DRAFT ALTERNATIVE URBAN AREAWIDE REVIEW
MAYO CLINIC BOLD. FORWARD. UNBOUND. IN ROCHESTER

For:

City of Rochester

June 2024

By:

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I. EXECUTIVE SUMMARY

1. Introduction / Background

Mayo Clinic is proposing to redevelop a 19.7-acre area within the downtown Special District. As the Responsible Government Unit, the City of Rochester determined that environmental review is required for the proposed redevelopment, and that an Alternative Urban Areawide Review (AUAR) is the appropriate review document. One development scenario is evaluated in the AUAR, which includes 1,970,000 sf of medical institutional and 90,000 sf electric generating facility land uses (Table i).

The City of Rochester distributed a Scoping AUAR for this study area on February 13, 2024 and accepted comments through March 14, 2024. This AUAR addresses comments received during that review. A final Order for Review was adopted by City Council via Resolution No. 069-24 on April 8, 2024.

Note to reviewers: Comments must be submitted to the Responsible Governmental Unit (RGU) during the 30-day comment period following notice of the Draft AUAR in the EQB *Monitor*.

AUAR guidance provided by the Minnesota Environmental Quality Board (EQB) is noted in *italics*.

Table i - Overview of Development Scenario.

Development Type	Scenario 1
Medical Institutional	1,970,000 sf
Electric Generating Facility	90,000 sf

II. DRAFT AUAR

2. Project Title

Mayo Clinic Bold. Forward. Unbound. In Rochester

3. Proposer

Proposer: Mayo Clinic
Contact Person: Karl Corrigan
Title: Environmental Compliance Coordinator
Address: 200 1st Street SW
City, State, Zip: Rochester, MN 55905
Phone: 507.284.2382
Email: corrigan.karl@mayo.edu

4. RGU

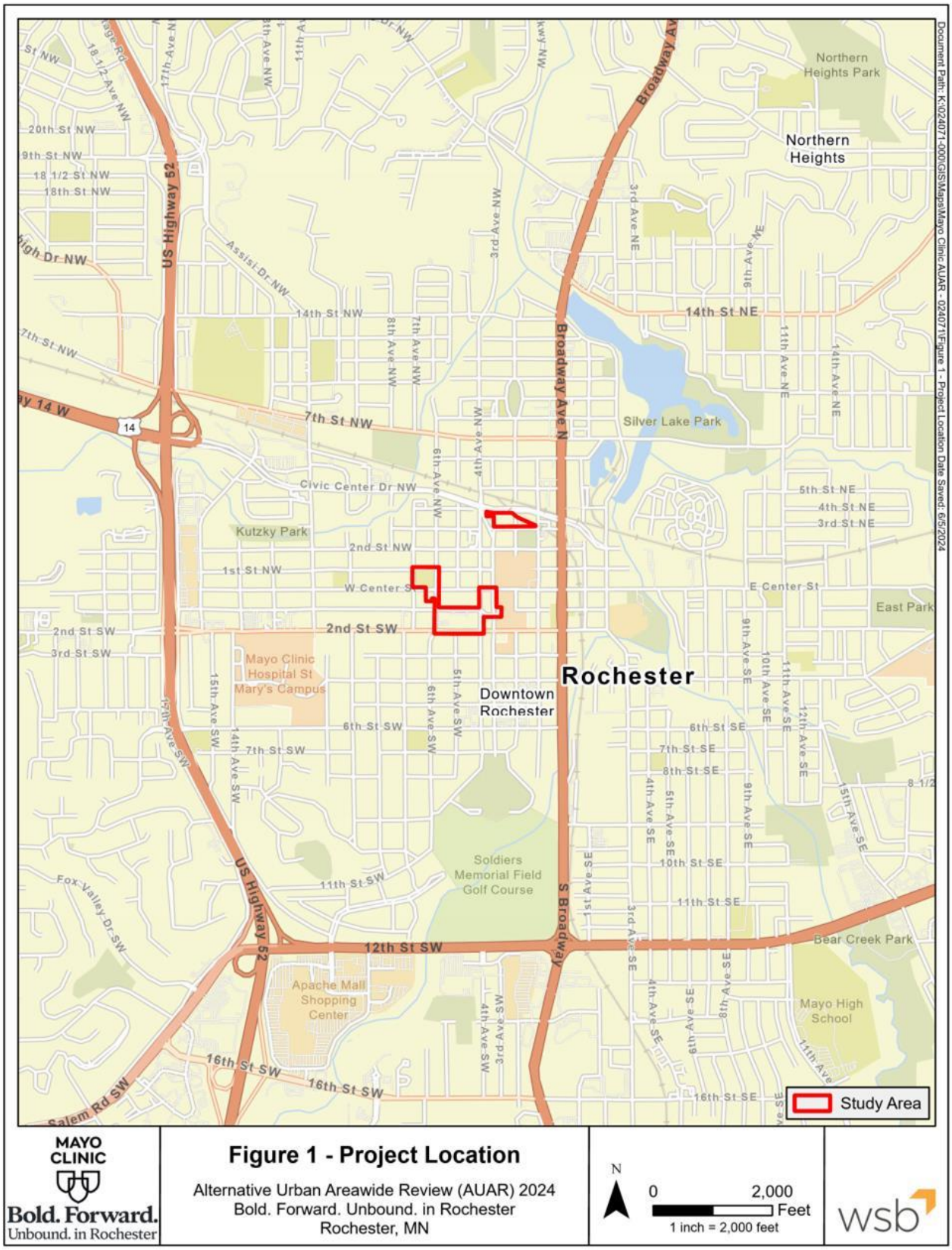
RGU: City of Rochester
Contact Person: Elliot Mohler
Title: Planner
Address: 4001 West River Parkway NW, Suite 100
City, State, Zip: Rochester, MN 55901
Phone: 507.328.2941
Email: communitydevelopment@rochestermn.gov

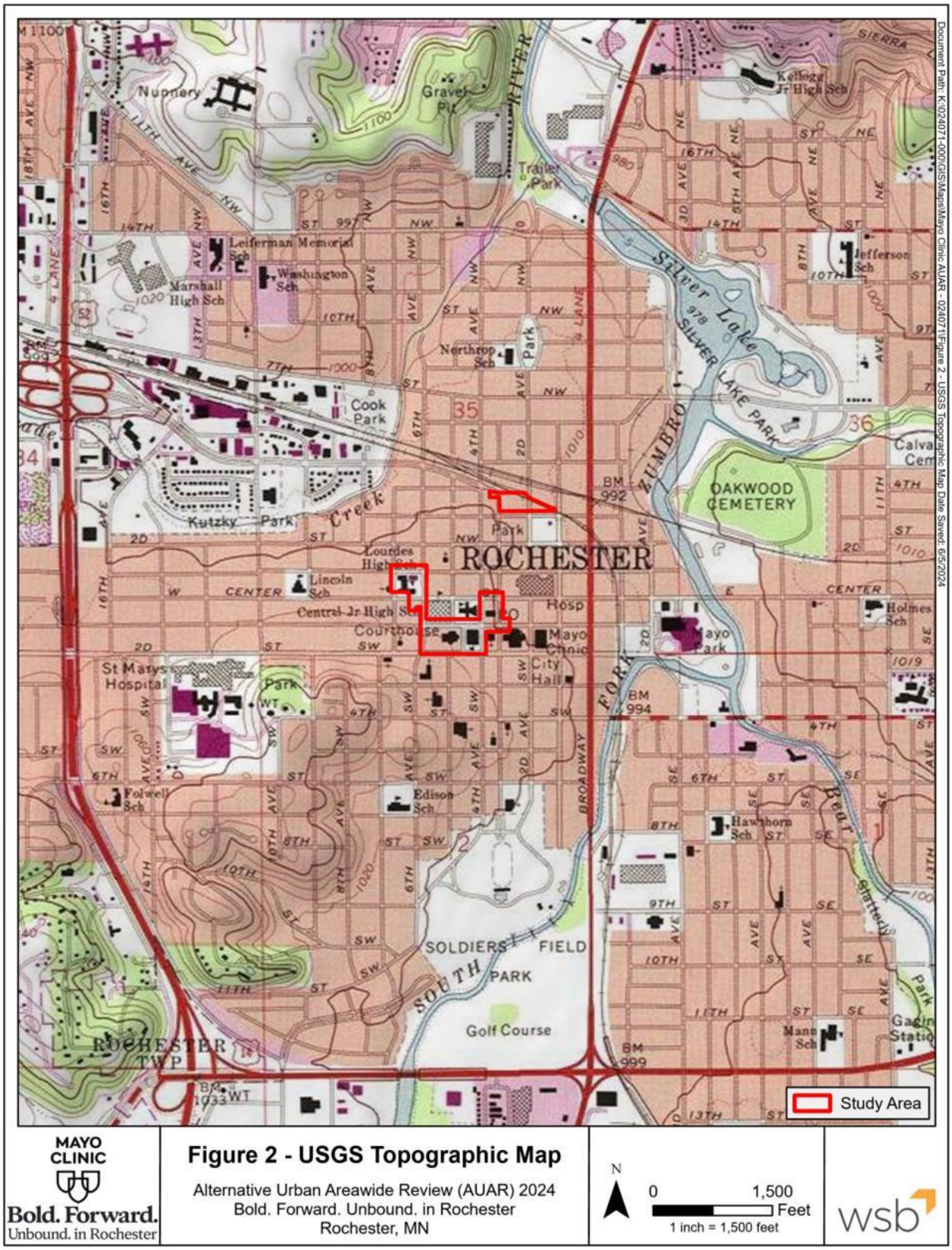
5. Project Location

County: Olmsted
City/Township: City of Rochester
PLS Location (¼, ¼, Section, Township, Range): SE ¼, SW ¼, S35, T107, R14; NW ¼, SE ¼, S35, T107, R14
Watershed (81 major watershed scale): Watershed No. 41 (Zumbro River)
GPS Coordinates: 44.022042, -92.469853
Tax Parcel Number(s): PINs 012848, 012731, 017905, 057927, 057928, 057929, 078602, 064644, 012768, 012770, 012771, 075682, 047602, 086863

At minimum, attach each of the following to the AUAR:

- A map clearly depicting the boundaries of the AUAR and any subdistricts used the AUAR analysis (**Figure 1**)
- US Geological Survey 7.5 minute, 1:24,000 scale map indicating project boundaries (**Figure 2**)
- A cover type map as required for Item 7 (**Figure 3**) Land use and planning and zoning maps as required in conjunction with Item 9 (**Figure 5 and 6**)


Northern Heights Park
Northern Heights
Broadway Ave N
US Highway 52
14th St NE
7th St NW
Silver Lake Park
Civic Center Dr NW
Kutzky Park
2nd St NW
1st St NW
W Center St
E Center St
East Park
2nd St SW
Mayo Clinic Hospital St Mary's Campus
Rochester
Downtown Rochester
6th St SW
7th St SW
6th St SE
7th St SE
8th St SE
Soldiers Memorial Field Golf Course
11th St SW
10th St SE
11th St SE
12th St SW
S Broadway
Bear Creek Park
Fox Valley Dr SW
Apache Mall Shopping Center
Mayo High School
16th St SW
16th St SE
Salem Rd SW
Study Area
MAYO CLINIC
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Figure 1 - Project Location
Alternative Urban Areawide Review (AUAR) 2024
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Rochester, MN
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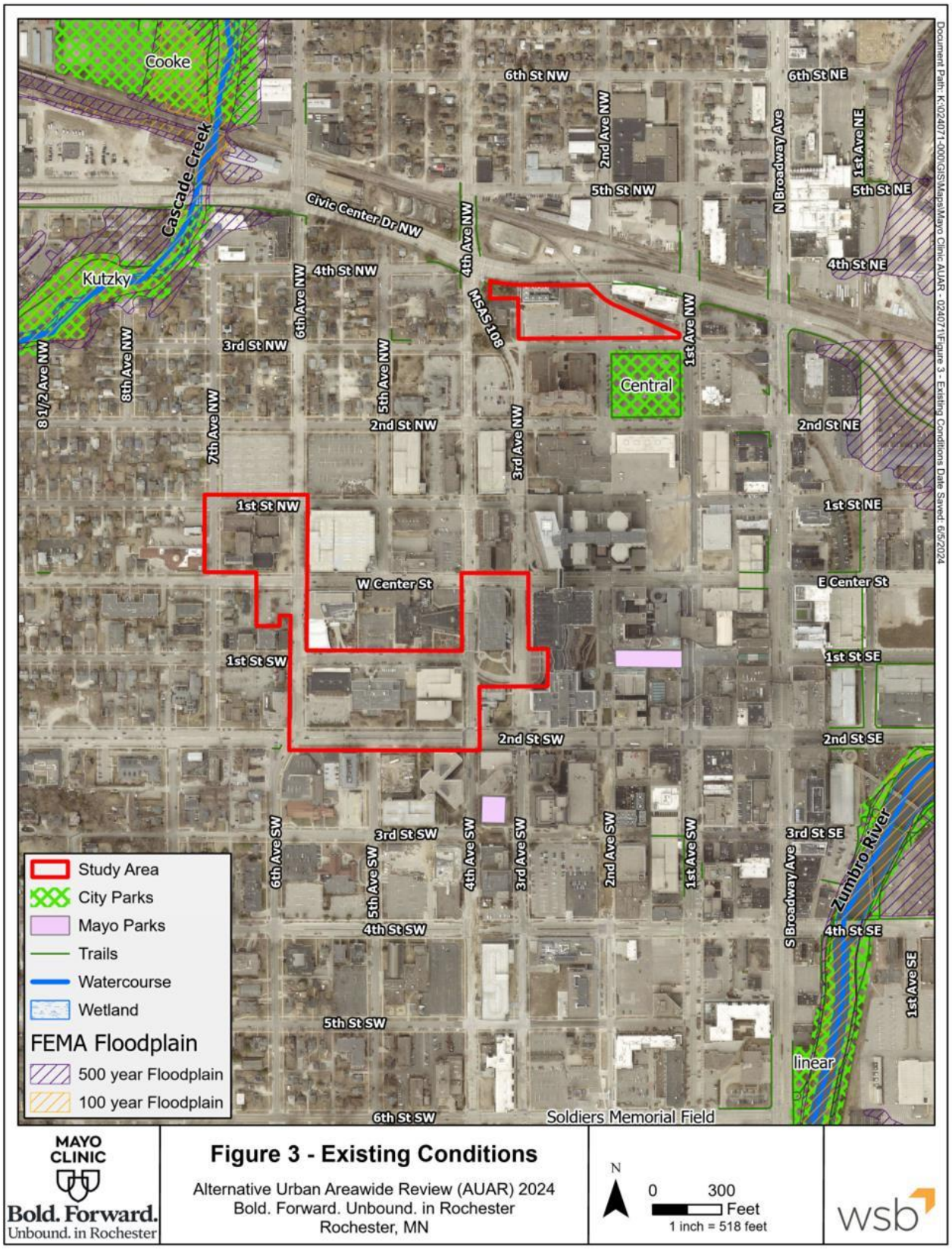
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Figure 2 - USGS Topographic Map

Alternative Urban Areawide Review (AUAR) 2024
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Rochester, MN

