have the resources to assist with construction or with MnDOT services such as the design or construction engineering of the project. However, I would request that you please continue to work with MnDOT Area staff to coordinate project development and to periodically review needs and opportunities for cooperation.

MnDOT Metro District looks forward to continued cooperation with Washington County as this project moves forward and as we work together to improve safety and travel options within the Metro Area.

If you have questions or require additional information at this time, please reach out to your Area Manager at Adam.Josephson@state.mn.us or 651-234-7719.

Sincerely,

Scott McBride
Metro District Engineer

CC: Adam Josephson, Metro District East Area Manager
Lynne Bly, Metro Program Director
Dan Erickson, Metro State Aid Engineer

Bielenberg / Helmo New Roadway calcs

Number of gallons

$L = 0.16$ miles
Stops = 0
Delay = 0

Total miles traveled − 10% of 10,500 = 1050 vph
−1050 vph · .16 miles = 168 veh·miles

F = Total travel · K1 + Total Delay · K2 + Stop · K3
= 168 · K1 + (0) · K2 + (0) · K3
= 168 · K1 + 0 + 0
= 168 · K1   K1 = see application
= 168 · .0378
= 6.35 gallons

$CO = F \cdot 0.0699$ kg/gal = 0.45 kg
$NO_x = F \cdot 0.0136$ kg/gal = 0.086 kg
$VOC = F \cdot 0.0162$ kg/gal = 0.11 kg

0.646 kg


P4
R4
E2
R8
FLEX 1
P3
R9
R3
PL1
P2
R5
R11
RET 1
E1
R1
R2
PR1
R6
R7
FLEX 2

HELMO STATION TRAFFIC STUDY-ADDENDUM

June 2018

Prepared by:
WSB and Associates
701 Xenia Avenue South, Suite 300
Minneapolis, MN 55416

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MAX RESIDENTIAL SCENARIO

The purpose of this addendum is to document the expected traffic impacts of two alternative scenarios to the proposed Transit Oriented Development around the Gold Line Bus Rapid Transit (BRT) Helmo Station. This scenario represents the maximum residential scenario, where the flex space is considered residential use.

The plan of the proposed development is shown in **Figure 17**. The proposed development will include:

- High density multi-family (also area shown as flex space)
- Medium density multi-family (also area shown as flex space)
- Employment and retail
- Office space
- Park and ride
- BRT station plaza
- New roads

Figure 17: Project Location and Proposed Development

In the Build scenarios, the developments are assumed to be fully built out. The trips generated by the development are shown in **Table 26 and Table 27** (**Table 4** in the original study identifies the trips generated by the Park and Ride Lot and Station Plaza). They are separated into west and east sections, depending on whether are proposed to west of Helmo Avenue or to the east. The existing business traffic to the immediate west of Helmo Avenue is assumed to go away in the Build scenario. The trip distribution of this development is assumed to be similar to the original study. The No Build scenario for this scenario will be identical to the original study.

Table 26: Max Residential West Development Trip Generation

Helmo Station PUD									
	Total 1000			AM Trips			PM Trips		
Future Use	SF/DU	ITE Code/Description	In	Out	Total	In	Out	Total	Weekday Trips
High Density Residential	232 Units	(220) Apartment	23	94	117	94	51	145	1,529
Retail	25.0	(820) Shopping Center	42	26	67	114	124	237	2,758
Professional Office	94.3	(710) General Office Building	161	22	183	31	153	184	1,256
Subtotal			**226**	**142**	**367**	**239**	**328**	**566**	**5,543**
Reductions		Transit/Walking(5%)	11	7	18	12	16	28	277
		Internal Trips Retail	4	6	10	16	24	40	250
		Internal Trips Residential	5	3	9	21	13	34	213
		Internal Trips Office	1	1	3	5	5	10	63
Subtotal Reductions			**22**	**18**	**39**	**54**	**58**	**112**	**802**
Total Trip Generation			**204**	**125**	**328**	**185**	**270**	**454**	**4,741**

Table 27: Max Residential East Development Trip Generation

Helmo Station PUD									
	Total 1000			AM Trips			PM Trips		
Future Use	SF/DU	ITE Code/Description	In	Out	Total	In	Out	Total	Weekday Trips
High Density Residential	594 Units	(220) Apartment	59	236	295	224	120	344	3,723
Medium Density Residential	119 Units	(230) Residential Condominium/Townhous e	10	49	59	46	23	69	748
Retail	5.0	(820) Shopping Center	16	10	25	39	42	81	969
Professional Office	31.5	(710) General Office Building	67	9	76	19	94	114	546
Subtotal			**152**	**304**	**455**	**328**	**280**	**608**	**5,986**
Reductions		Transit/Walking(5%)	8	15	23	16	14	30	299
		Internal Trips Retail	2	4	6	9	14	23	144
		Internal Trips Residential	4	2	6	15	7	22	138
		Internal Trips Office	1	2	2	3	6	9	56
Subtotal Reductions			**15**	**22**	**37**	**43**	**41**	**84**	**637**
Total Trip Generation			**137**	**282**	**419**	**285**	**239**	**524**	**5,349**

The estimated development generated new trips are shown in **Figure 18**. The development generated trips were added to the No-Build traffic volumes to estimate the 2028 Build traffic volumes which are shown in **Figure 19**. The development generated trips where added to the 2040 No-Build traffic volumes to estimate the 2040 Build traffic volumes which are shown in **Figure 20**.

Figure 18: Development Volumes – Max Residential Scenario

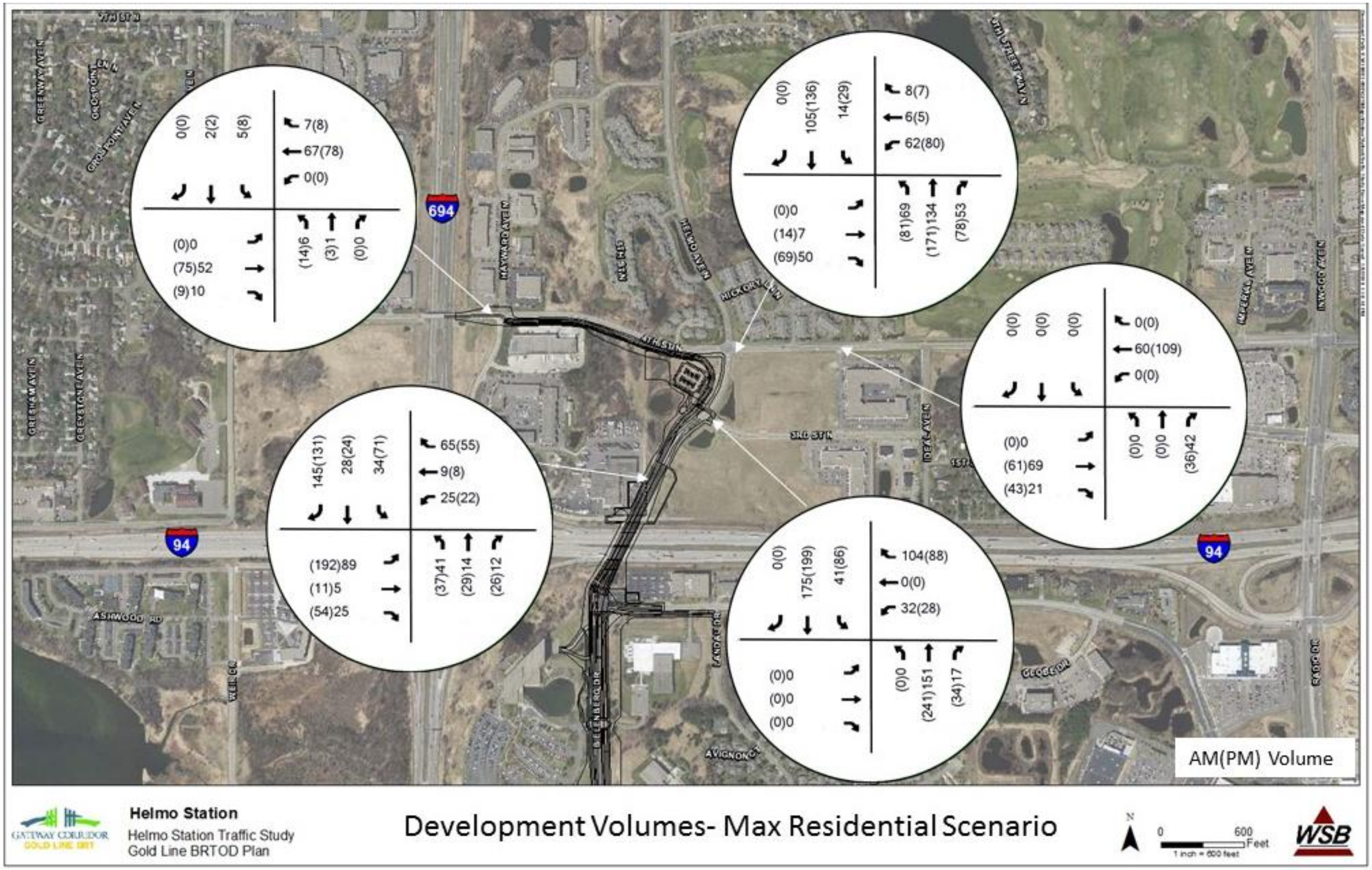


Figure 19: Build 2028 Forecasts – Max Residential Scenario

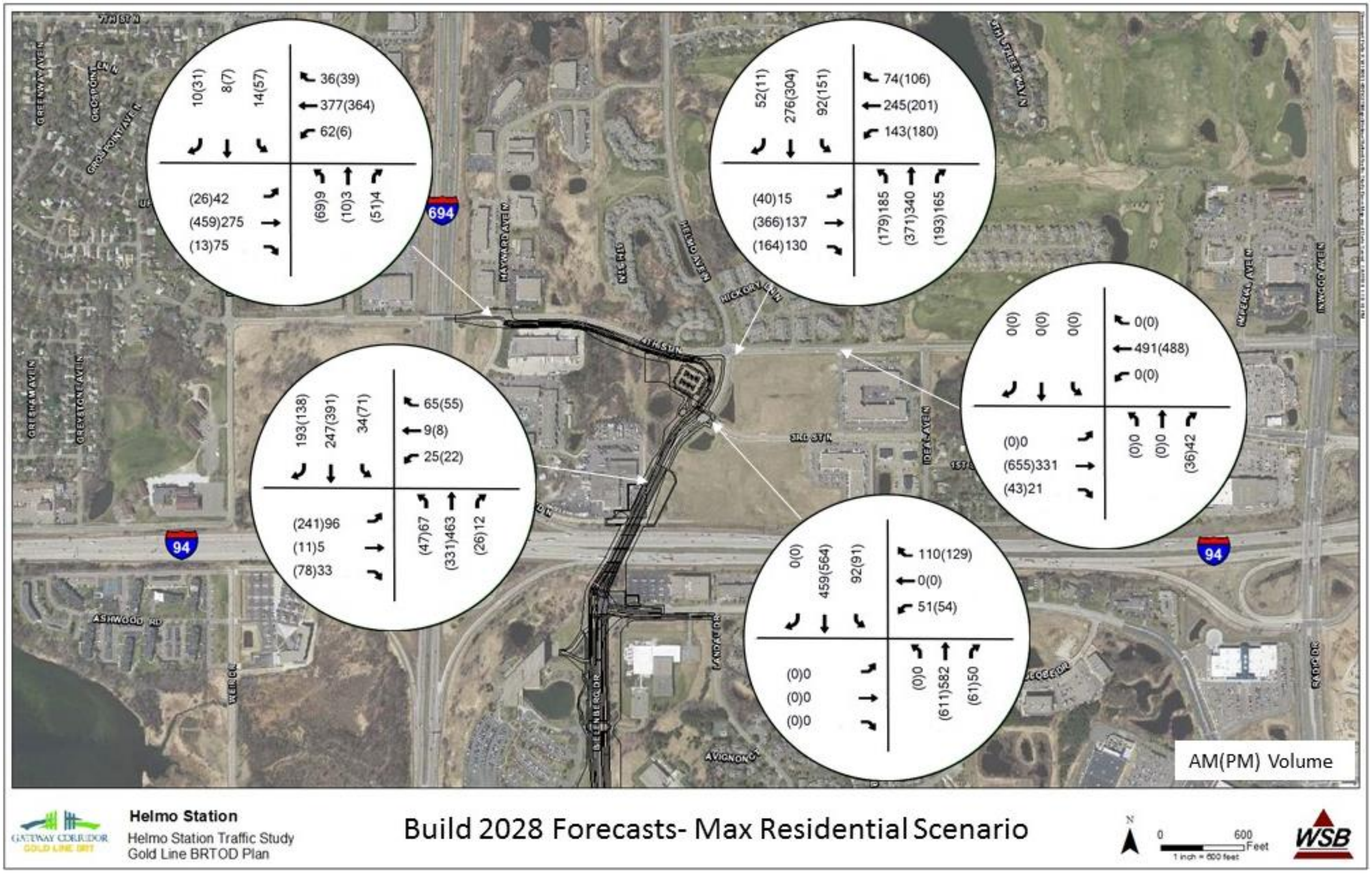
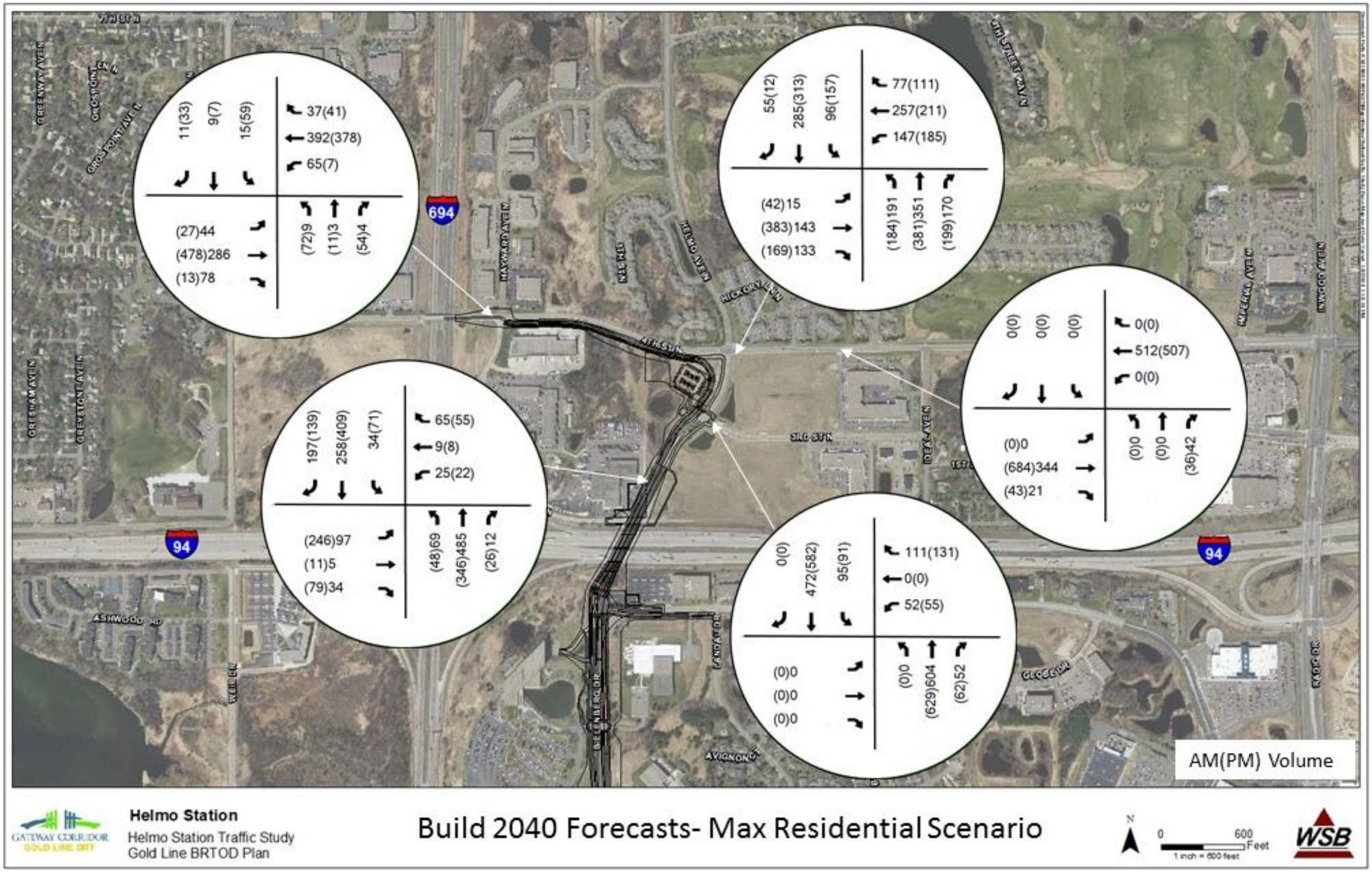