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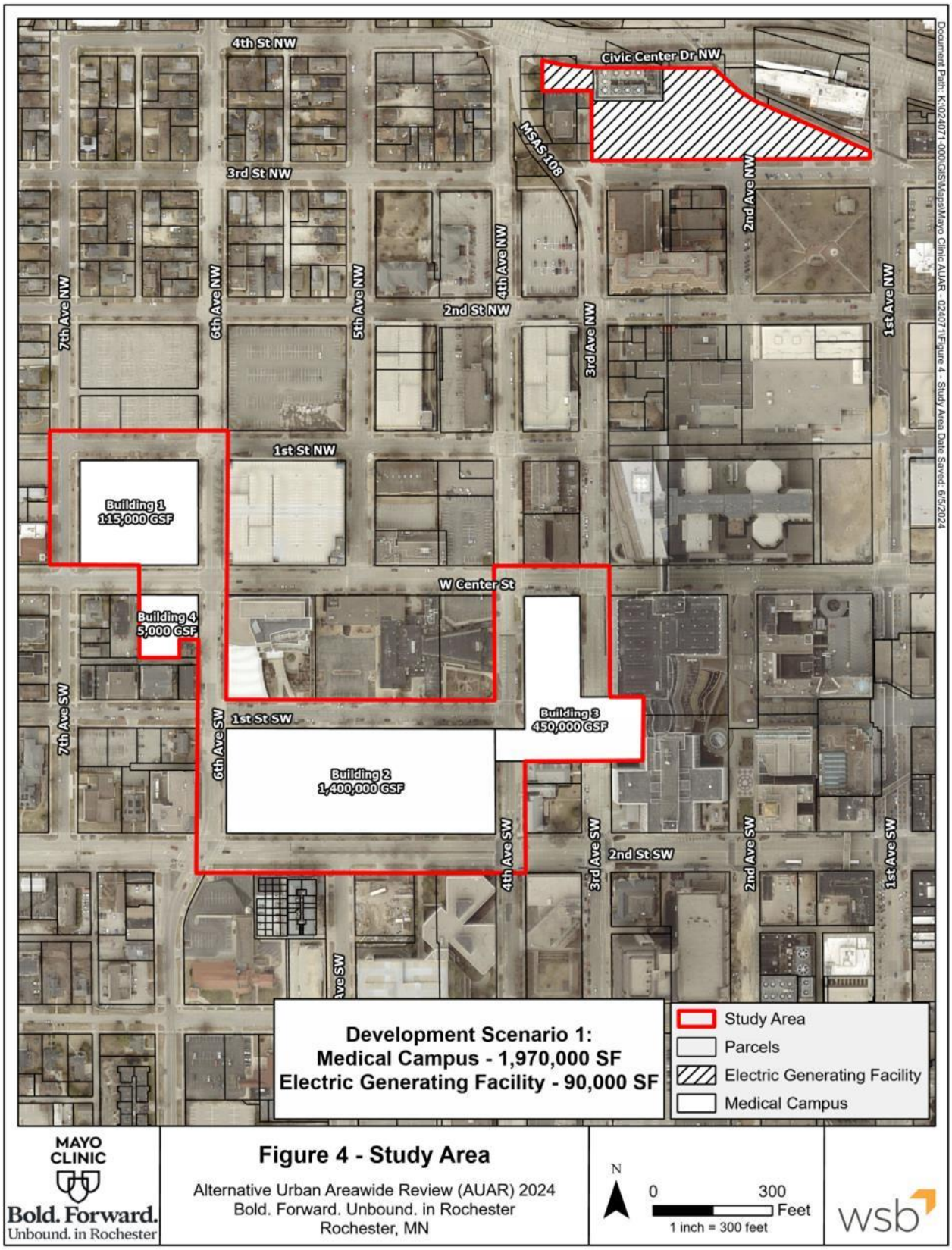
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Figure 3 - Existing Conditions

Alternative Urban Areawide Review (AUAR) 2024
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Rochester, MN

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1 inch = 518 feet

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4th St NW
Civic Center Dr NW
MSAS 108
3rd St NW
2nd Ave NW
7th Ave NW
6th Ave NW
5th Ave NW
4th Ave NW
2nd St NW
3rd Ave NW
1st Ave NW
1st St NW
Building 1
115,000 GSF
W Center St
Building 4
5,000 GSF
7th Ave SW
1st St SW
6th Ave SW
Building 3
450,000 GSF
Building 2
1,400,000 GSF
4th Ave SW
3rd Ave SW
2nd St SW
2nd Ave SW
1st Ave SW
Development Scenario 1:
Medical Campus - 1,970,000 SF
Electric Generating Facility - 90,000 SF
Study Area
Parcels
Electric Generating Facility
Medical Campus
MAYO CLINIC
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Unbound. in Rochester
Figure 4 - Study Area
Alternative Urban Areawide Review (AUAR) 2024
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Rochester, MN
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Feet
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Document Path: K:\024071-000\GIS\Maps\Mayo Clinic AUAR - 024071\Figure 4 - Study Area Date Saved: 6/5/2024

6. Project Description

The AUAR study area is located within the downtown Medical Institutional Campus Special District within central Rochester. The overall campus includes more than 30 buildings that serve Mayo Clinic's inpatient and outpatient medical care, research, education, and medical support functions within the downtown campus area as well as throughout Mayo's extended campus clinics. The AUAR study area consists of approximately 19.7 acres within the downtown Special District.

Mayo Clinic has identified redevelopment that reflects the changing needs of their downtown campus. The goal is to update the downtown campus to include state-of-the-art spaces that integrate digital technology to serve patients, staff, and the community into the future.

Mayo Clinic is proposing to redevelop the area with approximately 1,970,000 square feet of medical institutional and 90,000 sf of electric generating land uses. One development scenario is evaluated in the AUAR, which includes medical institutional and electric generating facility developments **(Table 1 and Figure 4)**. Each of these land use types are described below:

Medical Institutional – Four buildings totaling approximately 1,970,000 sf are proposed. The proposed include primary clinical in-patient focused buildings as well as a logistics building for pharmacy, linens, and sterile processing. There will be an underground tunnel connecting Building 1 to Buildings 2/3 within the 6th Avenue SW corridor for pedestrians, Autonomous Guided Vehicles (AGV), and utilities.

Electric Generating Facility – The existing Prospect Utility Plant (PUP) will be expanded to the southeast, within the footprint of the existing parking area west of 2nd Avenue. The expansion will interconnect with the existing plant building and have similar types of interior spaces and rooms with the addition of boiler room for the CHP and steam production equipment. East of 2nd Avenue, the parking lot will be reconstructed. Equipment in the plant expansion will generally be operationally independent of the existing PUP and include all major and ancillary equipment to produce chilled water, steam, normal power and essential power. The CHP will be comprised of a nominal 8.1 megawatts (MW) combustion turbine generator and heat recovery steam generator.

The proposed electric generating facility will be designed for operating at a capacity of less than 25 MW and will take a fuel restriction to generate less than 100,000 tons per year of greenhouse gas emissions (CO_2e). The electric generating facility is being included in the AUAR evaluation for the purpose of identifying potential cumulative effects. The facility does not require environmental review based on MN Rule 4410.4300 Subpt 3.

This development scenario is consistent with the Comprehensive Plan.

Table 1 - Overview of Development Scenario

Development Type	Scenario 1
Medical Institutional	1,970,000 sf
Electric Generating Facility	90,000 sf

sf = square feet

Construction of the facilities within the redevelopment study area is anticipated to occur over the next 6 years. Enabling work, such as removal of existing buildings and construction of new infrastructure to support the facilities, will occur first.

The intent of the AUAR is to recognize the most potentially impactful development scenario and identify mitigation measures that may be taken to compensate for those impacts. Redevelopment of the study area would include removal of existing buildings, new infrastructure, including water service, sewer, stormwater, streets, and utilities. All new services would be extensions to existing infrastructure or upgrading existing systems to support the redevelopment. Improvements to existing infrastructure or new infrastructure will be consistent with City of Rochester requirements and all applicable standards. Infrastructure construction/reconstruction includes new watermain, sanitary sewer, and stormwater piping, stormwater basins, public roadways, electric duct banks, trails, and sidewalks.

7. Climate Adaptation and Resilience

For the general project location, trends in precipitation, temperature, flood risk, and cooling degree days have been analyzed and described below. Some of the climate projections summarized below use Representative Concentration Pathways (RCPs), which are greenhouse gas concentration scenarios used by the Intergovernmental Panel on Climate Change.[1]

Precipitation
According to the Minnesota Climate Explorer, the historic average precipitation level in Olmsted County between 2000 and 2022 was 35.9 inches with the lowest range in 2003 (23.85 inches) and the highest average in 2019 (50.17 inches).[2] Average annual precipitation in Olmsted County from 2040-2059 is projected to be 32.74 inches under RCP 4.5. From 2080-2099, average annual precipitation is projected to be 33.6 inches under RCP 4.5 and 35.51 inches under RCP 8.5.

Temperature
According to the Minnesota Climate Explorer, the historic average temperature in Olmsted County between 2000 and 2022 was approximately 44.77°F with the lowest average in 2014 (41.14°F) and the highest average in 2012 (48.55°F). The average annual temperature in Olmsted County is projected to increase to 48.01°F from 2040 to 2059 under RCP 4.5 (intermediate emissions pathway). In 2080-2099, average annual temperature is projected to further increase to 50.32°F and 53.94°F under RCP 4.5 and 8.5 (high emissions pathway), respectively.

Urban Heat Island
Surfaces and structures such as roads, parking lots, and buildings absorb and re-emit more heat from the sun than natural landscapes. [3] This can significantly raise air temperature and overall extreme heat vulnerability in urban areas where there are dense concentrations of these surfaces. This is referred to as urban heat island effect. Using a desktop analysis of surrounding parking lots, buildings, average temperature at the location, green infrastructure, and other natural elements, the AUAR study area is likely located in an area of medium heat vulnerability. Mitigation measures will be considered and selected during the design process to reduce this vulnerability rating.

[1] RCP 4.5 is an intermediate scenario in which emissions decline after peaking around 2040, and RCP 8.5 is a worst-case scenario in which emissions continue to rise through the 21st century. Climate Explorer Metadata available at: https://www.dnr.state.mn.us/climate/climate-explorer-metadata.html

[2] Available at: https://arcgis.dnr.state.mn.us/climateexplorer/main/historical

[3] Available at: https://metrocouncil.org/Communities/Planning/Local-Planning-Assistance/CVA/Tools-Resources.aspx

Flood Risk
Climate change can exacerbate the frequency and intensity of extreme rainfall events and associated flooding in some locations. According to Flood Factor, a tool that identifies a property's risk of flooding, the study area has a moderate risk of flooding despite increases in extreme rainfall events.[4] However, due to local information we know that this area experiences moderate and severe localized flooding, so this AUAR will identify potential mitigation measures.

Cooling Degree Days
Degree days are based on the assumption that when the outside temperature is 65°F, heating or cooling is not needed to be comfortable, as defined by the National Weather Service. Degree days are the difference between the daily temperature mean and 65°F. If the temperature mean is above 65°F, 65 is subtracted from the mean and the result is the cooling degree days. For example, if the mean temperature over a 24-hour period is 70°F, then there have been 5 cooling degree days.[5] Cooling degree days are used as a proxy to estimate cooling needs for buildings.

According to Heat Vulnerability in Minnesota, the number of cooling days in 2019 for Olmsted County was 354. The number of cooling days in 2050 for Olmsted County is projected to be 436 and 577 for RCP 4.5 and 8.5, respectively.[6]

Table 2: Climate Considerations

Resource Category	Climate Considerations	Project Information	
		Climate Change Risks and Vulnerabilities	Adaptations
Project Design	Aspects of building architecture/materials choices and site design may impact urban heat island conditions in the surrounding area, including changing climate zones, temperature trends, and potential for extended heat waves.	In the coming decades, the location of the study area is anticipated to experience: • Increased annual temperatures • Increased freeze thaw cycles • Medium urban heat island effect	• Buildings could be constructed with rooftop infrastructure that have portions ready for a green roof or a non heat generating roof (such as green vegetation or stainless steel), and could have some windows with fritting to reduce bird strikes and provide heat reduction. • Building shells could be energy efficient • Proposed climate smart tree plantings and landscaping will reduce runoff and mitigate urban heat island effect

[4] Available at: https://riskfactor.com/city/rochester-mn/2754880_fsid/flood
[5] Available at: https://www.weather.gov/key/climate_heat_cool
[6] Available at: https://maps.umn.edu/climatehealthtool/heat_app/

Land Use	The land use will not be changing since the current and proposed use will both be public health facilities; however, the footprint amount of impervious surface, and impact on wind driven rain will be changing. The location of the project is not within floodplain areas and therefore no risks are identified with increased flooding events.	• Increased annual precipitation and more frequent heavy rainfall events • The study area is not within floodplain areas and therefore no risks are identified with increased flooding events.	• Design of the site and stormwater management facilities will meet City stormwater requirements which are designed to reduce the risk of flooding in the AUAR study area.
Water Resources	Current Minnesota climate trends and anticipated climate change in the general location of the project may influence water resources.	Due to general climate trends across the state, water resources in the general project area may become warmer, more polluted, and change in volume due to increased temperatures and runoff. There may be more evaporation and water available when it rains leading to an increase in the flood potential. It is projected that there will be more severe storm events with high, intense rain amounts which will require drainage systems to be adequately maintained to accommodate for the increase in water volume.	• Developers will consider using native plants and perennials for landscaping and stormwater features will absorb water and reduce the water demand for irrigation. • Stormwater BMPs will be designed to weather a 100-year storm event in accordance with City/ Watershed requirements as the property is developed. • Infiltration areas may be used and would improve water quality and stormwater runoff in the project vicinity.
Contamination / Hazardous Materials/ Wastes	Current Minnesota climate trends and anticipated climate change in the general location of the project may influence the potential environmental effects of generation/use/storage of hazardous waste and materials.	The proposed project would involve the use of regulated medical waste which is not anticipated to be impacted by future climate trends.	Mayo currently operates as a Large Hazardous Waste Generator and manages hazardous waste through a hazardous waste storage facility that meets or exceeds all regulatory standards. See Item 13 for additional detail.
Fish, wildlife, plant communities, andsensitive ecological resources (rare features)	Current Minnesota climate trends and anticipated climate change in the general location of the project may influence the local	Suitable habitat for species may become unsuitable due to land use changes, increased temperature, and runoff.	Native plantings and stormwater BMPs will provide suitable habitat for small mammals, insects, and bird species that currently utilize the existing developed area.

	species and suitable habitat.		

8. Cover Types

The study area encompasses approximately 19.7 acres and is comprised of a combination of impervious surface and lawn/landscaping areas. There are several existing structures within the study area, including buildings and parking ramps. Redevelopment within the study area will involve removal and reconstruction of buildings and parking areas. The existing impervious surface area within the study area totals approximately 10.45 acres. Assumed proposed conditions will result in a total impervious coverage of approximately 12.50 acres. Remaining areas will be restored as lawn/landscaping.

Mitigation Plan

- New impervious surfaces will be treated for stormwater runoff as outlined in Item 12.
- Remaining areas will be restored as lawn/landscaping.

9. Permits and Approvals

Redevelopment within the study area is anticipated to require the following government permits and approvals (**Table 3).**

Table 3 - Anticipated Permits and Approvals

Unit of Government	Type of Application	Status
State		
US Environmental Protection Agency	Class V Injection Well – EPA Underground Injection Control Permit	To be applied for, if needed
MN Pollution Control Agency	National Pollutant Discharge Elimination System (NPDES) Construction Storm Water Permit	To be applied for
	Sanitary Sewer Permit	To be applied for
	Approval of remediation and cleanup plans, as applicable	To be applied for
	Intent to Perform Demolition Notification	To be applied for, if needed
	Air Permit	To be applied for
MN Department of Natural Resources	Temporary dewatering permit for construction	To be applied for, if needed
	Long-term DNR Water Appropriation Permit if dewatering or sump pumping in volumes that exceed 10,000 gallons per day or one million gallons per year.	To be reviewed and applied for if threshold is anticipated to be met
	Preliminary Well Construction Approval	To be applied for, if needed
	Water Use Permit	To be applied for, if needed
MN Department of Health	Review of geothermal plans	To be obtained, if needed
	Watermain plan review	To be applied for
	Asbestos abatement/removal	To be applied for, if needed
	Groundwater Thermal Exchange Device (GTED) Construction Permit	To be applied for, if needed
State Historic Preservation Office	Coordination, if a federal nexus exists	To be applied for, as needed

Regional/ County/ Local		
Olmsted County	New Well Construction Permit	To be applied for
Rochester Olmsted Council of Governments (ROCOG)	Traffic Study review	In process
City of Rochester	Alternative Urban Areawide Review	In process
	Site Development Plan (SDP) review	To be applied for
	Final plat approvals	To be applied for
	Development agreements	To be applied for
	Obstruction Permit	To be applied for
	Excavation Permit	To be applied for
	Oversized Vehicle Permit	To be applied for
	Building permits	To be applied for
	Mass Excavation Permit	To be applied for, as needed
	Grading Permit	To be applied for
	Footing and Foundation Permit	To be applied for, as needed
	Public Works Review and Approval	To be completed
	Certificate of Occupancy	To be applied for
	City/Owner Contracts	To be applied for
	Revocable Permit	To be applied for
	Historic Preservation Commission Review	To be applied for
	Street and Public Utility Vacations Permit	To be applied for
	Demolition Permit	To be applied for

10. Land Use

Existing and Planned Land Uses and Zoning

i. Existing land use of the site as well as areas adjacent to and near the site, including parks, trails, prime or unique farmlands.

The existing land use in the study area is primarily medical institutional development surrounded by surface parking lots. The northern portion of the study area includes an existing electric utility generating facility, the Prospect Utility Plant (PUP), surrounded by surface parking. The City's Land Use map (**Figure 5**) includes primarily Medical Campus within the study area, with some areas of Downtown Fringe. Surrounding Land uses include Downtown Fringe and Traditional Core Neighborhood, and Parks and Open Space.

There are currently no designated off-street bike or pedestrian paved trail within the study area, though sidewalks line most streets and internal sidewalks connect several of the existing buildings. The nearest designated off-street paved trail is located approximately 0.25-mile northwest of the study area, on the west side of Cascade Creek or 0.25-mile east of the study area along the east side of the Zumbro River. On-street bike lanes are also available along 3rd Avenue NW/SW, West Center Street, West Silver Lake Drive NE and on 4th Avenue SW. The nearest city parks include Central Park, located adjacent to the northern portion of the study area, southeast of 3rd Street/2nd Avenue. Other city parks include Kutzky Park and Silver Lake Park, both located approximately 0.25-mile west and east of the study area, respectively. Mayo also has various areas of respite open to the public, including Harwick, Discovery Walk, a pocket park south of the study area, and Peace Plaza. **Figure 3** includes locations of existing parks and trails.

ii. Planned land use. Describe planned land use as identified in comprehensive plan (if available) and any other applicable plan for land use, water, or resources management by a local, regional, state, or federal agency.

The scenario proposed within the study area will result in redevelopment of medical institutional facilities and expansion of the electric generating facility. This development scenario is consistent with the Comprehensive Plan's[7] designated future land uses, which include Medical Campus, Downtown Fringe, Mixed Use Transit Supportive Corridors, and Traditional Core Neighborhood (**Figure 5**).

The *Medical Campus* land use designation includes hospitals, medical clinics, and medical research facilities as well as auxiliary and support facilities which could include utilities, on-site parking, and open space. This land use is present across much of the AUAR study area.

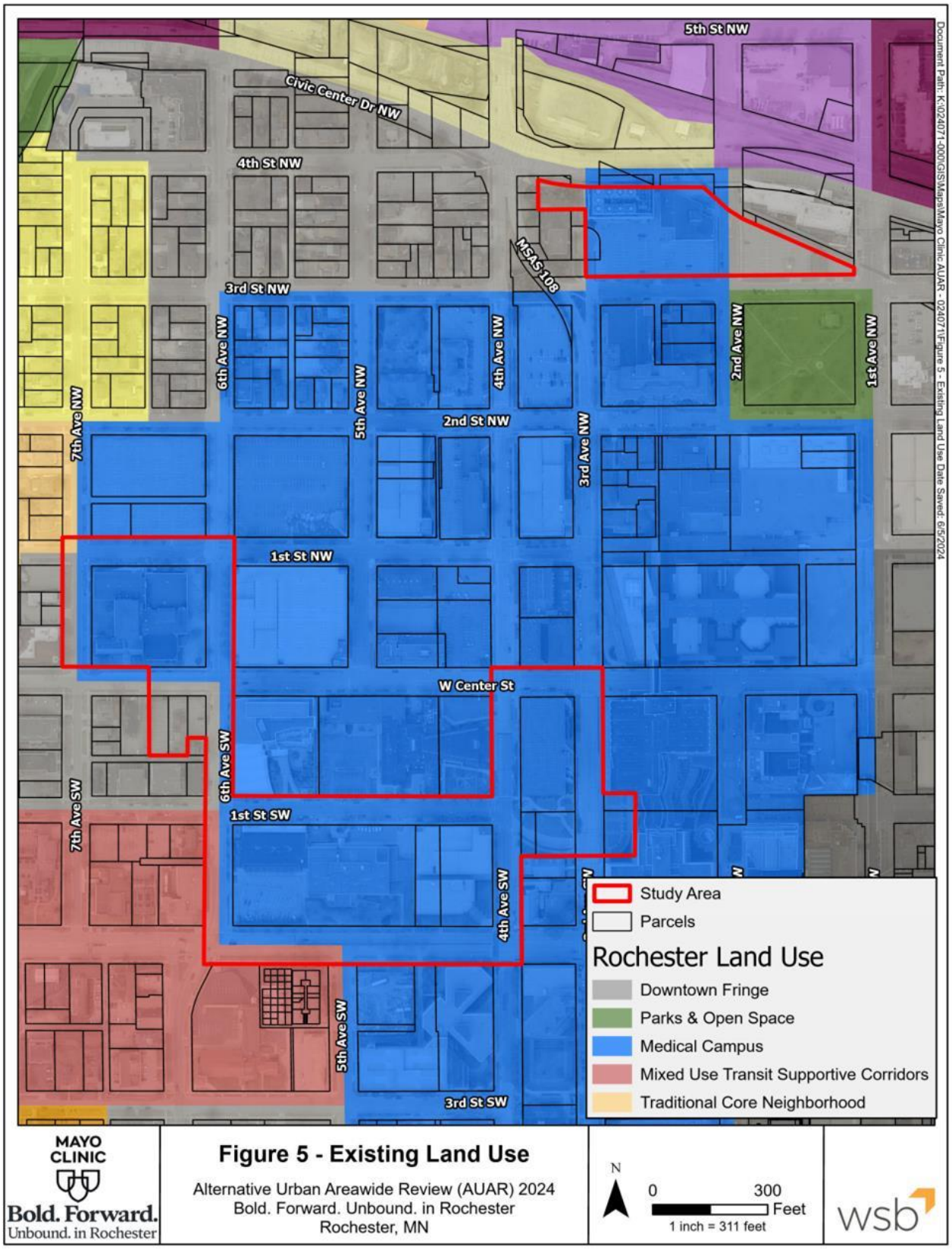
The *Downtown Fringe* land use designation allows for a mix of uses that provides a transition between more intensive, business-oriented land uses and less intensive, residential land uses. The types of development allowed within this land use area includes medium to high density residential, lodging, professional offices, restaurants, and institutional uses. This land use overlays the northeast portion of the AUAR study area, bordering on either side of a Medical Campus land use.

The *Mixed Use Transit Supportive Corridors* allow for development of transit-supportive densities of commercial, residential, and employment uses. This designation is applied along Rochester's busiest, widest, and most prominent streets that serve the city's major development destinations. Within the AUAR study area, this land use designation is present along existing streets in the southwest corner of the study area.

The *Traditional Core Neighborhood* designation allows for a variety of residential densities (single family and multi-family) as well as professional offices, small commercial uses, and complementary public and institutional uses. This land use is present only in a very small portion of the AUAR study area, overlaying an existing street.

Surrounding the AUAR study area, planned Land Uses include Medical Campus, Downtown Fringe, Mixed Use Transit Supportive Corridors, Downtown Core, Transit Supportive Neighborhood, and Parks and Open Space. The proposed redevelopment is compatible with the surrounding planned land uses.

[7] Rochester Comprehensive Plan 2040

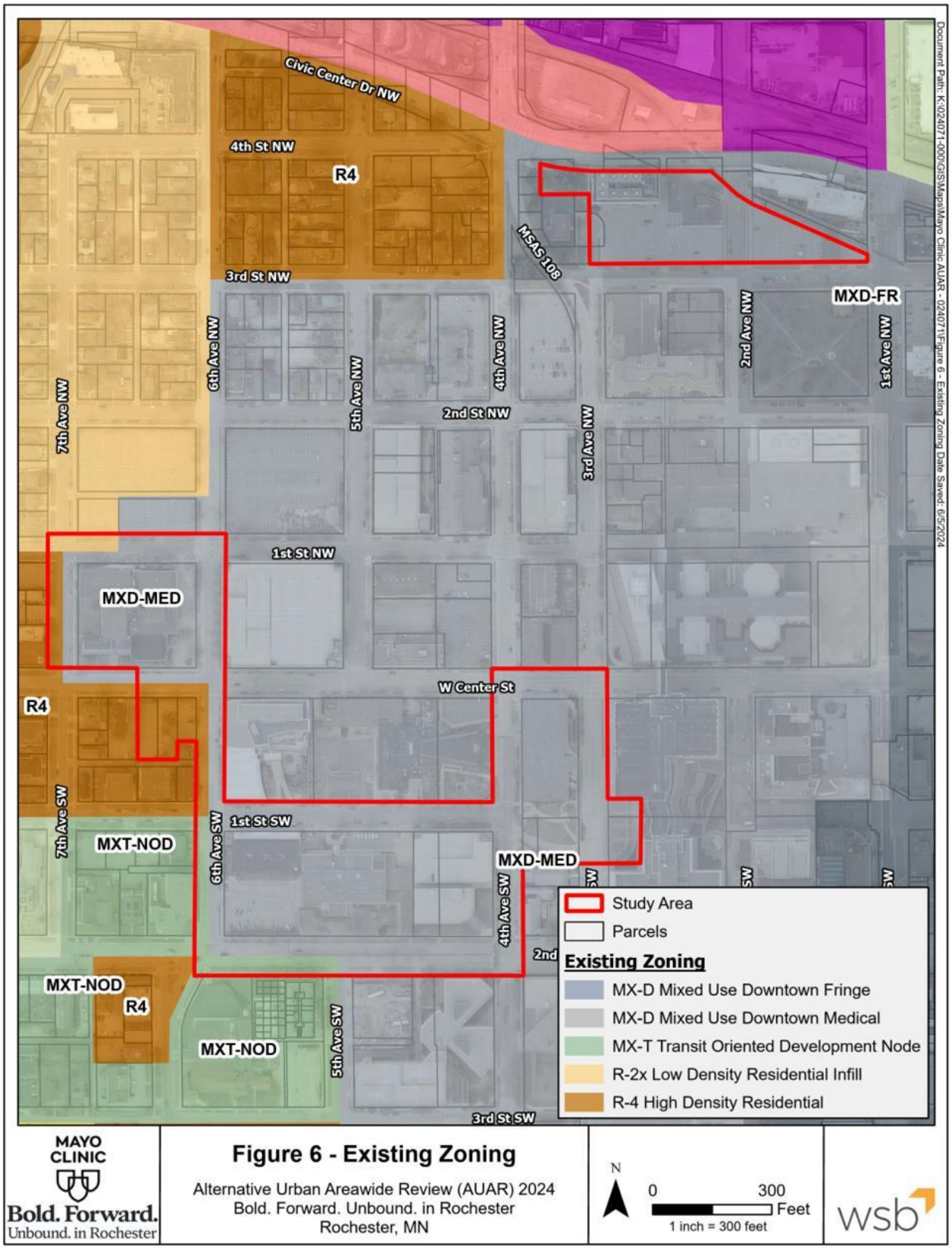

5th St NW
Civic Center Dr NW
4th St NW
MSAS 108
3rd St NW
6th Ave NW
5th Ave NW
4th Ave NW
2nd Ave NW
1st Ave NW
7th Ave NW
2nd St NW
3rd Ave NW
1st St NW
W Center St
6th Ave SW
7th Ave SW
1st St SW
4th Ave SW
5th Ave SW
3rd St SW
Study Area
Parcels
Rochester Land Use
Downtown Fringe
Parks & Open Space
Medical Campus
Mixed Use Transit Supportive Corridors
Traditional Core Neighborhood
Document Path: K:\024071-000\GIS\Maps\Mayo Clinic AUAR - 024071\Figure 5 - Existing Land Use Date Saved: 6/5/2024
MAYO CLINIC
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Unbound. in Rochester
Figure 5 - Existing Land Use
Alternative Urban Areawide Review (AUAR) 2024
Bold. Forward. Unbound. in Rochester
Rochester, MN
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iii. Zoning, including special districts or overlays such as shoreland, floodplain, wild and scenic rivers, critical area, agricultural preserves, etc.

The study area is currently zoned as primarily MXD-MED: Mixed Use Downtown Medical. Smaller areas of MXD – FR: Mixed use Downtown Fringe, MXT – NOD: Mixed Use Transit Oriented Node, R-4: High Density Residential, and R2X: Low Density Residential Infill are also present (**Figure 6**). This zoning is intended to provide for the highest intensity of development within the city. The Medical subdistrict (MXD-MED) is intended for medical facilities, public, and semi-public uses within the area of St. Mary's Hospital and medical campus. The Downtown Fringe subdistrict is intended to include development that is necessary to support or enhance the Central Business subdistrict.

This area of Rochester is within the Mayo Clinic's Medical Institutional Campus Special District. A 5-year plan for this Special District outlines the vision for this area, and was recently updated (September 2023).

There is no FEMA-mapped floodplain within the study area (FIRM Panels 27109C0163F and 27109C0164F) though mapped floodway and 100-year flood zones are located to the east and west along the Zumbro River and Cascade Creek, respectively. There are no agricultural preserves, wild and scenic rivers, critical areas, or shorelands within the study area.