Figure 20: Build 2040 Forecasts – Max Residential Scenario



GATEWAY CORRIDOR GOLD LINE BRT

OPERATIONS ANALYSIS

The intersection operational analysis process includes determining the LOS for the key intersections under the various peak hour traffic conditions. Using the forecasted traffic volumes, Synchro/SimTraffic models were developed for each scenario, LOS and other Measure of Effectiveness (MOEs) were calculated. Further explanation of the Synchro/SimTraffic model and LOS can be found in **Appendix A** of the original study. The operational analysis evaluated the performance of the intersections under the following scenarios:

- Build 2028
- Build 2040

BUILD CONDITIONS 2028

The 2028 Build conditions were analyzed by adding the estimated development traffic to the 2028 No-Build traffic volumes. The forecasted 2028 Build traffic volumes were analyzed with the improved No-Build 2028 network. The results of the analysis can be seen in **Tables 28** and **29**.

Table 28: Build 2028 MOE - AM Peak Hour (7am – 8am)

Intersection		Appr	Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)		Appr	Average & Maximum Traffic Queueing (feet)								
Control	Location													Left-Turn			Through			Right-Turn		
			L	T	R	L	T	R	Delay	LOS	Delay	LOS		Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage
Thru-Stop	1: Hudson Blvd/Hayward Ave & 4th Street N	NB	13	12	2	B	B	A	10	B			NB				12	38				
		WB	6	5	4	A	A	A	5	A			WB				25	115				
		SB	11	13	5	B	B	A	10	B			SB				17	52				
		EB	4	3	1	A	A	A	3	A			EB				18	92				
Signalized	2: Helmo Ave & 4th Street N	NB	18	17	5	B	B	A	14	B	16	B	NB	63	171	100	101	224		17	144	100
		WB	21	18	5	C	B	A	17	B			WB	63	159	100	86	204		20	51	230
		SB	17	21	14	B	C	B	19	B			SB	39	150	180	110	241				
		EB	22	26	8	C	C	A	17	B			EB	4	22	150	61	136		39	94	150
Thru-Stop	3: Helmo Ave & 3rd Street N	NB	0	2	1	A	A	A	2	A			NB					4				
		WB	27	0	17	D	A	C	20	C			WB	68	159							
		SB	9	2	0	A	A	A	3	A			SB	33	75	200						
		EB	0	0	0	A	A	A	0	A			EB									
Thru-Stop	4: Helmo Ave & Hudson Blvd	NB	7	3	2	A	A	A	3	A			NB				36	190				
		WB	31	37	19	D	E	C	24	C			WB				50	151				
		SB	5	3	1	A	A	A	2	A			SB				18	122				
		EB	51	51	40	F	F	E	48	E			EB				82	217				
Thru-Stop	5: New Street & 4th Street N	NB	0	0	4	A	A	A	4	A			NB	24	49							
		WB	0	1	0	A	A	A	1	A			WB									
		SB	0	0	0	A	A	A	0	A			SB									
		EB	0	2	1	A	A	A	2	A			EB									

Table 29: Build 2028 MOE - PM Peak Hour (4:30 pm – 5:30 pm)

Intersection		Appr	Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)		Appr	Average & Maximum Traffic Queueing (feet)								
														Left-Turn			Through			Right-Turn		
Control	Location		L	T	R	L	T	R	Delay	LOS	Delay	LOS		Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage
Thru-Stop	1: Hudson Blvd/Hayward Ave & 4th Street N	NB	14	16	7	B	C	A	11	B			NB				44	94				
		WB	5	4	3	A	A	A	4	A			WB				3	46				
		SB	13	14	8	B	B	A	11	B			SB				35	99				
		EB	3	2	0	A	A	A	2	A			EB				10	73				
Signalized	2: Helmo Ave & 4th Street N	NB	21	24	9	C	C	A	19	B	23	C	NB	62	172	100	118	251		29	186	100
		WB	29	19	6	C	B	A	20	C			WB	86	202	150	85	237		31	118	230
		SB	26	26	20	C	C	C	26	C			SB	69	165	180	130	251				
		EB	23	37	12	C	D	B	29	C			EB	16	121	150	167	342		65	250	150
Thru-Stop	3: Helmo Ave & 3rd Street N	NB	0	2	1	A	A	A	2	A			NB				1	15				
		WB	32	0	18	D	A	C	22	C			WB	74	208							
		SB	7	2	0	A	A	A	3	A			SB	30	76	200						
		EB	0	0	0	A	A	A	0	A			EB									
Thru-Stop	4: Helmo Ave & Hudson Blvd	NB	7	3	2	A	A	A	3	A			NB				26	176				
		WB	34	45	18	D	E	C	25	D			WB				45	114				
		SB	5	4	2	A	A	A	4	A			SB				26	135				
		EB	406	417	390	F	F	F	403	F			EB				653	684				
Thru-Stop	5: New Street & 4th Street N	NB	0	0	7	A	A	A	7	A			NB	24	70							
		WB	0	1	0	A	A	A	1	A			WB					12				
		SB	0	0	0	A	A	A	0	A			SB									
		EB	0	4	2	A	A	A	4	A			EB									

As can be seen from the tables above, the intersections on Helmo Avenue perform at an unacceptable LOS. In order to mitigate the impacts of the additional traffic from the developments, improvements are needed to the intersections.

The 2028 Build recommended network includes the following improvements (**Figure 21**):

- Longer turn lanes at Helmo Avenue and 4th Street signal intersection (Storage needed: 150 ft. northbound left, 200 ft. northbound right, 220 ft. eastbound right)
- Longer turn lanes at Helmo Avenue and 3rd Street (Storage needed: 100 ft. northbound right, 160 ft. westbound left)
- Signal at the realigned Hudson Boulevard and Helmo Avenue intersection with turn lanes (Storage needed: 100 ft. northbound left, 100 ft. westbound right and left, 100 ft. southbound left, 200 ft. southbound right, 250 ft. eastbound left, 100 ft. eastbound right)
- Eastbound turn lane at the new connection to 4th Street on the east (Storage needed: 100 ft. eastbound right)

Tables 30 and **31** display the AM Peak and PM peak hour intersection LOS and queuing results. All the intersections are expected to operate at acceptable levels of service in the 2028 Build conditions with the improvements.

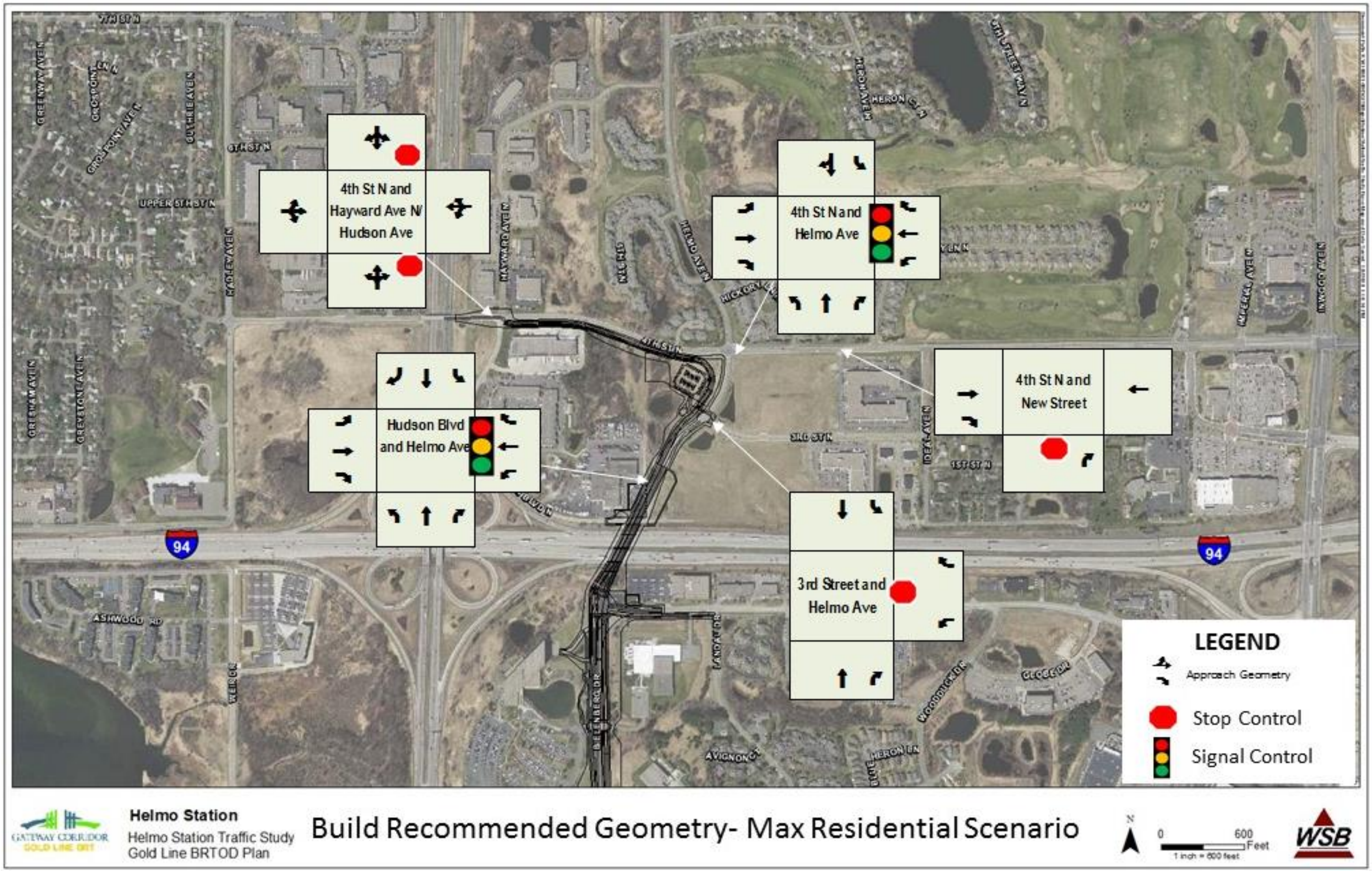
Table 30: Build 2028 MOE with Improvements- AM Peak Hour (7am – 8am)

Intersection		Appr	Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)		Appr	Average & Maximum Traffic Queueing (feet)								
Control	Location													Left-Turn			Through			Right-Turn		
			L	T	R	L	T	R	Delay	LOS	Delay	LOS		Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage
Thru-Stop	1: Hudson Blvd/Hayward Ave & 4th Street N	NB	12	12	3	B	B	A	10	B			NB				12	36				
		WB	6	5	4	A	A	A	5	A			WB				24	95				
		SB	12	13	4	B	B	A	10	B			SB				16	48				
		EB	4	3	1	A	A	A	3	A			EB				17	105				
Signalized	2: Helmo Ave & 4th Street N	NB	16	16	4	B	B	A	13	B	15	B	NB	57	132	150	88	196		10	39	200
		WB	18	15	4	B	B	A	14	B			WB	60	130	200	78	154		18	47	230
		SB	17	23	14	B	C	B	21	C			SB	39	145	180	111	235				
		EB	18	22	8	B	C	A	15	B			EB	4	19	150	53	131		39	86	220
Thru-Stop	3: Helmo Ave & 3rd Street N	NB	0	2	2	A	A	A	2	A			NB								4	100
		WB	22	0	8	C	A	A	12	B			WB	32	74					42	95	200
		SB	9	2	0	A	A	A	3	A			SB	33	89	160						
		EB	0	0	0	A	A	A	0	A			EB									
Signalized	4: Helmo Ave & Hudson Blvd	NB	9	8	2	A	A	A	8	A	8	A	NB	19	73	100	67	192				
		WB	18	20	8	B	C	A	12	B			WB	13	41	100	7	36		32	72	100
		SB	9	5	2	A	A	A	4	A			SB	13	50	100	33	94		10	61	200
		EB	18	18	4	B	B	A	15	B			EB	37	98	250	3	22		17	50	100
Thru-Stop	5: New Street & 4th Street N	NB	0	0	3	A	A	A	3	A			NB	17	40							
		WB	0	1	0	A	A	A	1	A			WB									
		SB	0	0	0	A	A	A	0	A			SB									
		EB	0	2	1	A	A	A	2	A			EB									