Civic Center Dr NW
4th St NW
R4
MSAS 108
3rd St NW
MXD-FR
6th Ave NW
5th Ave NW
4th Ave NW
2nd Ave NW
1st Ave NW
7th Ave NW
2nd St NW
3rd Ave NW
1st St NW
MXD-MED
W Center St
R4
7th Ave SW
1st St SW
6th Ave SW
MXT-NOD
MXD-MED
4th Ave SW
2nd
MXT-NOD
R4
MXT-NOD
5th Ave SW
3rd St SW
Study Area
Parcels
Existing Zoning
MX-D Mixed Use Downtown Fringe
MX-D Mixed Use Downtown Medical
MX-T Transit Oriented Development Node
R-2x Low Density Residential Infill
R-4 High Density Residential
Document Path: K:\024071-000\GIS\Maps\Mayo Clinic AUAR - 024071\Figure 6 - Existing Zoning Date Saved: 6/5/2024
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Bold. Forward.
Unbound. in Rochester
Figure 6 - Existing Zoning
Alternative Urban Areawide Review (AUAR) 2024
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Compatibility with Plans

The City of Rochester's 2040 comprehensive plan complies with the requirements set forth in Minnesota Rules, part 4410.3610, subpart 1. The proposed redevelopment within the study area is compatible with the existing and planned land uses for the area and is also compatible with the Mayo Clinic's 5-year plan.

Mitigation Plan

The proposed development scenario is anticipated to be compatible with planned land use in the study area. No incompatibilities are expected that would require rezoning or comprehensive plan amendments.

11. Geology, Soils, and Topography

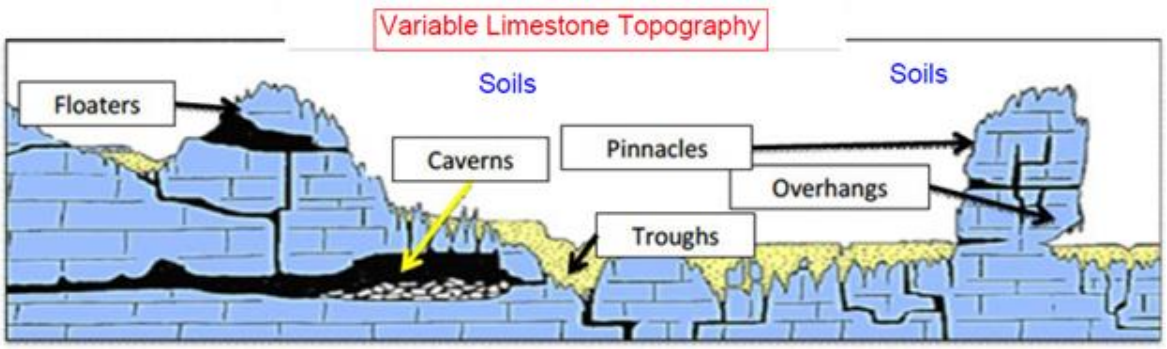
Geology: Describe the geology underlying the project area and identify and map any susceptible geologic features such as sinkholes, shallow limestone formations, unconfined/shallow aquifers, or karst conditions. Discuss any limitations of these features for the project and any effects the project could have on these features. Identify any project designs or mitigation measures to address effects to geologic features.

Information from onsite soil borings, Olmsted County Geologic Atlas, the Olmsted County Soil Survey, and the Minnesota Well Index were used for this analysis.

The surficial geology of the area is mostly alluvial river terrace deposits consisting of sands with gravel and gravelly sands with some minor clay and silt beds. The soils generally coarse to a cobbly gravel at localized areas and may be overlain by fine grained sands. Many of the clay and silt deposits have been replaced with granular fills where development has occurred.

The underlying bedrock consists mostly of Shakopee Formation which consists of tan to gray dolostone, sandy dolostone, sandstone, and thin layers of shale. Based on soil borings in this area, the top of dolostone bedrock typically ranges from 988 to 992 feet, however the study did note areas on top of dolostone bedrock at an elevation of 945 feet and Multi-Channel Analysis of Surface Waves (MASW) noted what appeared to be vertical fractures, void cavities, and other karst features.

Based on the Olmsted County Geologic Atlas, this region has a low to moderate probability of sinkholes and similar karst structures. Commonly this indicates that sinkholes are widely scattered throughout the area with an average sinkhole density of less than 1 sinkhole per square mile. The expected development of new sinkholes in this area is generally low though geotechnical borings did encounter karst features including vertical fractures, void cavities, and surficial bedrock troughs. Common karst features that could be encountered are shown below:



In localized areas, St. Peter Sandstone may be encountered overlying the Shakopee Formation. The St. Peter Sandstone generally consists of a fine to medium grained, whitish tan, quartzose sandstone. The sandstone is typically massive and structureless with the uppermost few feet iron stained.

Because of the depth of bedrock, construction methods at this location may cause vibrations to surrounding buildings. Excessive vibrations can cause damage to foundations, slabs, or cracking of interior or exterior walls. Other adjacent site features such as retaining walls may also be impacted. Vibration monitoring of surrounding facilities will be conducted during construction, as needed.

The geotechnical study identified more potential for karst conditions near the northern portion of the study area. To mitigate the potential for issues related to the geologic conditions present in the study area, the following measures are being considered, where necessary:

- Good surface drainage will be maintained throughout construction so that the site is not vulnerable to ponding during or after a rainfall. If water enters excavations, it should be promptly removed prior to further construction activities. Under no circumstances should fill or concrete be placed into standing water.
- To maintain construction safety, all excavations will comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P “Excavations and Trenches”.
- Field density tests will be taken in engineered fill and backfill placed to aid in judging its suitability. Fill placement and compaction will be monitored and tested to determine that the resulting fill and backfill conforms to specified density, strength or compressibility requirements.

Soils and Topography: Describe the soils on the site, giving NRCS (SCS) classifications and descriptions, including limitations of soils. Describe topography, any special site conditions relating to erosion potential, soil stability, or other soil limitations, such as steep slopes or highly permeable soils. Provide estimated volume and acreage of soil excavation and/or grading. Discuss impacts from project activities (distinguish between construction and operational activities) related to soils and topography. Identify measures during and after project construction to address soil limitations including stabilization, soil corrections, or other measures. Erosion/sedimentation control related to stormwater runoff should be addressed in response to Item 11.b.ii.

The site soil information was retrieved from the U.S. Department of Agriculture Web Soil Survey database and Olmsted County GIS Web Application. According to the Web soil survey, the study area is comprised of two (2) soil types **(Table 4)**. The hydric soils rating indicates the entire study area is comprised of non-hydric soils. One of the soil types, Waukee loam, is classified as prime farmland, but this area is developed and not in agricultural use. The erosion hazard rating indicates the study area is comprised of non-highly erodible soils, meaning that some erosion is

not likely, but erosion-control measures will still be provided in accordance with the NPDES construction stormwater permit requirements. The soil borings completed for the study area encountered mostly alluvial deposits overlying St. Peter Sandstone or Shakopee Formation bedrock.

Table 4 - Soil Types and Respective Coverages

Map unit symbol	Map unit name	Acres within study area	Percent of study area	Percent hydric	Erosion hazard rating
483A	Waukee loam, 0 to 2 percent slopes	2.4	12.4	0	Slight
1039	Urban Land	17.3	87.6	0	Not Rated
Total	**--**	**19.7**	**100**	**--**	**--**

Mitigation Plan

- Vibration monitoring will be conducted during construction, where necessary.
- Mitigation for the foundations may include extension of caissons to deeper elevations until sound rock is encountered or placement of additional concrete or grout to fill cavities and voids.
- Good surface drainage will be maintained throughout construction so that the site is not vulnerable to ponding during or after a rainfall. If water enters excavations, it should be promptly removed prior to further construction activities. Under no circumstances should fill or concrete be placed into standing water.
- To maintain construction safety, all excavations will comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P “Excavations and Trenches”.
- Field density tests will be taken in engineered fill and backfill placed to aid in judging its suitability. Fill placement and compaction should be monitored and tested to determine that the resulting fill and backfill conforms to specified density, strength or compressibility requirements.
- Adhere to NPDES construction stormwater permit requirements and implement construction best management practices, such as silt fence and erosion control blanket.

12. Water Resources

Surface Water and Groundwater Features:

i. **Surface Water: Lakes, streams, wetlands, intermittent channels, and county/judicial ditches. All surface water features should be described and identified on a map of the project area. Include any special designations such as public waters, trout stream/lake, wildlife lakes, migratory waterfowl feeding/resting lake, and outstanding resource value water. Include water quality impairments or special designations listed on the current MPCA 303d Impaired Waters List that are within one mile of the project. Include DNR Public Waters Inventory number(s), if any.**

The National Wetland Inventory (NWI) and Public Waters Inventory (PWI) were reviewed for existing water resources within the study area. Based on the review, there are no aquatic resources within the study area (**Figure 3**). Silver Lake, the Zumbro River and Cascade Creek, all DNR Public Waters, are located approximately 0.3 miles east (Silver Lake/Zumbro River) and 0.20 miles northwest of the study area, respectively.

The Minnesota Pollution Control Agency (MPCA) lists Cascade Creek (AUID 07040004-581), Silver Lake (AUID 55-0003-00), and Zumbro River (AUID 07040004-535) as impaired waters within a mile of the study area. The study area is not within a Federal Emergency Management Agency (FEMA) floodplain, but FEMA floodplain is associated with both the Zumbro River and Cascade Creek.

Because of the impaired waters located with 1 mile downstream of the study area, additional construction-related BMPs found in items 23.9 and 23.10 of the NPDES construction stormwater permit will be required.

ii. Groundwater: aquifers, springs, and seeps. Include 1) depth to groundwater; 2) if project is within a MDH well protection area; and 3) identification of any onsite and/or nearby wells, including unique numbers and well logs, if available. If there are no wells known on site or nearby, explain the methodology used to determine this.

Depth to Groundwater

Based on data from the Minnesota Natural Resources Atlas, the groundwater elevation within the study area varies 10 ft to 20 ft below ground surface (bgs) at the northern portion of the study area to 20 to 30 feet bgs at the southern end of the study area. The potentiometric surface in the Jordan Aquifer is approximately 30 ft below ground in the area of the injection test well, measured April 24, 2024.

Well Protection

The study area is located within the Rochester Central Drinking Water Supply Management Area (DWSMA) and has a high vulnerability rating. The study area is also located within the Rochester Central Wellhead Protection Area.

Onsite and Nearby Wells

Based on the results of the Salas O'Brien Open Loop Geothermal System Feasibility Study, three RPU municipal supply wells are located within 10,000 ft of the study area. These wells include RPU wells #11, 12 and 20.

- Well #11 is located ~2,500 ft south of the site and is completed in the Prairie Du Chien and Jordan Aquifers.
- Well #12 is located ~2,500 ft northeast of the site and is completed in the Jordan, Tunnel City and Wonewoc Aquifers.
- Well #20 is located ~2,000 ft west of the site and is completed in the Jordan, Tunnel City, Wonewoc and Mt. Simon Aquifers.

Details of selected private wells located within 4,000' of the study area are included in the table below and in **Appendix A**.

From the Salas O'Brien Open Loop Geothermal System Feasibility Study:

"One well (#241967) appears to be an observation well that was installed on (or near) the Mayo property in 1927; the well record notes that "water levels were affected by regional pumping" at the time it was drilled. It is noted that two of the private wells near the Mayo site (#228636 and #233630) were installed in the 1940's and were used for geothermal cooling of the

Rochester Dairy operations." Any wells within the study area that will be impacted by construction will be abandoned and sealed by a licensed contractor.

Table 5: Summary of Private Wells within 4,000 feet of Study Area

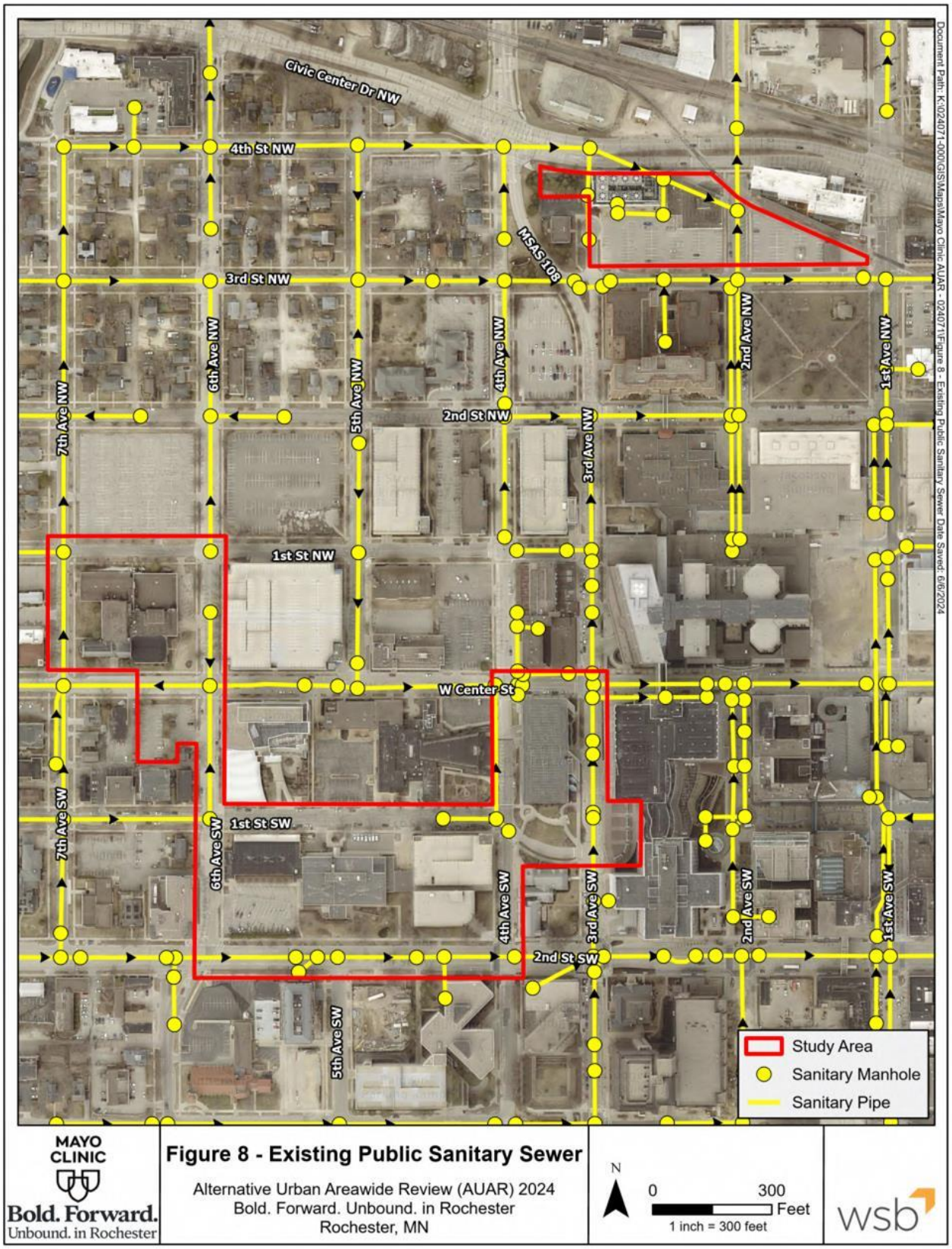
MN Well ID	Year Drilled	Depth (ft)	Aquifer	Well Yield (gpm)	Original Well Use
220786	1942	502	Shakopee, Jordan	500	St. Mary's Hospital
231890	1964	460	Jordan	NA	St. Mary's Hospital
241967	1927	552	Jordan	-	observation well
220664	1926	528	Shakopee, Jordan	400	commercial well
220665	1926	430	Shakopee, Jordan	NA	commercial well
228636	1945	401	Jordan	600	geothermal cooling
233030	1947	425	Jordan	650	geothermal cooling
233039	1969	250	Shakopee	450	geothermal cooling
251913	NA	441	Jordan	NA	Minnesota Geological Survey

Project Effects on Water Resources and Measures to Minimize or Mitigate the Effects

i. Wastewater: For each of the following, describe the sources, quantities, and composition of all sanitary, municipal/domestic, and industrial wastewaters projected or treated at the site.