Table 31: Build 2028 MOE with Improvements - PM Peak Hour (4:30 pm – 5:30 pm)

Intersection		Appr	Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)		Appr	Average & Maximum Traffic Queueing (feet)								
Control	Location													Left-Turn			Through			Right-Turn		
			L	T	R	L	T	R	Delay	LOS	Delay	LOS		Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage
Thru-Stop	1: Hudson Blvd/Hayward Ave & 4th Street N	NB	14	14	7	B	B	A	11	B			NB				44	105				
		WB	5	4	3	A	A	A	4	A			WB				4	54				
		SB	13	13	7	B	B	A	11	B			SB				36	100				
		EB	3	2	1	A	A	A	2	A			EB				10	73				
Signalized	2: Helmo Ave & 4th Street N	NB	22	25	9	C	C	A	20	C	23	C	NB	65	171	150	132	283		29	180	200
		WB	23	17	6	C	B	A	17	B			WB	77	168	200	73	162		27	83	230
		SB	28	27	20	C	C	C	27	C			SB	67	140	180	126	267				
		EB	21	38	12	C	D	B	29	C			EB	17	148	150	163	326		59	173	220
Thru-Stop	3: Helmo Ave & 3rd Street N	NB	0	2	1	A	A	A	2	A			NB				1	24		1	23	100
		WB	43	0	9	E	A	A	19	C			WB	40	106					46	105	200
		SB	9	2	0	A	A	A	3	A			SB	33	83	160						
		EB	0	0	0	A	A	A	0	A			EB									
Signalized	4: Helmo Ave & Hudson Blvd	NB	10	9	2	B	A	A	9	A	13	B	NB	16	56	100	52	158		2	45	100
		WB	20	28	8	C	C	A	13	B			WB	10	38	100	7	28		27	63	100
		SB	9	8	2	A	A	A	7	A			SB	24	71	100	67	184		8	47	200
		EB	34	14	6	C	B	A	27	C			EB	109	235	250	8	101		28	64	100
Thru-Stop	5: New Street & 4th Street N	NB	0	0	6	A	A	A	6	A			NB	17	58							
		WB	0	1	0	A	A	A	1	A			WB									
		SB	0	0	0	A	A	A	0	A			SB									
		EB	0	3	2	A	A	A	3	A			EB									

Figure 21: Build 2028 Recommended Intersection Lane Configuration and Control – Max Residential Scenario



BUILD CONDITIONS 2028 – Without Some Right Turn Lanes

After the Build 2028 scenario improvements were identified, WSB analyzed the traffic operations without the following right turn lanes in an alternative configuration:

- Eastbound right turn lane from Hudson Boulevard to Helmo Avenue
- Eastbound right turn lane from 4th Street to Helmo Avenue.

The results of the analysis are shown in the tables below.

Table 32: Build 2028 MOE Without Some Right Turn Lanes - AM Peak Hour (7am – 8am)

Intersection		Appr	Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)		Appr	Average & Maximum Traffic Queueing (feet)								
Control	Location													Left-Turn			Through			Right-Turn		
			L	T	R	L	T	R	Delay	LOS	Delay	LOS		Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage
Thru-Stop	1: Hudson Blvd/Hayward Ave & 4th Street N	NB	12	11	3	B	B	A	10	B			NB				12	32				
		WB	5	5	4	A	A	A	5	A			WB				21	95				
		SB	12	12	3	B	B	A	9	A			SB				16	48				
		EB	4	3	1	A	A	A	3	A			EB				18	91				
Signalized	2: Helmo Ave & 4th Street N	NB	18	17	5	B	B	A	14	B	17	B	NB	65	170	150	98	198		16	64	200
		WB	19	14	5	B	B	A	14	B			WB	62	142	200	76	166		18	49	230
		SB	17	23	16	B	C	B	21	C			SB	40	148	180	112	264				
		EB	18	27	15	B	C	B	21	C			EB	8	64	150	104	202				
Thru-Stop	3: Helmo Ave & 3rd Street N	NB	0	2	2	A	A	A	2	A			NB							1	15	100
		WB	21	0	8	C	A	A	12	B			WB	32	75					42	96	200
		SB	9	2	0	A	A	A	3	A			SB	33	88	160						
		EB	0	0	0	A	A	A	0	A			EB									
Signalized	4: Helmo Ave & Hudson Blvd	NB	9	8	2	A	A	A	8	A	8	A	NB	21	77	100	66	180				100
		WB	19	18	8	B	B	A	12	B			WB	13	43	100	7	36		31	66	100
		SB	8	6	2	A	A	A	5	A			SB	13	46	100	38	105		12	61	200
		EB	18	20	5	B	C	A	15	B			EB	44	108	250	20	56				
Thru-Stop	5: New Street & 4th Street N	NB	0	0	3	A	A	A	3	A			NB	17	44							
		WB	0	1	0	A	A	A	1	A			WB									
		SB	0	0	0	A	A	A	0	A			SB									
		EB	0	2	1	A	A	A	2	A			EB									

Table 33: Build 2028 MOE Without Some Right Turn Lanes - PM Peak Hour (4:30 pm – 5:30 pm)

Intersection		Appr	Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)		Appr	Average & Maximum Traffic Queueing (feet)								
Control	Location													Left-Turn			Through			Right-Turn		
			L	T	R	L	T	R	Delay	LOS	Delay	LOS		Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage
Thru-Stop	1: Hudson Blvd/Hayward Ave & 4th Street N	NB	14	16	7	B	C	A	11	B			NB				43	96				
		WB	5	4	3	A	A	A	4	A			WB				3	42				
		SB	14	13	7	B	B	A	12	B			SB				36	101				
		EB	3	2	1	A	A	A	2	A			EB				11	70				
Signalized	2: Helmo Ave & 4th Street N	NB	41	32	12	D	C	B	29	C	41	D	NB	96	239	150	164	312		40	208	200
		WB	32	17	7	C	B	A	20	C			WB	90	202	200	76	187		30	76	230
		SB	42	32	23	D	C	C	35	D			SB	81	160	180	147	260				
		EB	59	81	76	E	F	E	78	E			EB	67	250	150	405	746				
Thru-Stop	3: Helmo Ave & 3rd Street N	NB	0	2	1	A	A	A	2	A			NB				1	28		1	18	100
		WB	34	0	9	D	A	A	16	C			WB	37	107					46	93	200
		SB	9	2	0	A	A	A	3	A			SB	33	80	160						
		EB	0	0	0	A	A	A	0	A			EB									
Signalized	4: Helmo Ave & Hudson Blvd	NB	10	9	2	B	A	A	9	A	14	B	NB	16	72	100	52	163		3	66	100
		WB	22	31	8	C	C	A	14	B			WB	11	38	100	7	34		27	62	100
		SB	10	8	2	B	A	A	7	A			SB	23	56	100	65	177		8	45	200
		EB	39	18	7	D	B	A	31	C			EB	123	247	250	39	154				
Thru-Stop	5: New Street & 4th Street N	NB	0	0	5	A	A	A	5	A			NB	17	62							
		WB	0	1	0	A	A	A	1	A			WB									
		SB	0	0	0	A	A	A	0	A			SB									
		EB	0	3	2	A	A	A	3	A			EB									

As can be seen from the tables above, there are some delay and queuing issues at the intersections due to the changes. At the 4th Street and Helmo Avenue intersection, the delays to the eastbound approach cause the intersection to operate poorly.

BUILD CONDITIONS 2040

The 2040 Build conditions were analyzed by adding the estimated development traffic to the 2040 No-Build traffic volumes and with all the intersection improvements identified in the 2028 Build Scenario. **Tables 34** and **35** display the AM Peak and PM peak hour intersection LOS and queuing results.

All the intersections are expected to operate at acceptable levels of service in the 2040 Build conditions. The Helmo Avenue and 4th Street intersection experiences slightly longer queues compared to 2028 but the delays remain acceptable.

Table 34: Build 2040 MOE - AM Peak Hour (7am – 8am)

Intersection		Appr	Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)		Appr	Average & Maximum Traffic Queueing (feet)								
Control	Location													Left-Turn			Through			Right-Turn		
			L	T	R	L	T	R	Delay	LOS	Delay	LOS		Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage
Thru-Stop	1: Hudson Blvd/Hayward Ave & 4th Street N	NB	12	13	4	B	B	A	10	B			NB				13	40				
		WB	7	5	4	A	A	A	5	A			WB				26	112				
		SB	12	15	6	B	C	A	11	B			SB				21	57				
		EB	4	3	1	A	A	A	3	A			EB				18	92				
Signalized	2: Helmo Ave & 4th Street N	NB	16	15	4	B	B	A	13	B	16	B	NB	58	121	150	86	181		12	59	200
		WB	19	16	5	B	B	A	15	B			WB	61	127	200	88	183		23	73	230
		SB	17	23	16	B	C	B	21	C			SB	42	91	180	120	228				
		EB	18	23	8	B	C	A	16	B			EB	5	26	150	62	143		40	92	220
Thru-Stop	3: Helmo Ave & 3rd Street N	NB	0	2	1	A	A	A	2	A			NB							1	25	100
		WB	24	0	9	C	A	A	14	B			WB	34	83					43	92	200
		SB	9	2	0	A	A	A	3	A			SB	31	70	160						
		EB	0	0	0	A	A	A	0	A			EB									
Signalized	4: Helmo Ave & Hudson Blvd	NB	8	6	1	A	A	A	6	A	7	A	NB	21	87	100	59	174				
		WB	20	21	8	C	C	A	12	B			WB	13	58	100	4	25		31	72	100
		SB	7	5	2	A	A	A	4	A			SB	11	47	100	32	112		9	46	200
		EB	21	23	4	C	C	A	17	B			EB	36	92	250	3	26		19	44	100
Thru-Stop	5: New Street & 4th Street N	NB	0	0	3	A	A	A	3	A			NB	18	45							
		WB	0	1	0	A	A	A	1	A			WB									
		SB	0	0	0	A	A	A	0	A			SB									
		EB	0	2	2	A	A	A	2	A			EB									

Table 35: Build 2040 MOE - PM Peak Hour (4:30 pm – 5:30 pm)

Intersection		Appr	Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)		Appr	Average & Maximum Traffic Queueing (feet)								
Control	Location													Left-Turn			Through			Right-Turn		
			L	T	R	L	T	R	Delay	LOS	Delay	LOS		Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage
Thru-Stop	1: Hudson Blvd/Hayward Ave & 4th Street N	NB	15	15	9	C	C	A	13	B			NB				47	103				
		WB	7	4	3	A	A	A	4	A			WB				6	61				
		SB	14	14	7	B	B	A	12	B			SB				38	74				
		EB	3	2	0	A	A	A	2	A			EB				11	56				
Signalized	2: Helmo Ave & 4th Street N	NB	22	25	10	C	C	B	20	C	26	C	NB	73	210	150	131	242		33	130	200
		WB	25	19	6	C	B	A	18	B			WB	81	175	200	75	159		30	85	230
		SB	32	27	18	C	C	B	28	C			SB	78	192	180	136	266				
		EB	32	50	20	C	D	C	40	D			EB	40	249	150	225	560		91	320	220
Thru-Stop	3: Helmo Ave & 3rd Street N	NB	0	2	1	A	A	A	2	A			NB							1	18	100
		WB	30	0	9	D	A	A	15	C			WB	38	91					49	101	200
		SB	8	2	0	A	A	A	3	A			SB	32	80	160						
		EB	0	0	0	A	A	A	0	A			EB									
Signalized	4: Helmo Ave & Hudson Blvd	NB	11	9	2	B	A	A	9	A	12	B	NB	17	52	100	53	159		1	18	100
		WB	18	30	8	B	C	A	13	B			WB	11	38	100	8	46		26	62	100
		SB	9	8	2	A	A	A	7	A			SB	20	58	100	68	154		9	45	200
		EB	29	15	6	C	B	A	23	C			EB	95	206	250	6	26		28	61	100
Thru-Stop	5: New Street & 4th Street N	NB	0	0	5	A	A	A	5	A			NB	15	45							
		WB	0	1	0	A	A	A	1	A			WB									
		SB	0	0	0	A	A	A	0	A			SB									
		EB	0	3	2	A	A	A	3	A			EB									

SUMMARY OF MAX RESIDENTIAL SCENARIO

- Trips generated by the maximum residential scenario were estimated using ITE Trip Generation Manual 9th Edition. The development is estimated to generate over 10,000 daily trips with 747 trips in the AM Peak hour and 978 in the PM Peak hour.
- In existing conditions, all intersections operate at an acceptable LOS.
- The No Build 2028 scenario is assumed to be the same as the original study. A signal is needed at the 4th Street and Helmo Avenue intersection in this scenario.
- Under the 2028 Build Scenario, the intersections on Helmo Avenue perform at an unacceptable LOS due to the additional traffic and additional improvements are needed. The following improvements are required to minimize the impacts of the new development for 2028:
    - Longer turn lanes at Helmo Avenue and 4th Street Signal (Storage needed: 150 ft. northbound left, 200 ft. northbound right, 220 ft. eastbound right)
    - Longer turn lanes at Helmo Avenue and 3rd Street (Storage needed: 100 ft. northbound right, 160 ft. westbound left)
    - Signal and the realigned Hudson Boulevard and Helmo Avenue with turn lanes (Storage needed: 100 ft. northbound left, 100 ft. westbound right and left, 100 ft. southbound left, 200 ft. southbound right, 250 ft. eastbound left, 100 ft. eastbound right)
    - Eastbound turn lane at the new connection to 4th Street on the east (Storage needed: 100 ft. eastbound right)
    - If some of the right turn lanes are removed in the 2028 Build scenario from the full mitigation condition, there will be some delay and queuing issues in the PM peak hour at the 4th Street and Helmo intersection.
- In 2040 Build Scenario, the intersections continue to operate at an acceptable LOS.

MAX INDUSTRIAL OFFICE SCENARIO

This scenario represents the maximum industrial office scenario, where the flex space is considered office use.

The plan of the proposed development is shown in **Figure 18**. The proposed development will include:

- High density multi-family
- Medium density multi-family
- Employment and retail
- Office space (also area shown as flex space)
- Park and ride
- BRT station plaza
- New roads

In the Build scenarios, the developments are assumed to be fully built out. The trips generated by the development are shown in **Table 36 and Table 37** (**Table 4** in the original study identifies the trips generated by the Park and Ride Lot and Station Plaza). They are separated into west and east sections, depending on whether are proposed to west of Helmo Avenue or to the east. The existing business traffic to the immediate west of Helmo Avenue is assumed to go away in the Build scenario. The trip distribution of this development is assumed to be similar to the original study. The No Build scenario for this scenario will be identical to the original study.

Table 36: Max Industrial Office West Development Trip Generation

Future Use	Total 1000 SF/DU	ITE Code/Description	AM Trips In	AM Trips Out	AM Trips Total	PM Trips In	PM Trips Out	PM Trips Total	Weekday Trips
High Density Residential	232 Units	(220) Apartment	23	94	117	94	51	145	1,529
Retail	25.0	(820) Shopping Center	42	26	67	114	124	237	2,758
Professional Office	94.3	(710) General Office Building	161	22	183	31	153	184	1,256
Subtotal			**226**	**142**	**367**	**239**	**328**	**566**	**5,543**
Reductions		Transit/Walking(5%)	11	7	18	12	16	28	277
		Internal Trips Retail	3	5	8	12	19	31	194
		Internal Trips Residential	4	3	7	17	10	27	169
		Internal Trips Office	1	1	2	4	4	8	50
Subtotal Reductions			**19**	**15**	**35**	**45**	**49**	**94**	**690**
Total Trip Generation			**206**	**127**	**332**	**194**	**279**	**472**	**4,853**

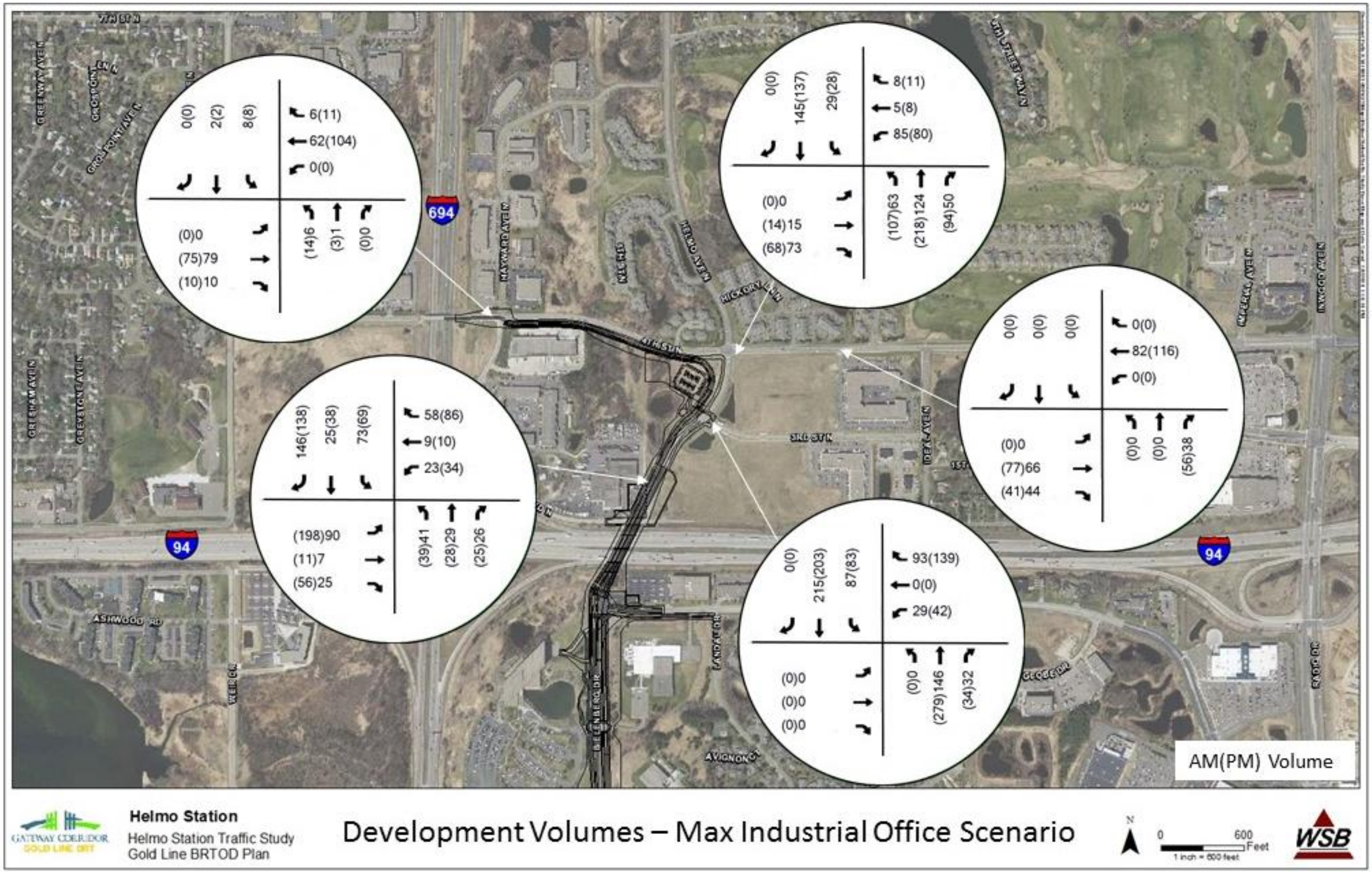
Table 37: Max Industrial Office East Development Trip Generation

Future Use	Total 1000 SF/DU	ITE Code/Description	AM Trips In	AM Trips Out	AM Trips Total	PM Trips In	PM Trips Out	PM Trips Total	Weekday Trips
High Density Residential	484 Units	(220) Apartment	48	193	241	185	99	284	3,057
Medium Density Residential	69 Units	(230) Residential Condominium/Townhouse	7	31	38	30	14	44	466
Retail	5.0	(820) Shopping Center	16	10	25	39	42	81	969
Professional Office	31.5	(710) General Office Building	67	9	76	19	94	114	546
Industrial Office	102.0	(710) General Office Building	171	23	194	33	160	193	1,333
Subtotal			**309**	**267**	**575**	**306**	**410**	**715**	**6,370**
Reductions		Transit/Walking(5%)	15	13	29	15	20	36	319
		Internal Trips Retail	1	2	3	5	6	11	69
		Internal Trips Residential	2	1	3	9	4	13	81
		Internal Trips Office	0	1	2	1	5	6	38
Subtotal Reductions			**19**	**17**	**37**	**30**	**35**	**66**	**507**
Total Trip Generation			**290**	**250**	**538**	**276**	**375**	**649**	**5,864**

The estimated development generated trips at each intersection are shown in the Figure below.

The development volumes (**Figure 22**) were added to the No Build 2028 and No Build 2040 volumes to calculate the estimated 2028 and 2040 build traffic volumes at the intersections (**Figures 23** and **24**).

Figure 22: Development Volumes – Max Industrial Office Scenario



GATEWAY CORRIDOR
GOLD LINE BRT

Figure 23: Build 2028 Forecasts – Max Industrial Office Scenario

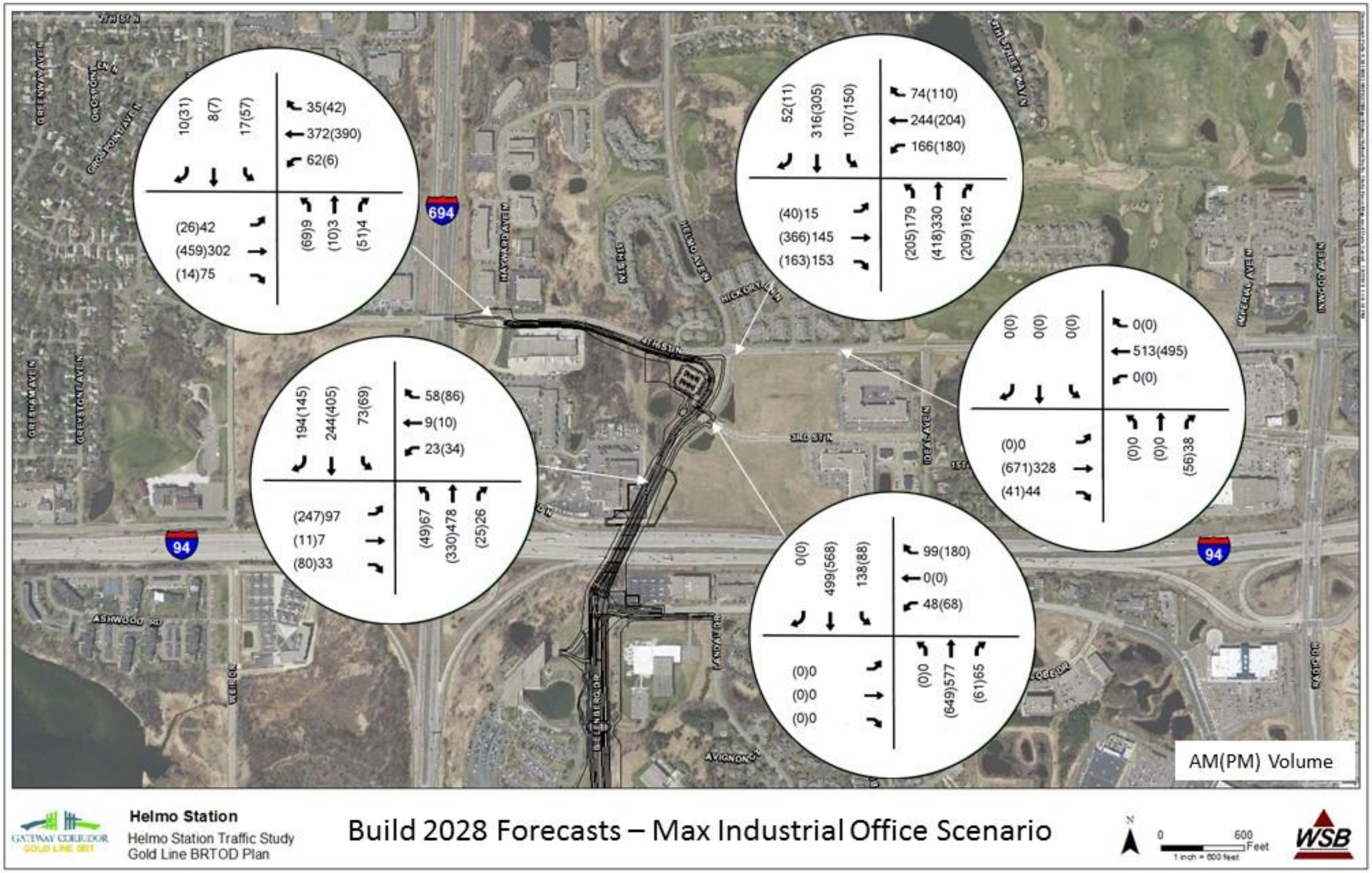
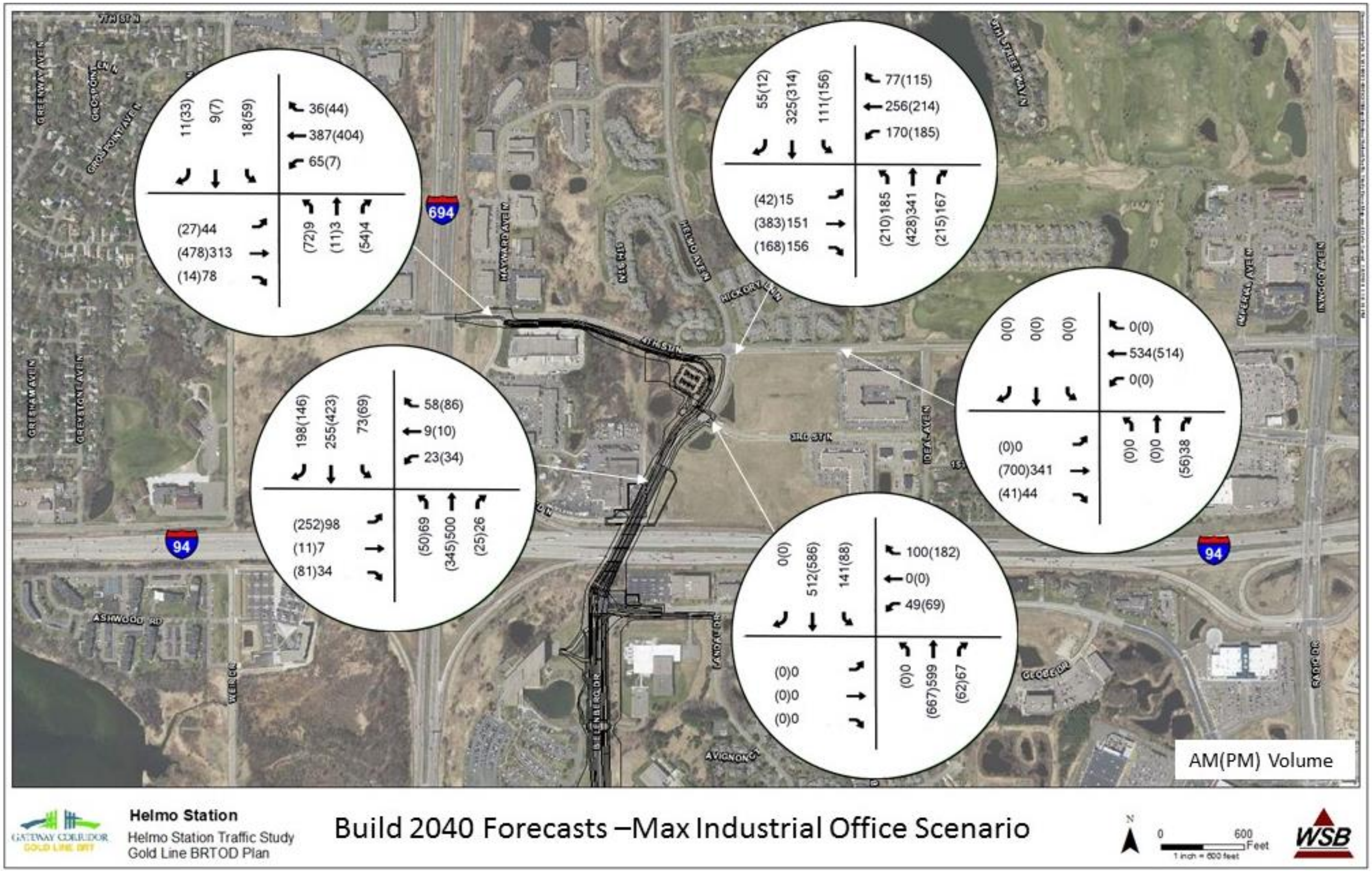


Figure 24: Build 2040 Forecasts – Max Industrial Office Scenario



GATEWAY CORRIDOR GOLD LINE BRT

The MOE for Build 2028 scenario are shown in **Tables 38** and **39** with only the improvements from the No Build 2028 scenario and no additional improvements.