1) Wastewater Subsurface Sewer Treatment Systems (If the wastewater discharge is to a publicly owned treatment facility, identify any pretreatment measures and the ability of the facility to handle the added water and waste loadings, including any effects on, or required expansion of, municipal wastewater infrastructure.)

The entire study area is served by the Rochester municipal sanitary sewer collection system. The existing public sanitary sewer system in the study area is depicted within **Figure 8.** The system conveys flow via gravity sewer lines to the Water Reclamation Plant (WRP) which discharges treated effluent to the South Fork of the Zumbro River. As of June 10, 2020, the Rochester WRP has a rated dry weather flow capacity of 15.86 million gallons per day (mgd) and an average wet weather flow capacity of 23.85 million gallons of wastewater per day, currently treating approximately 13 million gallons of wastewater per day on an annual average basis.


Civic Center Dr NW
4th St NW
3rd St NW
2nd St NW
1st St NW
W Center St
1st St SW
2nd St SW
MSAS 108
6th Ave NW
5th Ave NW
4th Ave NW
3rd Ave NW
2nd Ave NW
1st Ave NW
7th Ave NW
7th Ave SW
6th Ave SW
5th Ave SW
4th Ave SW
3rd Ave SW
2nd Ave SW
1st Ave SW
Study Area
Sanitary Manhole
Sanitary Pipe
Document Path: K:\024071-000\GIS\Maps\Mayo Clinic AUAR - 024071\Figure 8 - Existing Public Sanitary Sewer Date Saved: 6/6/2024
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Figure 8 - Existing Public Sanitary Sewer
Alternative Urban Areawide Review (AUAR) 2024
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1 inch = 300 feet
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The estimated wastewater flows for the proposed buildings within the development are as follows:

- Building 1 – to be finalized.
- Building 2

  Day 1:
  83,490 GPD
  225,423 GPD w/ 2.7 peaking factor

  Full Build:
  171,000 GPD
  461,700 GPD w/ 2.7 peaking factor

- Building 3

  Day 1:
  38,640 GPD
  104,328 GPD w/ 2.7 peaking factor

  Full Build:
  74,900 GPD
  202,230 GPD w/ 2.7 peaking factor

- Building 4 – Very minor for a floor drain only.
- Prospect Utility Plant (PUP) Expansion

  Day 1:
  381,600 GPD

  Full Build:
  1,000,800 GPD

The design team is working with the City of Rochester Public Works team to evaluate the existing City sanitary sewer system capacity and routing for the conveyance of both the wastewater within the existing system and the proposed additional loads. The concept design evaluation indicates that the downstream Water Reclamation Plant has adequate capacity for all portions of the development.

The proposed Building 1 has available adjacent infrastructure for connection as discussed with the City of Rochester. The estimated 8” sanitary sewer service can connect to the existing 12” public sanitary sewer main located within West Center Street.

For the proposed Buildings 2 and 3 portions of the existing infrastructure will need to be upgraded to accommodate the proposed wastewater flows. Existing upstream wastewater flows of the proposed Buildings 2 and 3 will also need to be rerouted. Proposed designs will continue to be evaluated with the City of Rochester. Options being considered include:

- Routing wastewater through proposed Building 3 on 4th Avenue
- Upsizing existing wastewater on 2nd Street from 4th Avenue to Broadway Avenue

The proposed Building 4 has available adjacent infrastructure for connection as discussed with the City of Rochester. The estimated 6" sanitary sewer service can connect to the existing 12" public sanitary sewer main located within West Center Street.

The proposed PUP Expansion building has available adjacent infrastructure for connection as discussed with the City of Rochester. The estimated 8" sanitary sewer and the estimated 4" sanitary sewer services can connect to the existing public sanitary sewer mains located in Third Street NW and the previously vacated Second Avenue NW. Further coordination of service connections will occur once the wastewater routing is confirmed for Building 2 and Building 3.

2) **Wastewater Discharge to Surface Water (If the wastewater discharge is to a subsurface sewage treatment system (SSTS), describe the system used, the design flow, and suitability of site conditions for such a system.)**

Not applicable. No subsurface sewage treatment systems (SSTS) are anticipated within the AUAR study area for the proposed development scenario.

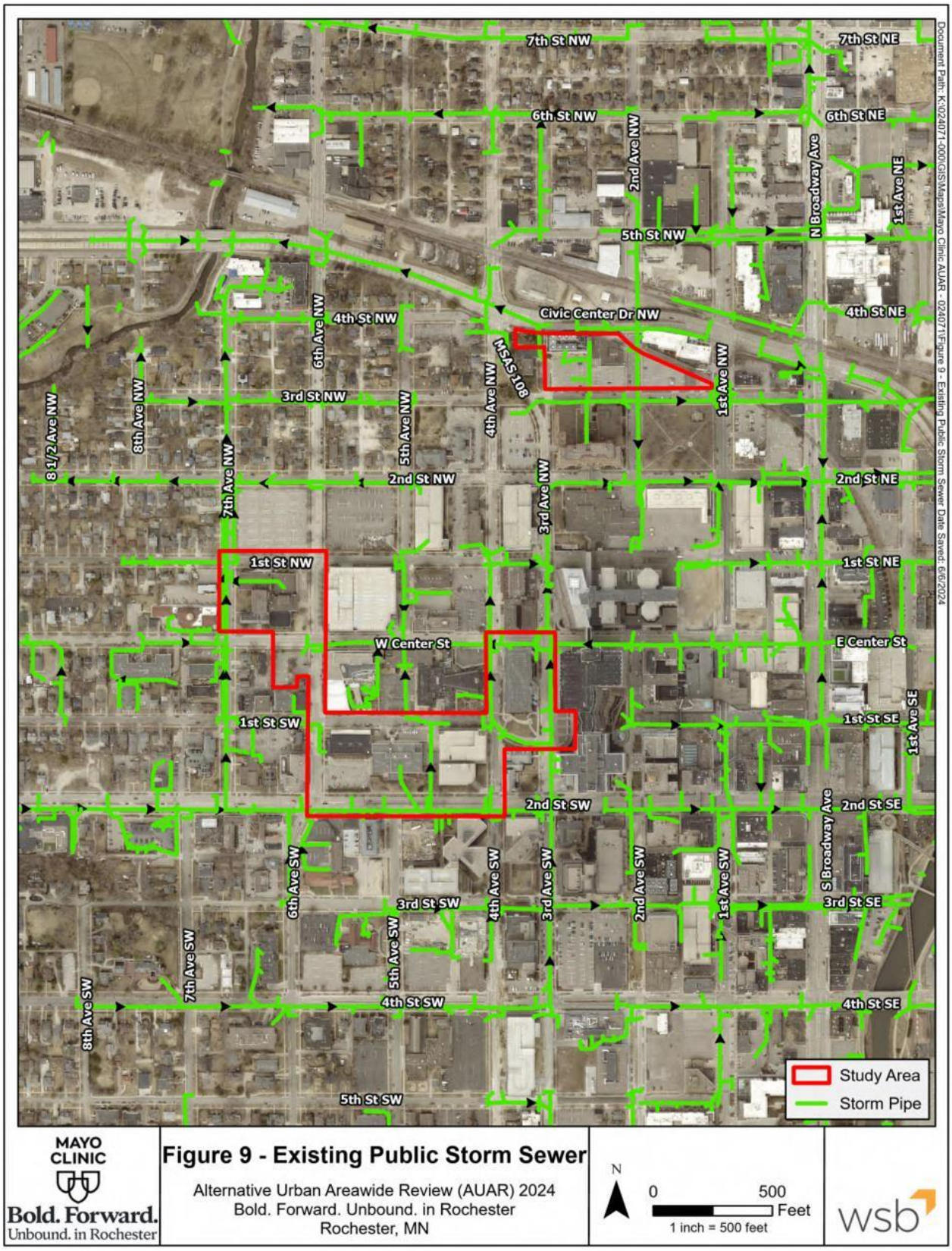
3) **If the wastewater discharge is to surface water, identify the wastewater treatment methods, discharge points, and proposed effluent limitations to mitigation impacts. Discuss any effects to surface or groundwater from wastewater discharges.**

Not applicable. No wastewater discharge to surface waters is anticipated for the proposed development scenario.

ii. **Stormwater: Describe the quantity and quality of stormwater runoff at the site prior to and post construction. Include the routes and receiving water bodies for runoff from the site (major downstream water bodies as well as the immediate receiving waters). Discuss any environmental effects from stormwater discharges. Describe stormwater pollution prevention plans including temporary and permanent runoff controls and potential BMP site locations to manage or treat stormwater runoff. Identify specific erosion control, sedimentation control, or stabilization measures to address soil limitations during and after project construction.**

Existing Condition

The study area totals approximately 17.61 acres. The existing impervious surface area within the study area, excluding the right-of-way (ROW) outside of 3rd and 4th Ave SW which will be vacated in proposed conditions, totals approximately 10.48 acres. The existing impervious areas within the ROW outside of 3rd and 4th Ave SW will be removed and replaced in-kind. See Proposed Conditions below for new and reconstructed impervious total, including the reconstructed ROW areas. Discharges from the current study area drain in two different directions: to Cascade Creek and Silver Lake via Zumbro River, South Fork. The existing storm sewer system is depicted within **Figure 9**. In existing conditions, 1.80 acres drains to Cascade Creek and 15.81 acres to Silver Lake/Zumbro River. Both Cascade Creek (AUID 07040004-581) and Zumbro River (AUID 07040004-535) are impaired waters. Cascade Creek has an impairment for benthic macroinvertebrates bioassessments and turbidity and the Zumbro River for benthic macroinvertebrates bioassessments, Fecal coliform, and turbidity. Silver Lake (AUID 55-0003-00) is impaired for Aquatic Consumption (mercury in fish tissue).


7th St NW
7th St NE
6th St NW
6th St NE
2nd Ave NW
N Broadway Ave
1st Ave NE
5th St NW
4th St NW
Civic Center Dr NW
4th St NE
6th Ave NW
MSAS 108
4th Ave NW
1st Ave NW
8th Ave NW
3rd St NW
5th Ave NW
8 1/2 Ave NW
7th Ave NW
2nd St NW
3rd Ave NW
2nd St NE
1st St NW
1st St NE
W Center St
E Center St
1st St SW
1st St SE
1st Ave SE
2nd St SW
2nd St SE
S Broadway Ave
6th Ave SW
4th Ave SW
3rd Ave SW
2nd Ave SW
1st Ave SW
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3rd St SE
7th Ave SW
5th Ave SW
8th Ave SW
4th St SW
4th St SE
5th St SW
Study Area
Storm Pipe
Document Path: K:\024071-000\GIS\Maps\Mayo Clinic AUAR - 024071\Figure 9 - Existing Public Storm Sewer Date Saved: 6/6/2024
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Figure 9 - Existing Public Storm Sewer
Alternative Urban Areawide Review (AUAR) 2024
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Proposed Conditions

Assumed proposed conditions will result in a total new and reconstructed impervious coverage of approximately 12.90 acres. 1.5 acres of this is reconstructed within the ROW and 11.4 acres is located on private parcels and vacated 3rd and 4th Ave SW. There is no increase of impervious within the ROW, but there will be a 0.92 acre increase on the private parcels. 1.80 acres of the study area will drain to Cascade Creek and 15.81 acres to Silver Lake/Zumbro River. Proposed discharge rates for all sites shall not exceed existing conditions. Water quality treatment, which is equivalent to 1 inch over all new and reconstructed impervious areas, will be required. Geotechnical studies and proposed designs prohibit the use of infiltration due to proximity to bedrock and unsuitable soils. Filtration practices will be utilized to meet the stormwater requirements. The exact nature of the filtration devices will vary from one site to another, but underground sand filters with pretreatment will be provided as the primary devices. Pretreatment will be provided in various ways as well. Manufactured devices such as hydrodynamic separators can be used as the primary pretreatment device with small settling forebays as secondary. This not only increases the efficiency of the sand filters but also reduces the overall operation and maintenance efforts.

Where feasible, above grade rain gardens will be implemented to provide some water quality benefit. Pretreatment to these features would include sumped and/or screened inlet devices.

The redevelopment scenario will utilize a common plan of development approach for stormwater management, whereby stormwater for all of the development parcels is considered rather than being limited to each individual parcel. Each project within the common plan will tie into existing public storm sewer infrastructure. Due to the highly developed existing conditions, peak discharge rates will be managed and/or reduced when compared to the existing conditions by simply treating the required water quality volume. Most sites will provide onsite treatment, but where that is not feasible Mayo Clinic will identify areas to oversize BMPs to provide the required water quality volume; these locations could be outside of the study area. Existing outfalls into Cascade Creek or Silver Lake/Zumbro River are not planned to be disturbed by projects occurring as part of redevelopment of this study area, and no new outfalls are proposed.

The National Pollution Discharge Elimination System (NPDES) permit requirements will be adhered to and construction best management practices will be implemented, such as silt fence and erosion control blanket. The impairments to Cascade Creek and Silver Lake/Zumbro River will require additional BMPs found in items 23.9 and 23.10 of the NPDES permit.

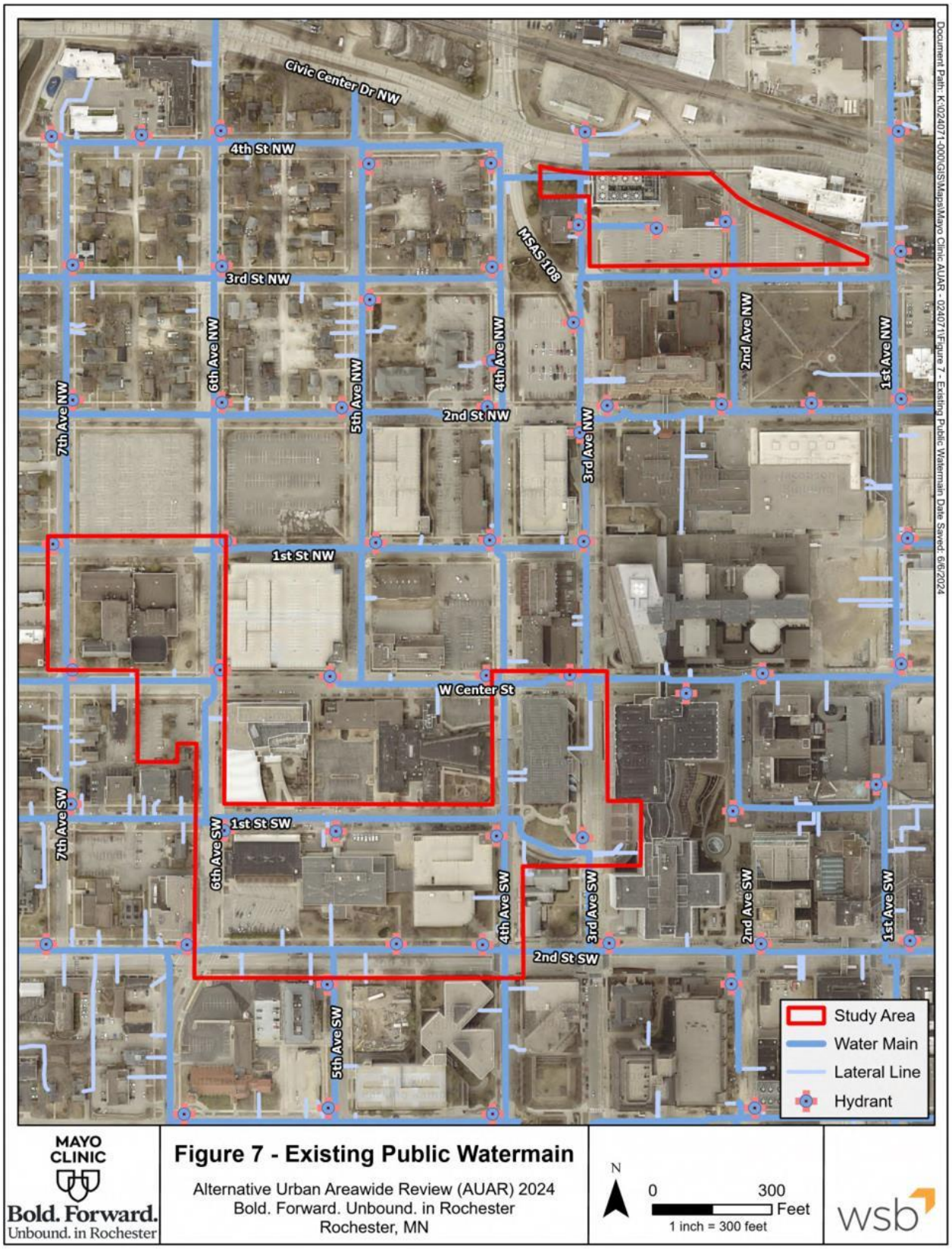
iii. Water Appropriation: Describe if the project proposes to appropriate surface or groundwater (including dewatering). Describe the source, quantity, duration, use, and purpose of the water use and if a DNR water appropriation permit is required. Describe any well abandonment. If connecting to an existing municipal water supply, identify the wells to be used as a water source and any effects on, or required expansion of, municipal water infrastructure. Discuss environmental effects from water appropriation, including an assessment of the water resources available for appropriation. Identify any measures to avoid, minimize, or mitigate environmental effects from the water appropriation.

Water Supply

The entire study area is served by Rochester Public Utilities (RPU). The RPU system is supplied by 32 municipal water supply wells. These 32 wells pump from a total of five

different aquifers: Shakopee aquifer, Jordan aquifer, Tunnel City aquifer, Wonewoc aquifer, and Mt. Simon aquifer.

Existing watermain that supplies the study area is depicted within **Figure 7**.


Civic Center Dr NW
4th St NW
3rd St NW
2nd St NW
1st St NW
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1st St SW
2nd St SW
MSAS 108
6th Ave NW
5th Ave NW
4th Ave NW
3rd Ave NW
2nd Ave NW
1st Ave NW
7th Ave NW
7th Ave SW
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4th Ave SW
3rd Ave SW
2nd Ave SW
1st Ave SW
Study Area
Water Main
Lateral Line
Hydrant
MAYO CLINIC
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Figure 7 - Existing Public Watermain
Alternative Urban Areawide Review (AUAR) 2024
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Document Path: K:\024071-000\GIS\Maps\Mayo Clinic AUAR - 024071\Figure 7 - Existing Public Watermain Date Saved: 6/6/2024

The design team is working with the Rochester Public Utilities Water (RPU-WTR) team to evaluate the existing City water supply system capacity and routing for the conveyance of both the water within the existing system and the proposed additional demands. The concept design evaluation to date indicates that the existing system has adequate flows and pressures for all portions of the development. RPU-WTR is modeling the proposed development data within their city model to confirm pipe sizes and necessary looping for adequate domestic and fire water coverage. Various mitigations measures are being considered design to reduce the water supply requirements of the project, these include:

- using low-flow toilets, urinals, and shower components,
- recirculation pumps that allow for hot water to be served quickly,
- utilize small instantaneous water heaters at fixtures that are a greater distance from the central water heater.

The proposed Building 1 has available adjacent infrastructure for connection as discussed with RPU-WTR. The estimated two - 8" water services can connect to the existing 8" public watermains located within West Center Street and Seventh Avenue NW.

For the proposed Buildings 2 and 3, some existing infrastructure will need to be upgraded to accommodate the proposed water demands. Looping of the existing system to maintain adequate pressures will be required. Proposed designs will continue to be evaluated with the RPU-WTR.

The proposed Building 4 is not expected to require water service.

The proposed PUP Expansion building has available adjacent infrastructure for connection as discussed with the RPU-WTR. The estimated two - 10" water services can connect to the existing 12" & 8" public watermains located in Third Avenue NW and Third Street NW. Mitigation measures being considered in the design of this facility to reduce water demand includes:

- using two stage reverse osmosis (RO) skids to increase the quality of permeate vs. concentrate compared to single stage RO skids,
- using various water treatment equipment (e.g., condensate polishers, softeners, carbon filters, cartridge filters, RO skids, and degassifier skids) to improve boiler water quality beyond industry standard which will reduce boiler blowdown required,
- placing softeners upstream of the RO to reduce backwash,
- directing RO skid reject to a reclaim water tank where it can be diluted with city water to acceptable conductivity and utilized for:
    - blowdown discharge tempering water,
    - cooling tower makeup water,
- using closed loop cooling for process equipment instead of open loop, and
- cooling tower chemical treatment to maintain a higher CoC, reducing blowdown and makeup water usage.

<u>Groundwater</u>

Geotechnical studies noted perched groundwater on top of the dolostone bedrock which can affect excavations and construction. Construction dewatering, if needed, will require a permit from the DNR.

Mayo is proposing to utilize an open loop geothermal system. Geothermal systems use the earth's heat to circulate groundwater to heat or cool a building's HVAC system. Geothermal is a renewable resource, providing reliable and clean energy, while offsetting

carbon emissions[8]. The design of the proposed open loop geothermal system includes supply wells, injection wells, and monitoring wells. All of the open loop wells will be installed in the Jordan aquifer. All groundwater pumped (i.e. appropriated) from the supply wells will be returned to the same aquifer via the injection wells; therefore, no long-term effects on the aquifer are expected. Hydrogeological studies indicate that groundwater in the Jordan aquifer migrates toward the Zumbro River and its tributaries. Other aquifers assessed during the feasibility study include the Wonewoc/Tunnel City aquifer; however, analysis indicates that aquifer would not yield the results necessary. Monitoring wells will be used to collect data on the operation of the system. Supply and return piping will connect the supply wells to the mechanical room in the PUP and the injection wells.

The water appropriation requirement from the supply wells, based on the preliminary geothermal system design, is a peak flow rate of 2,250 gallons per minute (gpm). The geothermal system is capable of continuously operating 365 days a year, although the flow rate will vary based on the demand of the system. The estimated annual amount of water being pulled from and reinjected back into the Jordan aquifer is 234,000,000 gallons. This amount is based on current preliminary load data associated with the entire Unbound project. Based on the above noted pumping rates, the project will required to submit a Preliminary Well Construction Assessment (PWCA), apply to the DOH for a permit for that type of system, and obtain a Water Appropriation permit from the DNR.

An open loop geothermal system test drilling program is currently being completed for the study area. The results of the test drilling program will be used to determine the following:

- aquifer characteristics (i.e. transmissivity, groundwater flow direction, groundwater temperature, etc.);
- potential zone of influence under operating conditions (i.e. simultaneous pumping and injection to the same aquifer);
- thermal modelling; and,
- environmental effects (e.g. impact on surface water features, groundwater resources, etc.), if any.

The test drilling program results will be evaluated for additional potential groundwater effects and coordinated with the DNR. Wells that are abandoned following the test drilling program will be sealed by a licensed contractor.

iv. Surface Waters

1) Wetlands: Describe any anticipated physical effects or alterations to wetland features, such as draining, filling, permanent inundation, dredging, and vegetative removal. Discuss direct and indirect environmental effects from physical modification of wetlands, including the anticipated effects that any proposed wetland alterations may have to the host watershed. Identify measures to avoid (e.g., available alternatives that were considered), minimize, or mitigate environmental effects to wetlands. Discuss whether any required compensatory wetland mitigation for unavoidable wetland impacts will occur in the same minor or major watershed and identify those probable locations.

The National Wetland Inventory (NWI) and Public Waters Inventory (PWI) were reviewed, and no wetlands exist within, or directly adjacent to, the study area.

[8] Department of Energy Geothermal Factsheet

2) **Other Surface Waters: Describe any anticipated physical effects or alterations to surface water features (lakes, streams, ponds, intermittent channels, county/judicial ditches) such as draining, filling, permanent inundation, dredging, diking, stream diversion, impoundment, aquatic plant removal, and riparian alteration. Discuss direct and indirect environmental effects from physical modification of water features. Identify measures to avoid, minimize, or mitigate environmental effects to surface water features, including in-water Best Management Practices that are proposed to avoid or minimize turbidity/sedimentation while physically altering the water features. Discuss how the project will change the number or type of watercraft on any water body, including current and projected watercraft usage.**

No other surface waters exist within the study area and alternations to adjacent surface waters, including Silver Lake, the Zumbro River, and Cascade Creek, are not anticipated with redevelopment. Development of the scenario will increase impervious surfaces within the study area. Stormwater BMPs will be implemented as discussed in Section 13.3(ii). No existing outfalls to Silver Lake/Zumbro River or Cascade Creek will be altered, and no new outfalls are proposed. Stormwater BMPs implemented within the study area are anticipated to mitigate for any potential impact to those waterbodies. No secondary impacts are expected.

Mitigation Plan

Sanitary Sewer

- Existing infrastructure will need to be upgraded to accommodate the proposed wastewater flows.
- Existing upstream wastewater flows of the proposed Buildings 2 and 3 will need to be rerouted.

Stormwater

- Water quality treatment is required for the entire site per City requirements.
- Provide water quality treatment equivalent to 1 inch over all new and reconstructed impervious areas.
- Obtain a National Pollution Discharge Elimination System (NPDES) construction stormwater permit for projects that exceed 1 acre of disturbance.
- Adhere to NPDES construction stormwater permit requirements and implement construction best management practices, such as silt fence and erosion control blanket.
- Incorporate green infrastructure options into design, where feasible.

Water Supply

- Some existing infrastructure will likely need to be upgraded to accommodate the proposed water demands.
    - Looping of the existing system to maintain adequate pressures will be required.
- Mitigation measures being considered to reduce the water supply requirements of the medical institutional facilities in the study area include:
    - using low-flow toilets, urinals, and shower components,
    - recirculation pumps that allow for hot water to be served quickly,
    - utilize small instantaneous water heaters at fixtures that are a greater distance from the central water heater.
- Mitigation measures being considered in the design of the PUP expansion facility to reduce water demand includes:
    - using two stage reverse osmosis (RO) skids to increase the quality of permeate vs. concentrate compared to single stage RO skids,

- using various water treatment equipment (e.g., condensate polishers, softeners, carbon filters, cartridge filters, RO skids, and degassifier skids) to improve boiler water quality beyond industry standard which will reduce boiler blowdown required,
- placing softeners upstream of the RO to reduce backwash,
- directing RO skid reject to a reclaim water tank where it can be diluted with city water to acceptable conductivity and utilized for:
- blowdown discharge tempering water,
- cooling tower makeup water,
- using closed loop cooling for process equipment instead of open loop, and
- cooling tower chemical treatment to maintain a higher CoC, reducing blowdown and makeup water usage.

Surface Water

- Provide additional construction-related BMPs found in items 23.9 and 23.10 of the NPDES permit.

Groundwater

- Construction dewatering, if required, will require a permit from the DNR.
- Submit a Preliminary Well Construction Assessment to the DNR.
- Abandon and seal unused wells using a licensed contractor.
- Obtain a Department of Health permit for installation of the geothermal system.
- Obtain a Water Appropriation permit from the DNR to operate the geothermal system.
- The current test drilling program results will be evaluated for additional potential effects and coordinated with the DNR.

13. Contamination/Hazardous Materials/Wastes

Pre-Project Site Conditions: Describe existing contamination or potential environmental hazards on or in close proximity to the project site, such as soil or groundwater contamination, abandoned dumps, closed landfills, existing or abandoned storage tanks, and hazardous liquid or gas pipelines. Discuss any potential environmental effects from pre-project site conditions that would be caused or exacerbated by project construction and operation. Identify measures to avoid, minimize, or mitigate adverse effects from existing contamination or potential environmental hazards. Include development of a Contingency Plan or Response Action Plan.

An Environmental Contamination Review (Review) was completed for the study area and those findings were reported in a January 8, 2024 Memorandum. The Review consisted of completing regulatory MPCA file reviews associated with sites that may have documented residual contamination in soil, groundwater, and/or soil vapor in the areas of planned construction. Residual soil and groundwater contamination is documented at the existing PUP facility (MPCA regulatory sites PB3593, VP21180, VP21181, and SA0001580) and existing Ozmun Building (MPCA regulatory sites LS0000723 and LS0009629).

At the existing PUP facility (planned Electric Generating Facility), contaminated surface soil is documented beneath and north of the current Johnson Building associated with historical printing activities prior to Mayo taking ownership of the property. The contaminated soil is present between 0-2 feet below grade and includes elevated concentrations of diesel range organics (DRO), tetrachloroethylene (PCE), arsenic, cadmium, lead, and methylene chloride. Elevated DRO in groundwater is also documented at the north side of the current Johnson Building at a depth of approximately 16 feet below grade. During future construction activities at the PUP facility, particularly west of 2nd Avenue Northwest, the upper two feet of soil will likely need to be managed as regulated fill based on the elevated contaminant concentrations. If encountered during construction, groundwater may also require special management due to elevated DRO.

The existing Ozmun Building property is associated with two closed petroleum leaks prior to Mayo taking ownership of the property. One petroleum release discovered in 1989 resulted in soil and groundwater contamination from leaking gasoline and diesel underground storage tanks (USTs). The leaking USTs were located at the northern portion of the site at the current aboveground storage tank (AST) and dumpster storage area, immediately south of 1st Street Southwest. Based on the available historical data, petroleum contaminated groundwater requiring special management may be encountered if future excavation activities are completed at depths beyond 17 feet below grade (within bedrock) at the northern portion of the site. The potential to encounter petroleum impacted soil at the northern portion of the site, north of the current Ozmun Building is low based on the available historical data.

The second petroleum release occurred in 1997 inside the current Ozmun Building, immediately northeast of the southwestern parking lot. The leak was discovered during the removal of an underground hoist associated with a former police garage. Elevated DRO concentrations are documented at seven feet below grade at the former hoist area. If future construction activities are planned at/near the former leaking hoist inside the Ozmun Building, DRO impacted soil requiring special management will likely be encountered at/near seven feet below grade.