Table 38: Build 2028 MOE - AM Peak Hour

Intersection		Appr	Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)		Appr	Average & Maximum Traffic Queueing (feet)								
														Left-Turn			Through			Right-Turn		
Control	Location		L	T	R	L	T	R	Delay	LOS	Delay	LOS		Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage
Thru-Stop	1: Hudson Blvd/Hayward Ave & 4th Street N	NB	8	9	4	A	A	A	7	A			NB				11	36				
		WB	6	5	4	A	A	A	5	A			WB				23	106				
		SB	11	13	4	B	B	A	9	A			SB				19	53				
		EB	4	3	1	A	A	A	3	A			EB				19	96				
Signalized	2: Helmo Ave & 4th Street N	NB	20	17	5	C	B	A	15	B	17	B	NB	57	149	100	88	208		16	128	100
		WB	20	15	5	C	B	A	15	B			WB	67	147	100	79	190		19	62	230
		SB	18	25	18	B	C	B	23	C			SB	47	177	180	132	301				
		EB	17	23	10	B	C	B	16	B			EB	4	18	150	56	149		46	109	150
Thru-Stop	3: Helmo Ave & 3rd Street N	NB	0	2	1	A	A	A	2	A			NB				1	16				
		WB	36	0	22	E	A	C	27	D			WB	70	212							
		SB	9	2	0	A	A	A	4	A			SB	44	96	200						
		EB	0	0	0	A	A	A	0	A			EB									
Thru-Stop	4: Helmo Ave & Hudson Blvd	NB	7	3	2	A	A	A	3	A			NB				38	159				
		WB	44	53	24	E	F	C	32	D			WB				48	129				
		SB	6	4	2	A	A	A	4	A			SB				31	120				
		EB	93	91	76	F	F	F	89	F			EB				118	267				
Thru-Stop	5: New Street & 4th Street N	NB	0	0	4	A	A	A	4	A			NB	22	49							
		WB	0	1	0	A	A	A	1	A			WB									
		SB	0	0	0	A	A	A	0	A			SB									
		EB	0	3	2	A	A	A	3	A			EB									

Table 39: Build 2028 MOE - PM Peak Hour

Intersection		Appr	Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)		Appr	Average & Maximum Traffic Queueing (feet)								
														Left-Turn			Through			Right-Turn		
Control	Location		L	T	R	L	T	R	Delay	LOS	Delay	LOS		Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage
Thru-Stop	1: Hudson Blvd/Hayward Ave & 4th Street N	NB	14	19	9	B	C	A	12	B			NB				45	100				
		WB	5	4	3	A	A	A	4	A			WB				2	36				
		SB	14	16	7	B	C	A	12	B			SB				36	84				
		EB	3	2	1	A	A	A	2	A			EB				12	64				
Signalized	2: Helmo Ave & 4th Street N	NB	23	24	10	C	C	B	20	C	24	C	NB	72	199	100	133	311		35	200	100
		WB	25	19	6	C	B	A	18	B			WB	77	146	150	75	159		31	81	230
		SB	28	29	21	C	C	C	28	C			SB	68	179	180	139	281				
		EB	25	41	14	C	D	B	32	C			EB	17	153	150	174	362		72	248	150
Thru-Stop	3: Helmo Ave & 3rd Street N	NB	0	2	1	A	A	A	2	A			NB				1	16				
		WB	40	0	28	E	A	D	31	D			WB	113	278							
		SB	8	2	0	A	A	A	3	A			SB	31	64	200						
		EB	0	0	0	A	A	A	0	A			EB									
Thru-Stop	4: Helmo Ave & Hudson Blvd	NB	8	3	2	A	A	A	4	A			NB				27	139				
		WB	50	66	31	F	F	D	39	E			WB				71	196				
		SB	5	3	2	A	A	A	3	A			SB				24	110				
		EB	320	334	313	F	F	F	319	F			EB				437	458				
Thru-Stop	5: New Street & 4th Street N	NB	0	0	7	A	A	A	7	A			NB	27	58							
		WB	0	1	0	A	A	A	1	A			WB									
		SB	0	0	0	A	A	A	0	A			SB									
		EB	0	4	2	A	A	A	4	A			EB									

As can be seen from the tables above, movements within the intersections on Helmo Avenue perform at an unacceptable LOS. In order to mitigate the impacts of the additional traffic from the developments, improvements are needed to the intersections.

The 2028 Build recommended network includes the following improvements (**Figure 25**):

- Longer turn lanes at Helmo Avenue and 4th Street signal intersection (Storage needed: 150 ft. northbound left, 230 ft. northbound right, 200 ft. westbound right,200 ft. eastbound right, 220 ft. southbound left)
- Longer turn lanes at Helmo Avenue and 3rd Street (Storage needed: 150 ft. northbound right, 150 ft. westbound left)
- Signal at the realigned Hudson Boulevard and Helmo Avenue intersection with turn lanes (Storage needed: 100 ft. northbound left, 100 ft. westbound left, 150 ft. southbound left and right, 200 ft. eastbound left, 100 ft. eastbound right)
- Eastbound turn lane at the new connection to 4th Street on the east (Storage needed: 100 ft. eastbound right)

Tables 40 and **41** display the AM Peak and PM peak hour intersection LOS and queuing results. All the intersections are expected to operate at acceptable levels of service in the 2028 Build conditions with the improvements.

Table 40: Build 2028 MOE - AM Peak Hour (7am – 8am) – Improved

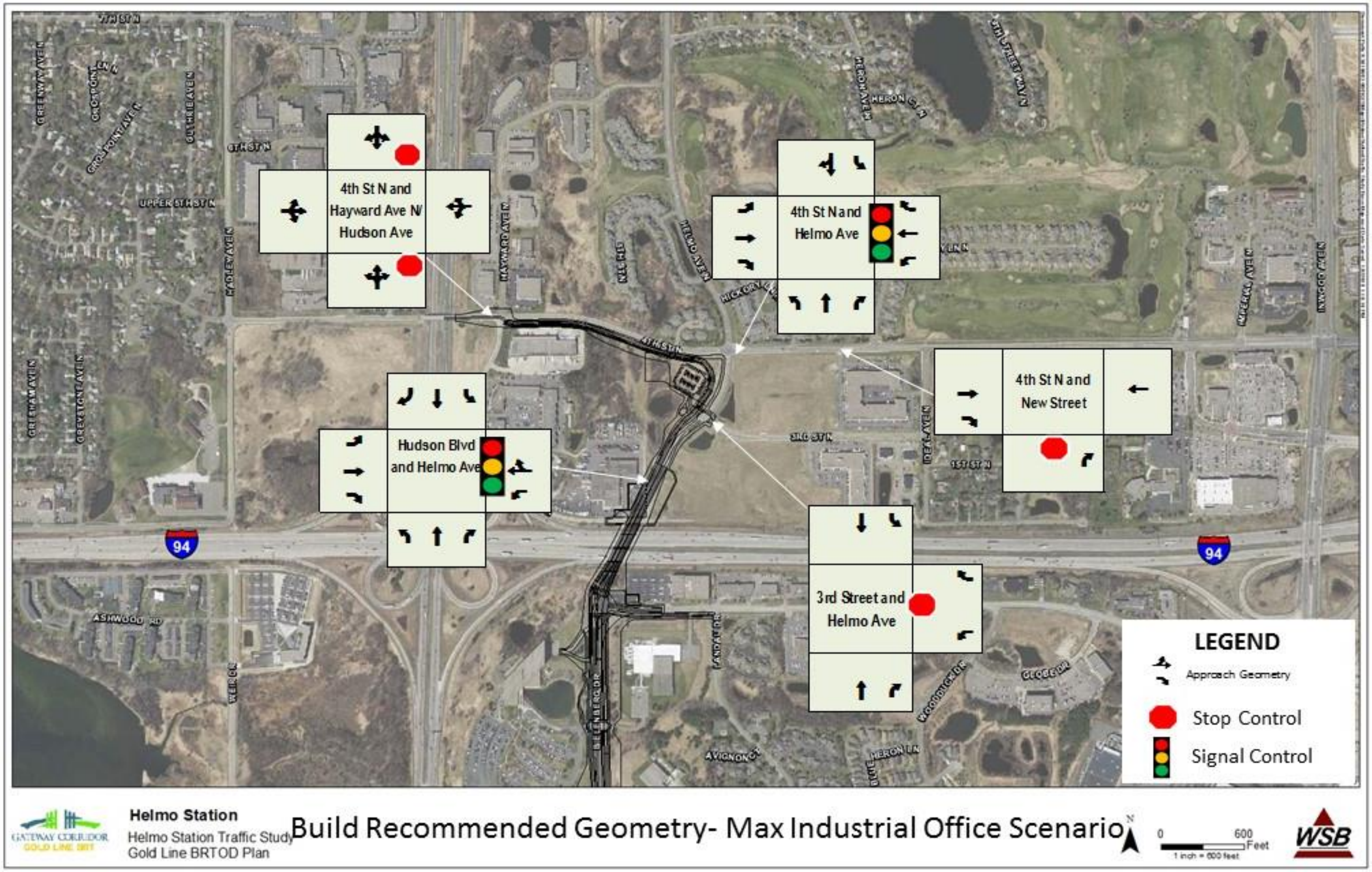
Intersection		Appr	Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)		Appr	Average & Maximum Traffic Queueing (feet)								
Control	Location		L	T	R	L	T	R	Delay	LOS	Delay	LOS		Left-Turn Ave Queue	Left-Turn Max Queue	Left-Turn Storage	Through Ave Queue	Through Max Queue	Through Storage	Right-Turn Ave Queue	Right-Turn Max Queue	Right-Turn Storage
Thru-Stop	1: Hudson Blvd/Hayward Ave & 4th Street N	NB	10	13	3	B	B	A	9	A			NB				11	36				
		WB	6	5	4	A	A	A	5	A			WB				22	111				
		SB	11	12	4	B	B	A	9	A			SB				21	54				
		EB	4	3	1	A	A	A	3	A			EB				18	73				
Signalized	2: Helmo Ave & 4th Street N	NB	22	18	5	C	B	A	16	B	18	B	NB	63	155	150	90	194		13	51	230
		WB	20	15	4	C	B	A	15	B			WB	68	140	200	74	153		19	48	230
		SB	19	26	20	B	C	C	24	C			SB	45	132	220	140	274				
		EB	19	26	12	B	C	B	19	B			EB	5	26	150	78	190		37	148	200
Thru-Stop	3: Helmo Ave & 3rd Street N	NB	0	2	2	A	A	A	2	A			NB					4		2	31	150
		WB	31	0	7	D	A	A	15	C			WB	35	106	150				37	73	
		SB	9	2	0	A	A	A	4	A			SB	42	98	160						
		EB	0	0	0	A	A	A	0	A			EB									
Signalized	4: Helmo Ave & Hudson Blvd	NB	10	9	3	B	A	A	9	A	8	A	NB	21	84	100	80	202			14	100
		WB	17	21	8	B	C	A	12	B			WB	15	48	100	32	82				
		SB	9	5	2	A	A	A	4	A			SB	24	68	150	32	100		11	45	150
		EB	17	14	4	B	B	A	14	B			EB	32	79	200	4	26		16	48	100
Thru-Stop	5: New Street & 4th Street N	NB	0	0	3	A	A	A	3	A			NB							16	33	
		WB	0	1	0	A	A	A	1	A			WB									
		SB	0	0	0	A	A	A	0	A			SB									
		EB	0	2	2	A	A	A	2	A			EB									

Table 41: Build 2028 MOE - PM Peak Hour (4:30 pm – 5:30pm) – Improved

Intersection		Appr	Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)		Appr	Average & Maximum Traffic Queueing (feet)								
Control	Location													Left-Turn			Through			Right-Turn		
			L	T	R	L	T	R	Delay	LOS	Delay	LOS		Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage
Thru-Stop	1: Hudson Blvd/Hayward Ave & 4th Street N	NB	14	19	9	B	C	A	12	B			NB				47	103				
		WB	4	4	3	A	A	A	4	A			WB				1	19				
		SB	15	17	8	C	C	A	13	B			SB				38	88				
		EB	3	2	1	A	A	A	2	A			EB				12	90				
Signalized	2: Helmo Ave & 4th Street N	NB	23	24	10	C	C	B	20	C	24	C	NB	78	226	150	147	291		37	157	230
		WB	25	18	7	C	B	A	18	B			WB	78	154	200	73	156		31	84	230
		SB	31	29	21	C	C	C	29	C			SB	68	134	220	138	261				
		EB	26	43	13	C	D	B	33	C			EB	17	117	150	177	340		64	236	200
Thru-Stop	3: Helmo Ave & 3rd Street N	NB	0	2	2	A	A	A	2	A			NB				1	20		1	18	150
		WB	38	0	12	E	A	B	19	C			WB	44	98	150				62	137	
		SB	10	2	0	B	A	A	3	A			SB	33	76	160						
		EB	0	0	0	A	A	A	0	A			EB									
Signalized	4: Helmo Ave & Hudson Blvd	NB	12	11	3	B	B	A	11	B	12	B	NB	15	43	100	61	170		2	46	100
		WB	18	27	9	B	C	A	13	B			WB	19	64	100	41	88				
		SB	11	10	3	B	B	A	8	A			SB	23	66	150	79	195		10	52	150
		EB	23	13	7	C	B	A	19	B			EB	86	191	200	6	36		30	62	100
Thru-Stop	5: New Street & 4th Street N	NB	0	0	7	A	A	A	7	A			NB							19	51	
		WB	0	1	0	A	A	A	1	A			WB									
		SB	0	0	0	A	A	A	0	A			SB									
		EB	0	3	2	A	A	A	3	A			EB									

The recommended intersection lane configuration and control types for Build 2028 scenario are shown in **Figure 27**.

Figure 25: Build 2028 Recommended Intersection Lane Configuration and Control– Max Industrial Office Scenario



BUILD CONDITIONS 2028 – Without Some Right Turn Lanes

After the Build 2028 scenario improvements were identified, WSB analyzed the traffic operations without the following right turn lanes in an alternative configuration:

- Eastbound right turn lane from Hudson Boulevard to Helmo Avenue
- Eastbound right turn lane from 4th Street to Helmo Avenue.

The results of the analysis are shown in the tables below.

Table 42: Build 2028 MOE Without Some Right Turn Lanes - AM Peak Hour (7am – 8am)

Intersection		Appr	Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)		Appr	Average & Maximum Traffic Queueing (feet)								
Control	Location													Left-Turn			Through			Right-Turn		
			L	T	R	L	T	R	Delay	LOS	Delay	LOS		Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage
Thru-Stop	1: Hudson Blvd/Hayward Ave & 4th Street N	NB	9	13	3	A	B	A	8	A			NB				11	32				
		WB	7	5	4	A	A	A	5	A			WB				26	116				
		SB	14	13	4	B	B	A	11	B			SB				20	53				
		EB	4	3	1	A	A	A	3	A			EB				17	87				
Signalized	2: Helmo Ave & 4th Street N	NB	22	19	5	C	B	A	16	B	19	B	NB	64	139	150	96	195		15	56	230
		WB	21	14	5	C	B	A	15	B			WB	66	132	200	77	175		19	54	230
		SB	21	29	22	C	C	C	26	C			SB	55	248	220	150	379				
		EB	20	29	18	C	C	B	23	C			EB	10	70	150	113	234				
Thru-Stop	3: Helmo Ave & 3rd Street N	NB	0	2	2	A	A	A	2	A			NB					4		1	22	150
		WB	27	0	7	D	A	A	14	B			WB	32	88	150				38	75	
		SB	8	2	0	A	A	A	3	A			SB	41	86	160						
		EB	0	0	0	A	A	A	0	A			EB									
Signalized	4: Helmo Ave & Hudson Blvd	NB	9	9	2	A	A	A	9	A	8	A	NB	21	80	100	75	176		1	17	100
		WB	17	22	7	B	C	A	11	B			WB	16	53	100	30	72				
		SB	9	6	2	A	A	A	5	A			SB	21	59	150	33	92		10	42	150
		EB	16	16	4	B	B	A	13	B			EB	38	86	200	20	58				
Thru-Stop	5: New Street & 4th Street N	NB	0	0	3	A	A	A	3	A			NB							15	36	
		WB	0	1	0	A	A	A	1	A			WB									
		SB	0	0	0	A	A	A	0	A			SB									
		EB	0	2	2	A	A	A	2	A			EB									

Table 43: Build 2028 MOE Without Some Right Turn Lanes - PM Peak Hour (4:30 pm – 5:30 pm)

Intersection		Appr	Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)		Appr	Average & Maximum Traffic Queueing (feet)								
Control	Location													Left-Turn			Through			Right-Turn		
			L	T	R	L	T	R	Delay	LOS	Delay	LOS		Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage	Ave Queue	Max Queue	Storage
Thru-Stop	1: Hudson Blvd/Hayward Ave & 4th Street N	NB	14	18	9	B	C	A	12	B			NB				46	100				
		WB	4	4	3	A	A	A	4	A			WB				2	43				
		SB	15	17	8	C	C	A	13	B			SB				37	91				
		EB	4	2	1	A	A	A	2	A			EB				15	98				
Signalized	2: Helmo Ave & 4th Street N	NB	37	35	13	D	D	B	30	C			NB	119	249	150	194	360		52	288	230
		WB	32	16	6	C	B	A	20	C	46	D	WB	89	173	200	71	138		28	87	230
		SB	49	36	27	D	D	C	40	D			SB	93	226	220	165	305				
		EB	82	101	93	F	F	F	97	F			EB	70	250	150	491	886				
Thru-Stop	3: Helmo Ave & 3rd Street N	NB	0	2	2	A	A	A	2	A			NB				1	22		1	18	150
		WB	40	0	15	E	A	C	22	C			WB	45	98	150				66	147	
		SB	9	2	0	A	A	A	3	A			SB	31	71	160						
		EB	0	0	0	A	A	A	0	A			EB									
Signalized	4: Helmo Ave & Hudson Blvd	NB	12	12	3	B	B	A	11	B			NB	16	43	100	67	163		3	50	100
		WB	18	31	9	B	C	A	13	B	12	B	WB	19	57	100	42	88				
		SB	10	10	3	B	B	A	8	A			SB	22	56	150	79	192		12	80	150
		EB	23	14	6	C	B	A	19	B			EB	93	200	200	35	107				
Thru-Stop	5: New Street & 4th Street N	NB	0	0	6	A	A	A	6	A			NB							19	48	
		WB	0	1	0	A	A	A	1	A			WB									
		SB	0	0	0	A	A	A	0	A			SB									
		EB	0	3	2	A	A	A	3	A			EB									

As can be seen from the tables above, there are some delay and queuing issues at the intersections due to the changes. At the 4th Street and Helmo Avenue intersection, the delays to the eastbound approach cause the intersection to operate poorly.

BUILD CONDITIONS 2040

The 2040 Build conditions were analyzed by adding the estimated development traffic to the 2040 No-Build traffic volumes and with all the intersection improvements identified in the 2028 Build Scenario. **Tables 44** and **45** display the AM Peak and PM peak hour intersection LOS and queuing results.

All the intersections are expected to operate at acceptable levels of service in the 2040 Build conditions. The intersections along Helmo Avenue experience slightly longer queues compared to 2028 but the delays remain acceptable.

Table 44: Build 2040 MOE - AM Peak Hour (7am – 8am) – Improved

Intersection: Control	Intersection: Location	Appr	Total Delay by Movement: L	Total Delay by Movement: T	Total Delay by Movement: R	LOS by Movement: L	LOS by Movement: T	LOS by Movement: R	LOS by Approach (Sec/Veh): Delay	LOS by Approach (Sec/Veh): LOS	LOS by Intersection (Sec/Veh): Delay	LOS by Intersection (Sec/Veh): LOS	Appr	Left-Turn: Ave Queue	Left-Turn: Max Queue	Left-Turn: Storage	Through: Ave Queue	Through: Max Queue	Through: Storage	Right-Turn: Ave Queue	Right-Turn: Max Queue	Right-Turn: Storage
Thru-Stop	1: Hudson Blvd/Hayward Ave & 4th Street N	NB	11	12	4	B	B	A	9	A			NB				13	39				
		WB	7	5	4	A	A	A	5	A			WB				28	114				
		SB	12	13	4	B	B	A	10	B			SB				21	42				
		EB	4	3	1	A	A	A	3	A			EB				18	88				
Signalized	2: Helmo Ave & 4th Street N	NB	24	18	5	C	B	A	16	B	18	B	NB	73	178	150	98	209		14	68	230
		WB	21	14	5	C	B	A	15	B			WB	71	139	200	78	157		22	69	230
		SB	19	25	19	B	C	B	23	C			SB	48	112	220	130	245				
		EB	18	25	12	B	C	B	18	B			EB	4	23	150	80	154		37	107	200
Thru-Stop	3: Helmo Ave & 3rd Street N	NB	0	2	2	A	A	A	2	A			NB					4		2	26	150
		WB	28	0	8	D	A	A	15	C			WB	32	80	150				40	80	
		SB	9	2	0	A	A	A	4	A			SB	43	86	160						
		EB	0	0	0	A	A	A	0	A			EB									
Signalized	4: Helmo Ave & Hudson Blvd	NB	10	9	3	B	A	A	9	A	8	A	NB	24	124	100	80	243		1	42	100
		WB	19	19	9	B	B	A	13	B			WB	16	46	100	33	74				
		SB	10	6	2	B	A	A	5	A			SB	23	62	150	35	89		11	45	150
		EB	18	15	4	B	B	A	14	B			EB	35	95	200	5	26		17	41	100
Thru-Stop	5: New Street & 4th Street N	NB	0	0	3	A	A	A	3	A			NB							16	40	
		WB	0	1	0	A	A	A	1	A			WB									
		SB	0	0	0	A	A	A	0	A			SB									
		EB	0	2	2	A	A	A	2	A			EB									

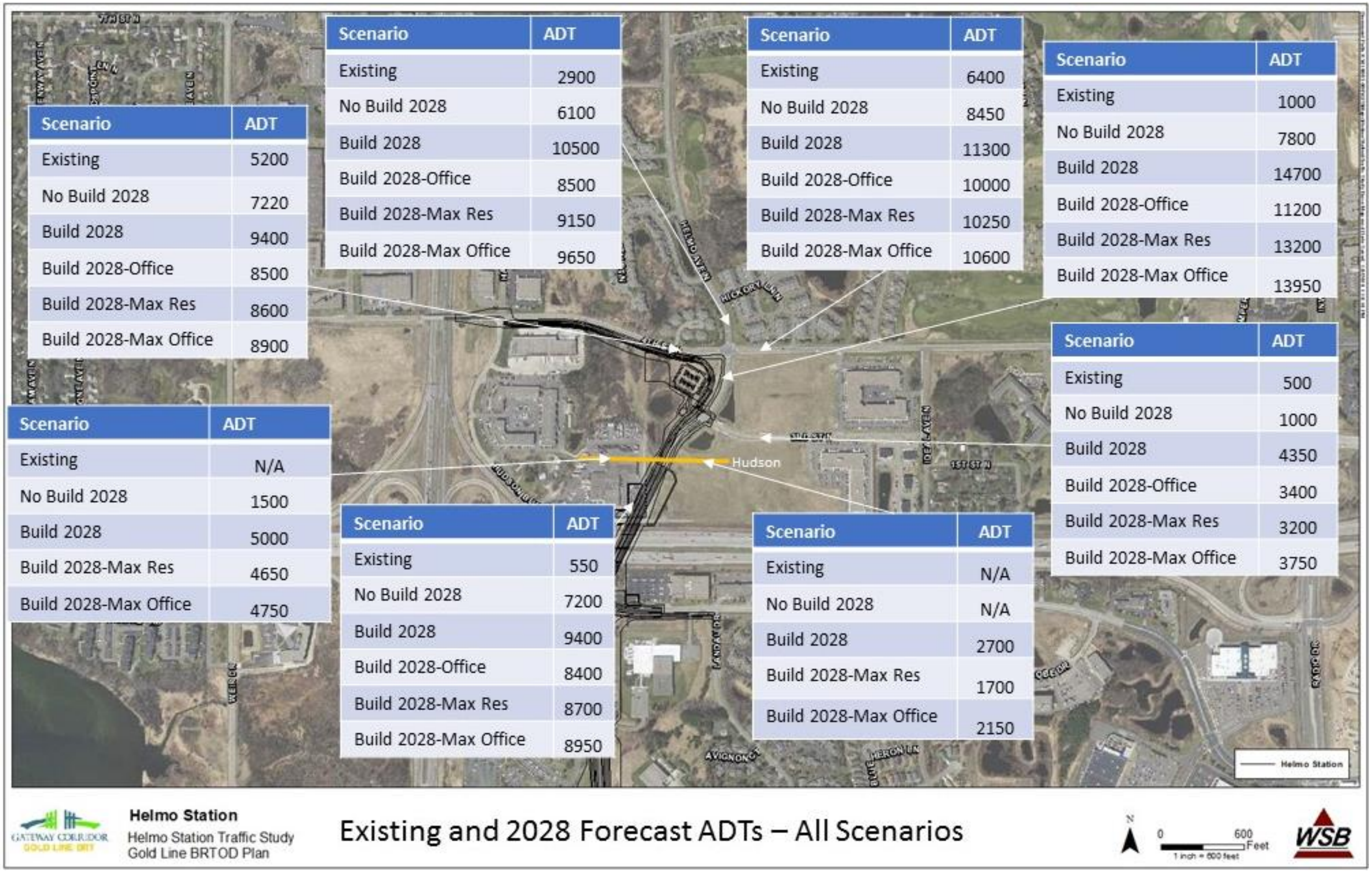
Table 45: Build 2040 MOE - PM Peak Hour (4:30 pm – 5:30 pm) – Improved

Intersection: Control	Intersection: Location	Appr	Total Delay by Movement: L	Total Delay by Movement: T	Total Delay by Movement: R	LOS by Movement: L	LOS by Movement: T	LOS by Movement: R	LOS by Approach (Sec/Veh): Delay	LOS by Approach (Sec/Veh): LOS	LOS by Intersection (Sec/Veh): Delay	LOS by Intersection (Sec/Veh): LOS	Appr	Left-Turn: Ave Queue	Left-Turn: Max Queue	Left-Turn: Storage	Through: Ave Queue	Through: Max Queue	Through: Storage	Right-Turn: Ave Queue	Right-Turn: Max Queue	Right-Turn: Storage
Thru-Stop	1: Hudson Blvd/Hayward Ave & 4th Street N	NB	16	16	10	C	C	B	14	B			NB				50	118				
		WB	7	4	3	A	A	A	4	A			WB				4	39				
		SB	15	13	7	C	B	A	12	B			SB				41	90				
		EB	4	2	1	A	A	A	2	A			EB				11	76				
Signalized	2: Helmo Ave & 4th Street N	NB	25	25	10	C	C	B	21	C	27	C	NB	86	248	150	149	286		37	148	230
		WB	27	19	7	C	B	A	19	B			WB	88	193	200	81	168		30	90	230
		SB	35	27	21	D	C	C	29	C			SB	78	163	220	132	269				
		EB	29	50	16	C	D	B	39	D			EB	31	216	150	210	442		82	265	200
Thru-Stop	3: Helmo Ave & 3rd Street N	NB	0	2	2	A	A	A	2	A			NB							1	17	150
		WB	48	0	12	E	A	B	22	C			WB	54	131	150				60	140	
		SB	10	2	0	B	A	A	3	A			SB	34	70	160						
		EB	0	0	0	A	A	A	0	A			EB									
Signalized	4: Helmo Ave & Hudson Blvd	NB	12	11	3	B	B	A	11	B	12	B	NB	17	52	100	63	182			7	100
		WB	17	27	9	B	C	A	12	B			WB	19	50	100	43	85				
		SB	11	10	3	B	B	A	9	A			SB	25	97	150	79	193		10	76	150
		EB	26	15	6	C	B	A	21	C			EB	91	222	200	5	40		29	70	100
Thru-Stop	5: New Street & 4th Street N	NB	0	0	6	A	A	A	6	A			NB							23	50	
		WB	0	1	0	A	A	A	1	A			WB									
		SB	0	0	0	A	A	A	0	A			SB									
		EB	0	3	2	A	A	A	3	A			EB									

SUMMARY OF MAX INDUSTRIAL OFFICE SCENARIO

- Trips generated by the maximum residential scenario were estimated using ITE Trip Generation Manual 9th Edition. The development is estimated to generate nearly 11,000 daily trips with 870 trips in the AM Peak hour and 1,121 in the PM Peak hour.
- The No Build 2028 scenario is assumed to be the same as the original study. A signal is needed at the 4th Street and Helmo Avenue intersection in this scenario.
- Under the 2028 Build Scenario, the intersections on Helmo Avenue perform at an unacceptable LOS due to the additional traffic and additional improvements are needed. The following improvements are required to minimize the impacts of the new development for 2028:
    - Longer turn lanes at Helmo Avenue and 4th Street Signal (Storage needed: 150 ft. northbound left, 230 ft. northbound right, 200 ft. westbound right, 200 ft. eastbound right, 220 ft. southbound left)
    - Longer turn lanes at 3rd Street and Helmo Avenue (Storage needed: 150 ft. northbound left, 150 ft. westbound left)
    - Signal and the realigned Hudson Boulevard and Helmo Avenue with turn lanes (Storage needed: 100 ft. northbound left, 100 ft. westbound left, 150 ft. southbound left and right, 200 ft. eastbound left, 100 ft. eastbound right)
    - Eastbound turn lane at the new connection to 4th Street on the east (Storage needed: 100 ft. eastbound right)
    - If the eastbound right turn lane at the 4th Street and Helmo intersection is removed in the 2028 Build scenario from the full mitigation condition, there will be some major delay and queuing issues in the PM peak hour.
    - In 2040 Build Scenario, the intersections continue to operate at an acceptable LOS.
- **Figure 26** and **27** show the ADT comparison between all development scenarios.