Based on the documented residual soil and groundwater contamination at the PUP facility and Ozmun Building, a Response Action Plan (RAP) will be developed for the proposed study area improvements. The RAP will describe the planned future land/building uses, and the soil, groundwater, and/or soil vapor management plans/methods that will be implemented in the event contamination is encountered during construction. The RAP will be overseen by an environmental consultant to ensure the management of contaminated materials is completed in accordance with MPCA and City/County regulations. Prior to construction, soil samples should be collected at areas with suspected or documented contamination for waste characterization and/or potential reuse purposes. Soil may be eligible for onsite and/or offsite reuse depending on the levels/types

of contaminants identified, thickness of proposed clean cover, placement depth, and/or proposed land use.

The potential exists for previously undocumented contamination to be present at other AUAR study area locations associated with the area's historical commercial and industrial property usage. Therefore, the RAP will include a Construction Contingency Plan (CCP) detailing procedures and protocols to manage previously unidentified environmental conditions that are encountered during construction activities. These conditions may include, but are not limited to, elevated soil vapor readings, abandoned USTs, buried drums, transformers, debris, ash, and asbestos containing waste material.

Project Related Generation/Storage of Solid Wastes: Describe solid wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from solid waste handling, storage, and disposal. Identify measures to avoid, minimize, or mitigate adverse effects from the generation/storage of solid waste including source reduction and recycling.

Typical construction-related solid waste materials (i.e., wood, concrete, steel/metal, plastics, etc.) will be generated during redevelopment of the study area. Construction-related waste will be recycled or disposed of at approved facilities, as appropriate. Once in operation, the proposed redevelopment will generate new solid waste management and sanitation services demands within the study area due to an increase in non-residential (commercial/industrial) municipal solid waste.

Solid waste generation and disposal during construction and operation of the proposed buildings will comply with applicable laws, rules, and ordinances related to the management of solid wastes, particularly per Chapter 3500 of the Olmsted County Ordinances & Codes (Solid Waste Management Ordinance (Ordinance)) and as described in the 2022-2032 Olmsted County Solid Waste Management Plan[9]. The Ordinance prohibits yard waste and recyclable materials from entering the Mixed Municipal Solid Waste (MMSW) stream and requires volume/weight-based pricing for MMSW to advance recycling and waste reduction. A central collection location for recyclable materials generated on the premises will be provided and delivered to a recycling center. Recycling will be completed in accordance with the 2016 Recycling Law (Minnesota Statutes Chapter 115A, including, but not limited to Sections 115A.151 and 115A.552).

Project Related Use/Storage of Hazardous Materials: Describe chemicals/hazardous materials used/stored during construction and/or operation of the project including method of storage. Indicate the number, location, and size of any above or below ground tanks to store petroleum or other materials. Discuss potential environmental effects from accidental spills or releases of hazardous materials. Identify measures to avoid, minimize, or mitigate adverse effects from the use/storage of chemicals/hazardous materials including source reduction and recycling. Include development of a spill prevention plan.

Chemicals/hazardous materials used and/or stored during construction may include petroleum products (e.g., gasoline, diesel, equipment/vehicle lubricants, etc.), adhesives, synthetic and natural resins, solvents, polymer bonding agents, and surface sealers. Temporary fueling tanks for construction equipment will likely be staged at multiple locations. The number, location, and size of planned temporary tanks for construction are unknown at this time; however, the location and use of temporary storage tanks will comply with state and local rules and regulations. Accidental spills or releases of petroleum/hazardous materials during construction will be promptly contained, reported to the Minnesota Duty Officer as applicable, and recovered (i.e., the spilled material will be cleaned up and corresponding wastes will be disposed appropriately).

During operation, the four proposed Medical Institutional buildings will likely include the use and/or storage of cleaning and disinfecting agents, sterilants, latex, and common laboratory

[9] Olmsted County Solid Waste Management Plan

chemicals and reagents (e.g., acetone, hydrochloric acid, benzyl chloride). The proposed electric generating facility will likely include the storage and use of chemicals/hazardous materials necessary for producing chilled water, steam, normal power, and essential power. Diesel fuel ASTs may be needed for emergency generators at the proposed Medical Institutional buildings and Electric Generating Facility. The specific location of these tanks will be determined as design progresses and the location and use of proposed storage tanks will comply with state and local rules and regulations. While in operation, the proposed new facilities will maintain hazardous material spill prevention plans and outline the standard methods to follow in the event a spill or release occurs.

Project Related Generation/Storage of Hazardous Wastes: Describe hazardous wastes generated/stored during construction and/or operation of the project. Indicate method of disposal. Discuss potential environmental effects from hazardous waste handling, storage, and disposal. Identify measures to avoid, minimize, or mitigate adverse effects from the generation/storage of hazardous wastes including source reduction and recycling.

The proposed buildings within the study area, both during construction and operation, will comply with the Hazardous Waste Management (HWM) Program outlined in the 2022-2032 Olmsted County Solid Waste Management Plan. The HWM Program is operated under a contract between the MPCA and Olmsted County and provides guidance to prevent hazardous material from entering the solid waste stream.

Potentially hazardous waste streams generated during construction may include accidental spills of petroleum, used oil (e.g., hydraulic, lubricating, and vehicle crankcase oils), aerosol cans containing residual product, solvents, cleaners (acids, bases, degreasers), paints and stains (oil and latex), and resins/epoxies/roofing tars. Any hazardous waste generated during construction will be handled and disposed of in accordance with state and local regulations. If any hazardous waste is currently stored within buildings proposed for demolition, the MPCA will be notified (if required) and the waste will be characterized, containerized, and disposed of at facilities licensed to handle regulated wastes.

If previously identified asbestos-containing material (ACM) will be disturbed during planned building renovation and/or demolition activities within the study area, the MPCA and Minnesota Department of Health (MDH) will be notified, and the ACM will be abated by an MDH-certified asbestos contractor. The asbestos abatement will also be overseen by an MDH-certified asbestos supervisor to ensure the hazardous material is managed in accordance with local, state, and federal regulations (e.g., wet methods, prompt containerization, securing the work area, etc.). If present, lead-based paint will also require proper removal to ensure compliance with Occupational Safety and Health Administration (OSHA) and MPCA requirements. Universal waste such as fluorescent bulbs/ballasts, mercury thermostats, and electronic waste will be disposed and/or recycled to the extent feasible prior to any building demolition or renovation.

During operation, the new facilities may generate hazardous waste. Mayo Clinic currently has a Large Hazardous Waste Generator license through the MPCA. This existing license will be reviewed and updated as necessary. Project operations staff will make a good faith effort to minimize hazardous waste generation. If necessary, a formal hazardous waste minimization program will be put in place to help reduce the volume and toxicity of waste generated. Disposal of hazardous waste during operation will be completed in accordance with state and local regulations. Any infectious waste generated at the proposed Medical Institutional buildings will be handled and disposed of in accordance with MPCA Guidance Document w-sw4-30, Infectious Waste, Management Guidance for Generators.

Mitigation Plan

- A Response Action Plan (RAP) should be developed prior to construction.
- DRO-impacted soil and groundwater may require special management. Refer to January 8, 2024 Environmental Contamination Review Memorandum

- A Construction Contingency Plan (CCP) detailing procedures and protocols to manage previously unidentified environmental conditions that are encountered during construction activities should be developed prior to construction.
- Construction-related waste will be recycled or disposed of at approved facilities, as appropriate.
- Solid waste generation and disposal during construction and operation will comply with applicable laws, rules, and ordinances related to the management of solid wastes.
- Recycling will be completed in accordance with the 2016 Recycling Law (Minnesota Statutes Chapter 115A, including, but not limited to Sections 115A.151 and 115A.552).
- While in operation, the proposed new facilities will maintain hazardous material spill prevention plans and outline the standard methods to follow in the event a spill or release occurs.
- Both during construction and operation, the proposed facilities will comply with the Hazardous Waste Management (HWM) Program outlined in the 2022-2032 Olmsted County Solid Waste Management Plan.
- Any hazardous waste generated during construction will be handled and disposed of in accordance with state and local regulations.
- If previously identified asbestos-containing material will be disturbed during building renovation and/or demolition activities, the MPCA and Minnesota Department of Health (MDH) will be notified, and the ACM will be abated by an MDH-certified asbestos contractor.
- Universal waste such as fluorescent bulbs/ballasts, mercury thermostats, and electronic waste will be disposed and/or recycled to the extent feasible prior to any building demolition or renovation.
- The Mayo's existing Large Hazardous Waste Generator license will be reviewed and updated as necessary.
- If necessary, a formal hazardous waste minimization program will be put in place to help reduce the volume and toxicity of waste generated.
- Disposal of hazardous waste during operation will be completed in accordance with state and local regulations.
- Any infectious waste generated at the proposed Medical Institutional buildings will be handled and disposed of in accordance with MPCA Guidance Document w-sw4-30, Infectious Waste, Management Guidance for Generators.

14. Fish, Wildlife, Plant Communities, and Sensitive Ecological Resources (Rare Features)

Fish and Wildlife Resources

AUAR Guidance: The description of fish and wildlife resources should be related to the habitat types depicted on the cover types of maps. Any differences in impacts between development scenarios should be highlighted in the discussion.

The study area is located within a highly developed area of Rochester and little habitat is available for wildlife. The nearest water resources available include the Zumbro River approximately 0.5 miles east and Cascade Creek approximately 0.2 miles northwest. Wildlife species that may occur within the study area include those known to use human-disturbed habitats, such as the house sparrow (*Passer domesticus*), rock pigeon (*Columba livia*), and raccoon (*Procyon lotor*).

Current land cover within the study area is entirely developed and predominately impervious. The development scenario will replace existing impervious structures with other impervious structures. Vegetation is limited to boulevard trees and rain garden plantings. Land cover in the proposed

development scenario will be similar to the existing land cover and will provide similar habitat for wildlife.

Rare Features

A formal NDNR (Correspondence # MCE 2024-00010) Natural Heritage Inventory (NHI) report has been requested and the DNR's response is included in **Appendix B**. WSB also reviewed the MNDNR NHI data (License Agreement 2022-030, January 2025). This information indicates there are multiple records of the special concern peregrine falcon (*Falco peregrinus*), Ozark minnow (*Notropis nubilus*), black redhorse (*Moxostoma duqueshei*), creek heelsplitter (*Lasmigona compressa*), state threatened ellipse mussel (*Venustaconcha ellipsiformis*), fluted-shell mussel (*Lasmigona costata*), elktoe mussel (*Alismidonta marginata*), edible valerian (*Valeriana edulis* var. *ciliata*), and the watchlist rusty patched bumble bee (*Bombus affinis*) within the vicinity of the study area or within a one-mile radius around the study area.

The U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) service indicated that the federally endangered northern long-eared bat (NLEB; *Myotis septentrionalis*) and rusty patched bumble bee, proposed endangered tricolored bat (*Perimyotis subflavus*), experimental population of whooping crane (*Grus americana*), and candidate species for listing monarch butterfly (*Danaus plexippus*) may occur within or near the study area (**Appendix B**). Non-essential, experimental populations are not considered essential to the continued existence of a species. Take prohibitions and USFWS consultation requirements are relaxed for non-essential, experimental populations.

Northern Long Eared Bat
Suitable NLEB summer habitat consists of a variety of forested or wooded habitats where they roost, forage, and travel and may also include some adjacent non-forested habitats such as emergent wetlands, edges of agricultural fields, old fields, or pastures. Summer habitat includes forests and woodlots containing potential roosts (i.e., live trees or snags greater than or equal to three inches diameter at breast height (dbh) that have exfoliating bark, cracks, crevices, or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. During winter months NLEB hibernate in caves or abandoned mines and tend to be found in deep crevices. Males and non-reproductive females may also roost in caves or mines. Developed areas are not suitable habitat for NLEB. There are no known hibernacula or maternity roost trees in Olmsted County.

Tricolored Bat
Tricolored bats hibernate in caves and mines. In the summer, tricolored bats often roost in trees, but some males and non-reproductive females also roost in their winter hibernaculum. Maternity colonies may be established in trees, rock crevices, or barns and other buildings.

Whooping Crane
The eastern population of whooping cranes rarely occur in Minnesota. During migration, whooping cranes use wetlands with emergent vegetation and shallow water (i.e., < 18 inches [46 cm] deep), including shallow marshes and wet meadows. Whooping cranes also use flooded agricultural fields and shallow river bottoms. Whooping cranes avoid areas with tall structures (e.g., trees, buildings, et cetera). There is not suitable whooping crane habitat within the study area.

Rusty Patched Bumble Bee
RPBB occur in a variety of habitats including prairies, woodlands, marshes, agricultural landscapes, and residential parks and gardens. RPBB require areas that support sufficient food (nectar and pollen from diverse and abundant flowers), undisturbed nesting sites in proximity to floral resources, and overwintering sites for hibernating queens. Nesting sites include underground and abandoned rodent cavities or clumps of grass (i.e., bunchgrasses), and overwintering sites include patches of undisturbed soil along woodland edges. The USFWS adapted a habitat connectivity model to identify the zones around current (2007-

2017) records where there is a high potential for RPBB to occur. The zones are referred to as High Potential Zones or Low Potential Zones. High Potential Zones contain known locations and the surrounding area and are considered to have the greatest potential for species presence. RPBB presence is assumed within High Potential Zones where suitable habitat is present. Although the entire study area is within the RPBB High Potential Zone, based on current land cover there does not appear to be suitable overwintering or foraging habitat for RPBB available.

Monarch Butterfly
Monarch butterflies use fields and parks where native milkweed (*Asclepias* spp.) and other plant species are common. Monarch larvae are milkweed obligates, however adults feed on a variety of flowering plants.

Effects on Fish, Wildlife, Plant Communities, Rare Features, and Ecosystems

There are no Minnesota Biological Survey (MBS) sites of biodiversity significance, MNDNR native plant communities (NPCs), or calcareous fens within the study area or within one mile of the study area. The construction activities associated with the proposed redevelopments should not impact the MBS sites of biodiversity, NPCs, or calcareous fens that are more than one mile of the study area.

Although there are records of special status species within or near the study area, state and federal guidelines will be followed to prevent adverse impacts to special status species. Also, land use within the study area is developed and does not provide quality habitat for most special status species. Mitigation measures will include avoiding impacting habitat during certain times of the year or conducting a species study of the area, if needed. The wildlife species that currently use the study area are likely to continue to use the study area after the area is redeveloped as they are common, ubiquitous, and are associated with human-disturbed habitats. To avoid impacts during construction, wildlife-friendly erosion control BMPs should be utilized. Impacts to habitat can further be minimized by ensuring invasive species don't spread through construction practices and planting disturbed areas with native, weed-free, seed mixes.

In addition to the special status species listed above, redevelopment within the study area will also consider the potential for impacts to birds due to window strikes. Birds cannot see clear or reflective glass and therefore may try to fly through windows, either because they see reflections of habitat in the window (e.g., clouds, trees, etc.) or they see what they think is habitat on the inside (e.g., potted plants). At night, lights inside buildings can also attract birds and result in collisions. Collisions with glass often result in either injury or fatality. It is anticipated that some of the building architecture will include large areas of glass windows. In these buildings, design considerations will include elements that minimize the potential for bird strikes by making the glass more visible to birds. These elements may include using ultraviolet (UV) patterned glass or fritted glass. In addition to minimizing bird strikes, fritted glass can also provide energy savings by providing some shading to the interior of the building.