Figure 26: Existing and 2028 Forecast ADTs – All Scenarios



Scenario	ADT
Existing	5200
No Build 2028	7220
Build 2028	9400
Build 2028-Office	8500
Build 2028-Max Res	8600
Build 2028-Max Office	8900

Scenario	ADT
Existing	2900
No Build 2028	6100
Build 2028	10500
Build 2028-Office	8500
Build 2028-Max Res	9150
Build 2028-Max Office	9650

Scenario	ADT
Existing	6400
No Build 2028	8450
Build 2028	11300
Build 2028-Office	10000
Build 2028-Max Res	10250
Build 2028-Max Office	10600

Scenario	ADT
Existing	1000
No Build 2028	7800
Build 2028	14700
Build 2028-Office	11200
Build 2028-Max Res	13200
Build 2028-Max Office	13950

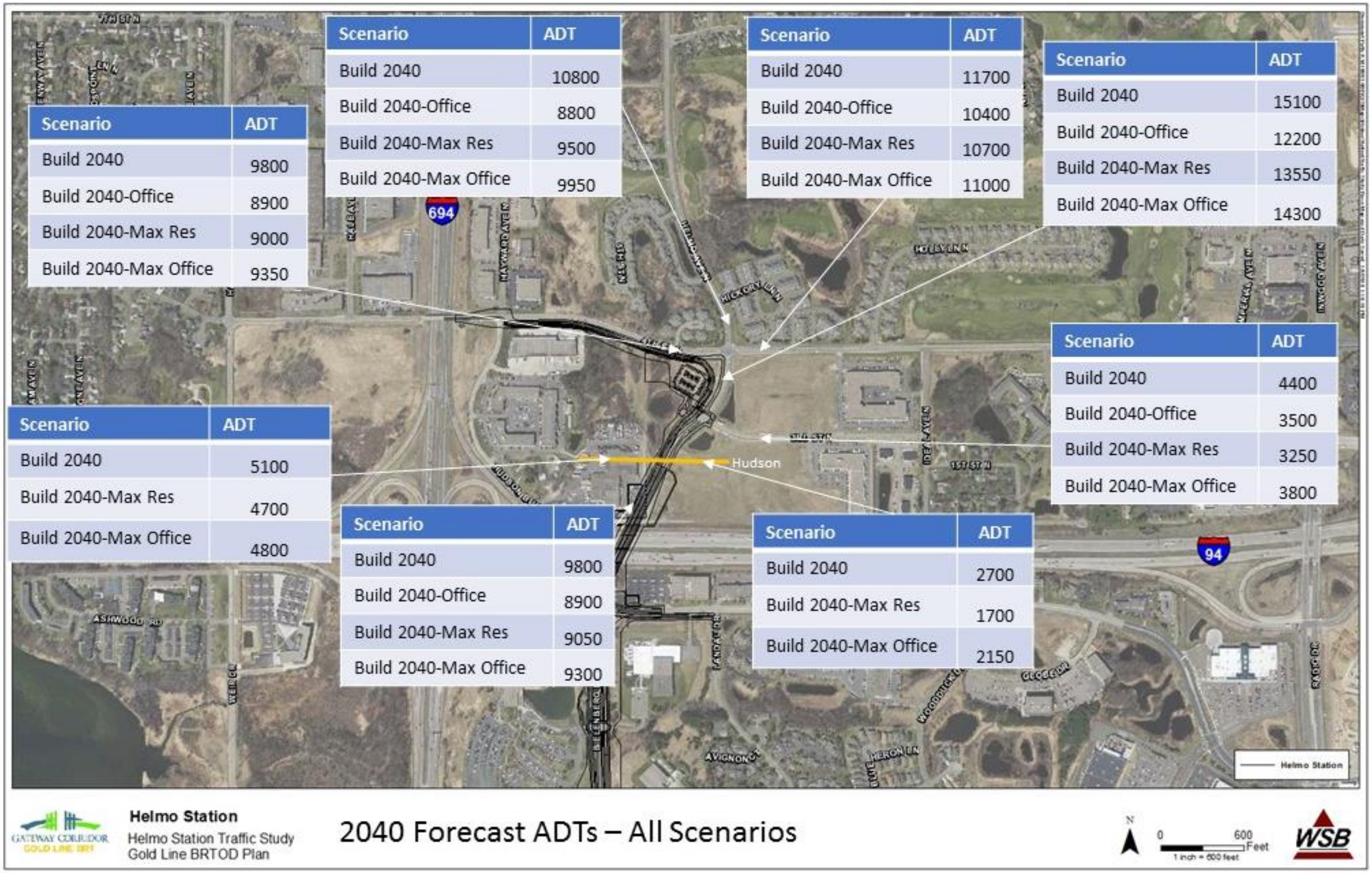
Scenario	ADT
Existing	N/A
No Build 2028	1500
Build 2028	5000
Build 2028-Max Res	4650
Build 2028-Max Office	4750

Scenario	ADT
Existing	550
No Build 2028	7200
Build 2028	9400
Build 2028-Office	8400
Build 2028-Max Res	8700
Build 2028-Max Office	8950

Scenario	ADT
Existing	N/A
No Build 2028	N/A
Build 2028	2700
Build 2028-Max Res	1700
Build 2028-Max Office	2150

Scenario	ADT
Existing	500
No Build 2028	1000
Build 2028	4350
Build 2028-Office	3400
Build 2028-Max Res	3200
Build 2028-Max Office	3750

Figure 27: 2040 Forecast ADTs – All Scenarios



Scenario	ADT
Build 2040	10800
Build 2040-Office	8800
Build 2040-Max Res	9500
Build 2040-Max Office	9950

Scenario	ADT
Build 2040	11700
Build 2040-Office	10400
Build 2040-Max Res	10700
Build 2040-Max Office	11000

Scenario	ADT
Build 2040	15100
Build 2040-Office	12200
Build 2040-Max Res	13550
Build 2040-Max Office	14300

Scenario	ADT
Build 2040	9800
Build 2040-Office	8900
Build 2040-Max Res	9000
Build 2040-Max Office	9350

Scenario	ADT
Build 2040	4400
Build 2040-Office	3500
Build 2040-Max Res	3250
Build 2040-Max Office	3800

Scenario	ADT
Build 2040	5100
Build 2040-Max Res	4700
Build 2040-Max Office	4800

Scenario	ADT
Build 2040	9800
Build 2040-Office	8900
Build 2040-Max Res	9050
Build 2040-Max Office	9300

Scenario	ADT
Build 2040	2700
Build 2040-Max Res	1700
Build 2040-Max Office	2150

Project Summary – Roadway Expansion Category

Project Name: Helmo/Bielenberg Bridge

Applicant: Washington County

Route: new Bridge over I-94 from Helmo Avenue in Oakdale to Bielenberg Drive in Woodbury

Cities Where Project Is Located: City of Oakdale, City of Woodbury

Requested Award Amount: $4,400,000

Total Project Cost: $5,500,000

Project Description:

The proposed project is a new bridge connection across Interstate 94 (I-94) from Helmo Avenue in Oakdale to Bielenberg Drive in Woodbury that includes two to three lanes for high volume general purpose traffic and a ten-foot pedestrian and bicycle lane with buffer. The bridge as a whole also includes two dedicated Bus Rapid Transit (BRT) lanes to be constructed and funded through the METRO Gold Line Bus Rapid Transit (BRT) project. The roadway, bike and pedestrian lanes proposed in this application are not funded by Gold Line.

The new bridge relieves one of the most congested intersections in Washington County, CSAH 13 (Radio Drive/Inwood Avenue), in the heart of Oakdale and Woodbury commercial districts. Relieving congestion on CSAH 13 benefits commuters, freight haulers, transit and express service users by reducing delay at the intersection of the I-94 south ramps and CSAH 13. A reduction in congestion also means a reduction in air pollution from idling exhaust, a result of congestion.

The bridge design was created in close collaboration with the Gold Line Project and MnDOT to ensure it complements the bus rapid transit lanes and does not preclude potential future installation of a southbound I-694 to eastbound I-94 interchange.

A pedestrian and bicycle lane will connect existing trails to the north and south of I-94, closing a critical bike and pedestrian gap created by the interstate. In addition, Bus Rapid Transit Oriented Development (BRTOD) plans have identified Gold Line corridor-wide walk and bike access routes that in general follow the Gold Line alignment between Woodbury and Saint Paul. The Helmo/Bielenberg Bridge connection is a crucial component linking the rest of the corridor-wide trail with major destination centers in Woodbury.

The roadway, pedestrian and bicycle connections provided by the new bridge were identified in the 2030 Oakdale and Woodbury Comprehensive Plans, and building these connections in conjunction with Gold Line BRT, a major east metro transportation investment, creates efficiencies and cost savings for the region.

Continued and coordinated transportation investments in a congested and rapidly growing corridor benefits the east metro as a whole, and better situates the cities of Oakdale and Woodbury to meet their planning goals in 2040 and beyond.

List of Project Benefits:

The new Helmo/Bielenberg Bridge connection will:

- Increase ease of street crossings with a new street grid reinvestment in Oakdale, with a transit/auto/multi-modal lane configuration that will slow traffic speeds and increase the perception of safety at crossings
- Increase pedestrian and bicycle access due to a new connection between Oakdale and Woodbury
- Improve air quality by relieving congestion at heavily trafficked CSAH 13
- Encourage new TOD development, to include new business, housing, and recreation options for current and future residents and employees in a rapidly growing part of the east metro.

Before Photo:

Google Street View (pulled 7/13/2018)

FID	Sys	Route	Ref_Point	Co	City	Month	Day	Year	DyWk	Time	Sev	Diag	Junc	SL	Type	True_Mile:	Route_Coc	UTM_X	UTM_Y	Longitude	Latitude	POINT_X	POINT_Y
29	05-MSAS	41730102	001+00.542	82	4173	1	10	2013	THU	1738	C	1	1	50	1	1.542	5.42E+08	505204.1	4976039	-92.934	44.93776	505204.1	4976039
31	04-CSAH	82000013	007+00.190	82	2100	3	18	2013	MON	1011	N	4	1	45	25	7.19	4.82E+08	505192.8	4977298	-92.9342	44.9491	505192.8	4977298
0	04-CSAH	82000013	007+00.137	82	4173	4	18	2013	THU	1301	N	4	1	30	35	7.137	4.82E+08	505189	4977217	-92.9342	44.94837	505189	4977217
6	04-CSAH	82000013	006+00.937	82	4173	10	16	2013	WED	1330	N	1	1	30	1	6.937	4.82E+08	505199.3	4976726	-92.9341	44.94395	505199.3	4976726
22	04-CSAH	82000013	006+00.406	82	4173	11	2	2013	SAT	1113	N	1	1	20	1	6.406	4.82E+08	505231.1	4976058	-92.9337	44.93794	505231.1	4976058
21	04-CSAH	82000013	006+00.995	82	4173	11	15	2013	FRI	545	N	8	1	45	8	6.995	4.82E+08	505187	4976907	-92.9343	44.94557	505187	4976907
38	04-CSAH	82000013	006+00.965	82	4173	11	19	2013	TUE	1740	C	1	1	45	1	6.965	4.82E+08	505191.3	4976808	-92.9342	44.94469	505191.3	4976808
8	04-CSAH	82000013	007+00.030	82	4173	4	30	2014	WED	1200	N	1	1	45	1	7.03	4.82E+08	505189.6	4977022	-92.9342	44.94661	505189.6	4977022
24	04-CSAH	82000013	007+00.042	82	4173	8	4	2014	MON	1805	N	1	1	50	1	7.042	4.82E+08	505190.6	4977062	-92.9342	44.94697	505190.6	4977062
18	04-CSAH	82000013	006+00.946	82	4173	11	21	2014	FRI	1730	N	90	1	45	1	6.946	4.82E+08	505196.6	4976746	-92.9341	44.94412	505196.6	4976746
2	05-MSAS	41730117	001+00.100	82	4173	11	28	2014	FRI	1438	C	1	1	50	1	1.1	5.42E+08	505199.3	4976726	-92.9341	44.94395	505199.3	4976726
34	04-CSAH	82000013	006+00.975	82	4173	12	5	2014	FRI	1700	N	1	1	45	1	6.975	4.82E+08	505189.9	4976841	-92.9342	44.94498	505189.9	4976841
37	04-CSAH	82000013	006+00.994	82	4173	12	14	2014	SUN	1410	C	1	1	50	1	6.994	4.82E+08	505187.1	4976903	-92.9342	44.94554	505187.1	4976903
26	04-CSAH	82000013	007+00.142	82	4173	12	20	2014	SAT	1718	N	1	1	50	1	7.142	4.82E+08	505189.4	4977225	-92.9342	44.94844	505189.4	4977225
23	04-CSAH	82000013	007+00.299	82	2100	12	22	2014	MON	1742	N	1	1	45	1	7.299	4.82E+08	505201.5	4977460	-92.9341	44.95056	505201.5	4977460
28	04-CSAH	82000013	007+00.142	82	4173	12	23	2014	TUE	1507	N	1	1	50	1	7.142	4.82E+08	505189.4	4977225	-92.9342	44.94844	505189.4	4977225
19	04-CSAH	82000013	007+00.266	82	2100	12	20	2014	SAT	1328	N	1	1	45	1	7.266	4.82E+08	505199	4977413	-92.9341	44.95013	505199	4977413
40	04-CSAH	82000013	007+00.147	82	4173	1	5	2015	MON	1724	N	4	1	50	32	7.147	4.82E+08	505189.7	4977232	-92.9342	44.94851	505189.7	4977232
7	04-CSAH	82000013	007+00.145	82	4173	4	10	2015	FRI	708	N	99	1	50	32	7.145	4.82E+08	505189.6	4977229	-92.9342	44.94848	505189.6	4977229
25	04-CSAH	82000013	007+00.042	82	4173	4	21	2015	TUE	1745	C	1	1	50	1	7.042	4.82E+08	505190.6	4977062	-92.9342	44.94697	505190.6	4977062
10	04-CSAH	82000013	006+00.674	82	4173	5	4	2015	MON	1557	N	1	1	50	1	6.674	4.82E+08	505215	4976487	-92.9339	44.9418	505215	4976487
39	04-CSAH	82000013	007+00.139	82	4173	6	2	2015	TUE	1318	N	4	1	50	26	7.139	4.82E+08	505189.1	4977220	-92.9342	44.9484	505189.1	4977220
15	10-M	28880501	000+00.000	82	2888	6	4	2015	THU	1722	N	1	1	45	1	0	1.03E+09	505173.4	4977479	-92.9344	44.95073	505173.4	4977479
9	04-CSAH	82000013	006+00.937	82	4173	6	13	2015	SAT	2130	N	1	1	45	1	6.937	4.82E+08	505199.3	4976726	-92.9341	44.94395	505199.3	4976726
35	04-CSAH	82000013	007+00.071	82	2100	7	14	2015	TUE	1704	N	1	1	45	1	7.071	4.82E+08	505189.9	4977117	-92.9342	44.94747	505189.9	4977117
13	04-CSAH	82000013	007+00.172	82	4173	8	20	2015	THU	1319	N	1	1	30	1	7.172	4.82E+08	505191.4	4977270	-92.9342	44.94885	505191.4	4977270
1	04-CSAH	82000013	007+00.137	82	4173	10	16	2015	FRI	1240	N	1	1	45	1	7.137	4.82E+08	505189	4977217	-92.9342	44.94837	505189	4977217
20	04-CSAH	82000013	006+00.637	82	4173	10	19	2015	MON	2135	C	1	1	50	1	6.637	4.82E+08	505219.3	4976440	-92.9338	44.94137	505219.3	4976440
32	04-CSAH	82000013	006+00.647	82	4173	11	19	2015	THU	1745	N	1	1	45	1	6.647	4.82E+08	505216.8	4976462	-92.9339	44.94157	505216.8	4976462
27	04-CSAH	82000013	007+00.142	82	4173	11	17	2015	TUE	1059	C	7	1	40	24	7.142	4.82E+08	505189.4	4977225	-92.9342	44.94844	505189.4	4977225
33	04-CSAH	82000013	006+00.647	82	4173	12	18	2015	FRI	1731	N	1	1	45	1	6.647	4.82E+08	505216.8	4976462	-92.9339	44.94157	505216.8	4976462
30	04-CSAH	82000013	006+00.407	82	4173	12	20	2015	SUN	1928	N	2	1	40	1	6.407	4.82E+08	505231	4976060	-92.9337	44.93795	505231	4976060

1: Inwood Ave N & 4th Street N/Hudson Blvd N

Direction	All
Future Volume (vph)	2640
CO Emissions (kg)	3.21
NOx Emissions (kg)	0.62
VOC Emissions (kg)	0.74

2: Inwood Ave/Inwood Ave N & 3rd Street N/I-94 WB Ramps

Direction	All
Future Volume (vph)	3895
CO Emissions (kg)	4.78
NOx Emissions (kg)	0.93
VOC Emissions (kg)	1.11

3: Radio Drive/Inwood Ave & EB I-94 Ramp/Woodbury Lakes Road

Direction	All
Future Volume (vph)	4845
CO Emissions (kg)	5.64
NOx Emissions (kg)	1.10
VOC Emissions (kg)	1.31

4: Radio Drive & Hudson Road/City Place Blvd

Direction	All
Future Volume (vph)	4901
CO Emissions (kg)	6.28
NOx Emissions (kg)	1.22
VOC Emissions (kg)	1.45

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	120	175	265	55	65	80	880	95	20	755	50
Future Volume (veh/h)	80	120	175	265	55	65	80	880	95	20	755	50
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	82	124	180	273	57	67	82	907	98	21	778	52
Adj No. of Lanes	1	1	1	2	1	1	2	2	1	1	2	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	194	368	313	459	412	351	377	1206	539	84	986	441
Arrive On Green	0.11	0.20	0.20	0.13	0.22	0.22	0.11	0.34	0.34	0.05	0.28	0.28
Sat Flow, veh/h	1774	1863	1583	3442	1863	1583	3442	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	82	124	180	273	57	67	82	907	98	21	778	52
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1721	1863	1583	1721	1770	1583	1774	1770	1583
Q Serve(g_s), s	3.2	4.3	7.7	5.6	1.8	2.6	1.6	17.0	3.2	0.9	15.2	1.8
Cycle Q Clear(g_c), s	3.2	4.3	7.7	5.6	1.8	2.6	1.6	17.0	3.2	0.9	15.2	1.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	194	368	313	459	412	351	377	1206	539	84	986	441
V/C Ratio(X)	0.42	0.34	0.58	0.59	0.14	0.19	0.22	0.75	0.18	0.25	0.79	0.12
Avail Cap(c_a), veh/h	238	374	318	461	412	351	461	1206	539	238	1137	509
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.0	25.8	27.1	30.5	23.4	23.6	30.3	21.8	17.3	34.3	24.9	20.1
Incr Delay (d2), s/veh	1.5	0.5	2.5	2.0	0.2	0.3	0.3	2.7	0.2	1.5	3.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	2.3	3.6	2.8	1.0	1.1	0.8	8.6	1.4	0.5	7.8	0.8
LnGrp Delay(d),s/veh	32.5	26.3	29.6	32.5	23.5	23.9	30.6	24.5	17.5	35.8	28.3	20.2
LnGrp LOS	C	C	C	C	C	C	C	C	B	D	C	C
Approach Vol, veh/h		386			397			1087			851	
Approach Delay, s/veh		29.2			29.8			24.4			28.0	
Approach LOS		C			C			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	9.0	30.9	14.5	20.2	13.7	26.3	12.7	22.0
Change Period (Y+Rc), s	5.5	5.5	4.5	5.5	5.5	5.5	4.5	5.5
Max Green Setting (Gmax), s	10.0	24.0	10.0	15.0	10.0	24.0	10.0	15.0
Max Q Clear Time (g_c+I1), s	2.9	19.0	7.6	9.7	3.6	17.2	5.2	4.6
Green Ext Time (p_c), s	0.0	4.1	0.2	0.6	0.1	3.6	0.1	1.4

Intersection Summary	
HCM 2010 Ctrl Delay	27.0
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	70	275	255	50	85	255	955	695	205	930	60
Future Volume (veh/h)	60	70	275	255	50	85	255	955	695	205	930	60
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	62	72	284	263	52	88	263	985	0	211	959	62
Adj No. of Lanes	1	1	1	2	1	1	2	2	1	1	2	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	157	317	270	390	363	309	390	1159	519	247	1250	559
Arrive On Green	0.09	0.17	0.17	0.11	0.20	0.20	0.11	0.33	0.00	0.14	0.35	0.35
Sat Flow, veh/h	1774	1863	1583	3442	1863	1583	3442	3539	1583	1774	3539	1583
Grp Volume(v), veh/h	62	72	284	263	52	88	263	985	0	211	959	62
Grp Sat Flow(s),veh/h/ln	1774	1863	1583	1721	1863	1583	1721	1770	1583	1774	1770	1583
Q Serve(g_s), s	2.9	2.9	15.0	6.5	2.0	4.2	6.5	22.8	0.0	10.2	21.2	2.3
Cycle Q Clear(g_c), s	2.9	2.9	15.0	6.5	2.0	4.2	6.5	22.8	0.0	10.2	21.2	2.3
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	157	317	270	390	363	309	390	1159	519	247	1250	559
V/C Ratio(X)	0.39	0.23	1.05	0.67	0.14	0.29	0.67	0.85	0.00	0.86	0.77	0.11
Avail Cap(c_a), veh/h	201	317	270	391	363	309	391	1185	530	272	1326	593
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.9	31.5	36.5	37.5	29.4	30.2	37.5	27.6	0.0	37.1	25.3	19.2
Incr Delay (d2), s/veh	1.6	0.4	69.5	4.5	0.2	0.5	4.5	5.9	0.0	21.2	2.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	1.5	11.7	3.3	1.1	1.9	3.3	12.0	0.0	6.5	10.7	1.0
LnGrp Delay(d),s/veh	39.5	31.9	106.1	42.0	29.5	30.7	42.0	33.5	0.0	58.2	27.9	19.3
LnGrp LOS	D	C	F	D	C	C	D	C		E	C	B
Approach Vol, veh/h		418			403			1248			1232	
Approach Delay, s/veh		83.4			37.9			35.3			32.6	
Approach LOS		F			D			D			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.7	34.4	15.5	20.5	15.5	36.6	13.3	22.7
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Max Green Setting (Gmax), s	13.5	29.5	10.0	15.0	10.0	33.0	10.0	15.0
Max Q Clear Time (g_c+I1), s	12.2	24.8	8.5	17.0	8.5	23.2	4.9	6.2
Green Ext Time (p_c), s	0.1	4.0	0.1	0.0	0.1	7.9	0.0	1.4

Intersection Summary	
HCM 2010 Ctrl Delay	40.7
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	235	150	805	0	0	0	0	1670	525	100	1135	225
Future Volume (veh/h)	235	150	805	0	0	0	0	1670	525	100	1135	225
Number	7	4	14				5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863				0	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	198	216	830				0	1722	541	103	1170	0
Adj No. of Lanes	1	1	2				0	3	1	2	2	1
Peak Hour Factor	0.97	0.97	0.97				0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2				0	2	2	2	2	2
Cap, veh/h	503	529	899				0	1997	622	391	2040	913
Arrive On Green	0.28	0.28	0.28				0.00	0.39	0.39	0.11	0.58	0.00
Sat Flow, veh/h	1774	1863	3167				0	5253	1583	3442	3539	1583
Grp Volume(v), veh/h	198	216	830				0	1722	541	103	1170	0
Grp Sat Flow(s),veh/h/ln	1774	1863	1583				0	1695	1583	1721	1770	1583
Q Serve(g_s), s	7.1	7.4	20.0				0.0	24.5	24.8	2.2	16.5	0.0
Cycle Q Clear(g_c), s	7.1	7.4	20.0				0.0	24.5	24.8	2.2	16.5	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	503	529	899				0	1997	622	391	2040	913
V/C Ratio(X)	0.39	0.41	0.92				0.00	0.86	0.87	0.26	0.57	0.00
Avail Cap(c_a), veh/h	507	533	906				0	2004	624	437	2092	936
HCM Platoon Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00				0.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	22.7	22.8	27.3				0.0	21.9	22.0	31.9	10.5	0.0
Incr Delay (d2), s/veh	0.5	0.5	14.7				0.0	4.1	12.6	0.4	0.4	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.5	3.9	10.6				0.0	12.1	13.0	1.0	8.1	0.0
LnGrp Delay(d),s/veh	23.2	23.3	42.1				0.0	26.0	34.6	32.2	10.9	0.0
LnGrp LOS	C	C	D					C	C	C	B	
Approach Vol, veh/h		1244						2263			1273	
Approach Delay, s/veh		35.8						28.1			12.6	
Approach LOS		D						C			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	14.4	36.4		27.8		50.8		
Change Period (Y+Rc), s	5.5	5.5		5.5		5.5		
Max Green Setting (Gmax), s	10.0	31.0		22.5		46.5		
Max Q Clear Time (g_c+I1), s	4.2	26.8		22.0		18.5		
Green Ext Time (p_c), s	0.1	4.1		0.3		25.4		

Intersection Summary	
HCM 2010 Ctrl Delay	26.0
HCM 2010 LOS	C

Notes

User approved volume balancing among the lanes for turning movement.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	705	50	400	40	25	185	195	1330	50	180	1220	520
Future Volume (veh/h)	705	50	400	40	25	185	195	1330	50	180	1220	520
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	764	0	412	41	26	191	201	1371	52	186	1258	536
Adj No. of Lanes	3	0	1	1	1	1	2	3	1	2	3	1
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	909	0	417	128	307	261	388	1534	478	387	1533	477
Arrive On Green	0.17	0.00	0.26	0.07	0.16	0.16	0.11	0.30	0.30	0.11	0.30	0.30
Sat Flow, veh/h	5322	0	1583	1774	1863	1583	3442	5085	1583	3442	5085	1583
Grp Volume(v), veh/h	764	0	412	41	26	191	201	1371	52	186	1258	536
Grp Sat Flow(s),veh/h/ln	1774	0	1583	1774	1863	1583	1721	1695	1583	1721	1695	1583
Q Serve(g_s), s	12.2	0.0	22.8	1.9	1.0	10.1	4.8	22.7	2.1	4.5	20.2	26.5
Cycle Q Clear(g_c), s	12.2	0.0	22.8	1.9	1.0	10.1	4.8	22.7	2.1	4.5	20.2	26.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	909	0	417	128	307	261	388	1534	478	387	1533	477
V/C Ratio(X)	0.84	0.00	0.99	0.32	0.08	0.73	0.52	0.89	0.11	0.48	0.82	1.12
Avail Cap(c_a), veh/h	999	0	417	202	318	270	391	1534	478	391	1533	477
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.3	0.0	32.2	38.8	31.1	34.9	36.7	29.4	22.2	36.6	28.5	30.7
Incr Delay (d2), s/veh	6.1	0.0	40.5	1.4	0.1	9.5	1.2	7.1	0.1	0.9	3.7	79.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.5	0.0	14.6	1.0	0.5	5.1	2.4	11.6	0.9	2.2	10.0	22.1
LnGrp Delay(d),s/veh	41.4	0.0	72.7	40.2	31.2	44.4	37.9	36.5	22.3	37.5	32.2	110.2
LnGrp LOS	D		E	D	C	D	D	D	C	D	C	F
Approach Vol, veh/h		1176			258			1624			1980	
Approach Delay, s/veh		52.3			42.4			36.2			53.8	
Approach LOS		D			D			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.4	32.0	11.8	28.7	15.4	32.0	20.5	20.0
Change Period (Y+Rc), s	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Max Green Setting (Gmax), s	10.0	26.5	10.0	21.5	10.0	26.5	16.5	15.0
Max Q Clear Time (g_c+I1), s	6.5	24.7	3.9	24.8	6.8	28.5	14.2	12.1
Green Ext Time (p_c), s	0.2	1.8	0.0	0.0	0.2	0.0	0.8	0.3

Intersection Summary	
HCM 2010 Ctrl Delay	47.2
HCM 2010 LOS	D

Notes

User approved volume balancing among the lanes for turning movement.