Mitigation Plan

Various mitigation measures may be incorporated into design to avoid, minimize, or mitigate the potential for effects to wildlife, including:

- Follow current USFWS guidelines for tree removal to avoid impacts to NLEB.
- Plant native, weed-free, species in re-vegetated areas where deemed appropriate.
- Incorporate pollinator species into landscaped planting areas, where deemed appropriate.
- Invasive species will be controlled during site construction by inspecting and decontaminating equipment when moving between sites.
- Utilize wildlife-friendly erosion control blanket to avoid entanglement, where deemed appropriate.

- Use UV patterned or fritted glass on building windows.

15. Historical Properties

Describe any historic structures, archeological sites, and/or traditional cultural properties on or in close proximity to the site. Include 1) historic designations; 2) known artifact areas; and 3) architectural features. Attach letter received from the Minnesota State Historic Preservation Office (SHPO). Discuss any anticipated effects to historic properties during project construction and operation. Identify measures that will be taken to avoid, minimize, or mitigate adverse effects to historic properties.

The AUAR study area was reviewed for the potential for historic or archeological resources using a variety of data including data from the State Historic Preservation Office (SHPO) and Minnesota Indian Affairs Council (MIAC) as well as prior studies conducted for the area (Mayo Clinic Rochester Campus: An Assessment of Cultural Resources (Volumes I and II)). The MN SHPO's Statewide Historic Inventory Portal (MnSHIP) documents six inventoried structures within the study area, which are summarized in **Table 6**. MIAC reviewed the site and determined that there were no known or suspected burial sites within the study area (**Appendix B**). An unanticipated discoveries plan was recommended and will be incorporated into project plans.

Table 6: SHPO Inventoried Properties

SHPO Inventory ID	Historic Name/Current Name	NRHP Listed/Eligible for Listing	Rochester Historic Property Designation
OL-ROC-00041	Lourdes High School	No/Eligible	Local Designation Removed via Council Decision on March 18, 2024
OL-ORC-00029	Unknown/615 West Center Street	No/Not Evaluated	N/A
OL-ROC-00019	Olmsted County Courthouse/Ozmun Center	No/Not Eligible	N/A
OL-ROC-00018	High School/Ozmun East	No/Not Recommended Eligible	N/A
OL-ROC-00356	Post Office (razed)/Damon Parking Ramp	N/A	N/A
OL-ROC-00409	William W. Mayo Statue	No/Not Evaluated	Listed

None of the sites in the study area on listed on the National Register of Historic Places (NRHP). Two of the sites, the Lourdes High School and William W. Mayo statue, were both designated as historic properties through the city's Heritage Preservation Commission, which has authority via city ordinance Chapter 4-7 to designate local properties and landmarks. The Lourdes High School was recently removed from the list via City Council decision (March 18, 2024). As mitigation, the Mayo Clinic intends to construct a park with features that honor the site. The William W. Mayo statue will also need to be moved as development progresses. A committee of Mayo Clinic staff will determine the temporary and final location of the statue as final design progresses. Coordination with the Rochester Heritage Preservation Commission will occur, if necessary. The

statue is expected to remain within the Mayo medical campus and thus no permanent impacts are expected.

The study area is also adjacent to a potential NRHP Historic District, the Mayo Clinic Historic District, but none of the buildings within the study area have been identified as contributing to that District. No other impacts to historic properties or cultural resources are expected.

Mitigation Plan

- Construct a linear park that honors the Lourdes High School site.
- Determine temporary and permanent location for William W. Mayo statue and coordinate with Rochester Heritage Preservation Commission, if necessary.
- Develop unanticipated discoveries plan.

16. Visual

Scenic views or vistas may include spectacular viewing points along lakes, rivers or bluffs; virgin timber tracts; prairie remnants; geological features; waterfalls; specimen trees; or plots of wildflowers. Describe any project related visual effects such as vapor plumes or glare from intense lights. Discuss the potential visual effects from the project. Identify any measures to avoid, minimize, or mitigate visual effects.

There are no scenic views or vistas within or near the study area. Site lighting under each scenario will be consistent with the City of Rochester ordinances. A lighting plan will be developed and submitted to the City of Rochester during the site planning review and approval stage.

Mitigation Plan

- A lighting plan will be developed and submitted to the City of Rochester during the site planning review and approval stage.

17. Air

Stationary Source Emissions: Describe the type, sources, quantities, and compositions of any emissions from stationary sources such as boilers or exhaust stacks. Include any hazardous air pollutants, criteria pollutants, and any greenhouse gases. Discuss effects to air quality including any sensitive receptors, human health, or applicable regulatory criteria. Include a discussion of any methods used to assess the project's effect on air quality and the results of that assessment. Identify pollution control equipment and other measures that will be taken to avoid, minimize, or mitigate adverse effects from stationary source emissions.

This item is not applicable to an AUAR. Any stationary air emissions source large enough to merit environmental review requires individual review.

Not applicable. The proposed electric generating facility will be designed for operating at a capacity of less than 25 MW and will take a fuel restriction to generate less than 100,000 tons per year of greenhouse gas emissions (CO_2e). The facility does not require environmental review based on MN Rule 4410.4300 Subpt 3.

Vehicle Emissions: Describe the effect of the project's traffic generation on air emissions. Discuss the project's vehicle-related emissions effect on air quality. Identify measures (e.g., traffic operational improvements, diesel idling minimization plan) that will be taken to minimize or mitigate vehicle-related emissions.

Motor vehicles emit airborne pollutants (such as mobile source air toxics [MSATs]), thereby affecting air quality. The Environmental Protection Agency (EPA) regulates air pollutants including ozone, particulate matter, carbon monoxide, nitrogen dioxide, lead, and sulfur dioxide. Potential impacts resulting from these pollutants are assessed by comparing estimated concentrations to National Ambient Air Quality Standards (NAAQS). Advances in vehicle technology and fuel regulations will result in reduced vehicle emissions.

The Minnesota Department of Transportation (MnDOT) has developed a screening method designed to identify intersections that will not cause a carbon monoxide (CO) impact above state standards. MnDOT has demonstrated that even the 10 highest traffic volume intersections in the Twin Cities do not experience CO impacts. Therefore, intersections with traffic volumes lower than these 10 highest intersections will not cause a CO impact above state standards. MnDOT's screening method demonstrates that intersections with total daily approaching traffic volumes below 82,300 vehicles per day will not have the potential for causing CO air pollution problems. None of the intersections in the study area exceed the criteria that would lead to a violation of the air quality standards.

Dust and Odors: Describe sources, characteristics, duration, quantities, and intensity of dust and odors generated during project construction and operation. (Fugitive dust may be discussed under Item 16a). Discuss the effect of dust and odors in the vicinity of the project including nearby sensitive receptors and quality of life. Identify measures that will be taken to minimize or mitigate the effects of dust and orders.

Fugitive dust will be generated during the construction phase of all proposed development scenarios. Dust emissions will be controlled by watering, sprinkling, or calcium chloride applications, as necessary. Contractors will maintain streets, alleys, sidewalks, and other public spaces adjacent to construction activities to keep them free from dust, litter, and other debris in accordance with City standards. Dust emissions are not expected during the operational phase of any of the proposed development scenarios. No odors are anticipated during construction or operation.

Mitigation Plan

- During construction, control dust by watering, sprinkling, or calcium chloride applications, as necessary.
- During construction, contractors will maintain streets, alleys, sidewalks, and other public spaces adjacent to construction activities to keep them free from dust, litter, and other debris in accordance with City standards.

18. Greenhouse Gas (GHG) Emission/Carbon Footprint

GHG Quantification

Analyses for GHG emissions for the study area were conducted under no-build conditions and full-build scenarios; each calculation is shown in **Appendix C**. This basis for comparison was chosen based on alignment with methods used in the transportation and traffic analysis. Project-specific emission sources and references to the methods used to quantify emissions are included within the calculation tables in the appendix.

GHG Assessment

1) *Describe any mitigation considered to reduce the project's GHG emissions.*

The Mayo Clinic has implemented comprehensive sustainability initiatives for its buildings, focusing on energy efficiency, waste reduction, and green construction practices. These efforts include retrofitting existing structures with energy-efficient systems to meet EUI targets, utilizing renewable energy sources, and adhering to LEED standards for new constructions. The clinic also emphasizes water conservation, sustainable landscaping, and the use of eco-friendly materials, demonstrating a commitment to reducing its environmental footprint while promoting a healthier, more sustainable future. During this phase in site planning, plans are concept-level; exploration and development of potential mitigation practices is dependent on further development planning and design. The following are potential design strategies and sustainability measures that will be considered for the proposed development to reduce emissions; the project proposers already plan to incorporate some of these measures:

- Include energy efficient appliances, equipment, and lighting
- Utilize energy efficient building shells
- Implement waste best management practices; recycle and compost appropriate material when applicable
- On-site native landscaping to reduce potable water and pesticide use, along with the inclusion of additional green spaces, trees and tree trenches to improve local air quality, absorb greenhouse gas emissions, and reduce local urban heat island effect.
- Provide on-site electric vehicle charging infrastructure in parking structures.
- Setting Mayo Energy Use Intensity (EUI) targets for buildings
- Seek LEED Certification for buildings
- Construct a geothermal open loop system to heat/cool buildings.

Implementation of the above strategies will be evaluated on a case-by-case basis based on feasibility, schedule, code requirements, and stakeholder preferences.

2) *Describe and quantify reductions from selected mitigation, if proposed to reduce the project's GHG emissions. Explain why the selected mitigation was preferred.*

Geothermal is a mitigation measure being considered with this project and is a reliable local source of renewable energy, and produces only about one-sixth of the carbon dioxide of a natural gas power plant, and little—if any—nitrous oxide or sulfur dioxide"[10].

Due to the high-level nature of this analysis and uncertainty of any specific future implementation of mitigation measures other quantification of reductions isn't available at this time.

3) *Quantify the proposed projects predicted net lifetime GHG emissions (total tons/#of years) and how those predicted emissions may affect achievement of the Minnesota Next Generation Energy Act goals and/or other more stringent state or local GHG reduction goals.*

Minnesota's Next Generation Energy Act requires the state to reduce greenhouse gas emissions in the state by 80% between 2005 and 2050, while supporting clean energy, energy efficiency, and supplementing other renewable energy standards in Minnesota. To contribute to the achievement of this goal, the project proposers may implement specific mitigation measures identified above.

[10] www.energy.gov

Methods for modeling air emissions were completed in accordance with EAW (Environmental Assessment Worksheet) standards. The expected lifespan of the project is 50 years. Per the tables presented in **Appendix C**, the project's predicted net GHG emissions over the project's lifespan (compared to no-build conditions) are estimated at +29,615 CO2e metric tons per year, with a reduction of GHG emissions estimated at -1.2 kg CO2e per square foot of building area per year. **Table 7** presents a summary of modeled emissions for the no-build and full-build scenarios.

Table 7. GHG Emissions Summary

	Total Emissions (tonnes/yr)	Total Building Area (sqft)	Total Emissions per Building Area (kg/yr/sqft)
No-Build	7,094	357,648	19.8
Full Build	36,709	1,970,000	18.6

Assumptions were used in the generation of the above estimates; these assumptions are included in **Appendix C**. The proposed Prospect Utility Plant (PUP) will be designed for operating at a capacity of less than 25 MW and will take a fuel restriction to generate less than 100,000 tons per year of greenhouse gas emissions (CO_2e). The PUP will provide energy to all buildings within the AUAR study area, as well as buildings outside the study area of this AUAR. This GHG emissions estimate considers only the non-PUP buildings within the AUAR study area to prevent counting energy used outside the study area.

These estimates do not account for future integration of energy or transportation goals that are referenced in areawide comprehensive plans from municipalities and energy providers.

As development advances, project proposers could implement any applicable state or local GHG goals as determined by regulatory authorities or project stakeholders. The proposer may explore additional sustainability measures such as the examples listed above to reduce operational emissions to the extent practicable. The proposed project will be built in compliance with state regulations and city building codes.

19. Noise

Describe sources, characteristics, duration, quantities, and intensity of noise generated during project construction and operation. Discuss the effect of noise in the vicinity of the project including 1) existing noise levels/sources in the area; 2) nearby sensitive receptors; 3) conformance to state noise standards; and 4) quality of life. Identify measures that will be taken to minimize or mitigate the effects of noise.

Per the AUAR guidelines, construction noise does not need to be addressed unless there are unusual circumstances that warrant it. No unusual circumstances are anticipated that would warrant a detailed noise analysis. Noise and vibration monitoring will be conducted during geothermal well installation, though unusual noise is not expected.

Existing noise sources within the study area include those typical of a downtown urban setting and medical facilities, including roadway traffic, emergency vehicle sirens, and helicopters. The existing medical campus includes one helipad, located on a building northeast of the study area. The existing prospect utility plant is also a source of noise. None of the noise sources currently

exceed state noise standards requiring mitigation. Nearby receptors include the Mayo Clinic facilities and a park (Central Park).

During the operational phase of the redeveloped area, noise sources and levels are expected to be similar to existing. One additional helipad is proposed, which is a permitted use under the Special District Development Standards developed for the area. Operation of the utility plant expansion will not produce noise that exceeds state noise standards.

While changes in traffic patterns and generation will occur as part of redevelopment, changes in traffic sound levels are not anticipated to be readily perceptible. A sound level increase of 3 dBA is barely discernible to the human ear, a 5 dBA increase is clearly discernible, and a 10 dBA increase is perceived as being twice as loud[11]. For example, if the sound level of light traffic is 60 dBA and the sound level of heavy traffic is 70 dBA, the heavy traffic will be perceived as twice as loud as the light traffic. No proposed redevelopment activities are anticipated to exceed state noise standards requiring mitigation.

Mitigation Plan

- Noise and vibration monitoring will be conducted during geothermal well installation.

20. Transportation

Describe Traffic. Describe traffic-related aspects of project construction. Include 1) existing and proposed additional parking space; 2) estimate total average daily traffic generated; 3) estimate maximum peak hour traffic generated and time of occurrence; 4) source of trip generation rates used in the estimate; and 5) availability of transit and/or other alternative transportation modes.

Discuss the effect on traffic congestion on affected roads and describe any traffic improvements necessary. The analysis must discuss the project's impact on regional transportation system.

Identify measures that will be taken to minimize project related transportation effects.

A Traffic Analysis has been completed for the study area for existing (2018), no-build (2045), and projected (2045) scenarios. The analysis included parking, drop-off traffic, valet and shuttle services, transit, bicycle, and pedestrian facilities. The full traffic study report is included in **Appendix D**. Because construction will occur in phases over several years, additional traffic analysis was conducted for interim scenarios in which the proposed development will be partially completed. The interim traffic analysis is also included in **Appendix D**.

The traffic study was conducted in coordination with the City of Rochester, Olmsted County, and the Rochester-Olmsted Council of Governments (ROCOG). The methodology included trip generation estimates and travel demand modeling to forecast future traffic and traffic simulation to determine the operational impacts.

The largest change to the transportation network included in the study area will be the closure of 3rd Avenue SW and 4th Avenue SW between Center Street and 2nd Street SW for car and bicycle traffic. Traffic that currently uses these roadway segments will need to reroute, mainly to 6th Avenue SW and Broadway Avenue for north-south traffic and Center Street, 2nd Street SW, and 3rd Street SW for east-west traffic.

Parking

[11] A Guide to Noise Control in Minnesota (MPCA, 2015)

The redevelopment will include the removal of the existing Damon parking ramp. The Mayo Clinic Transport Unit provided data on the number of entrances and exits at existing employee and visitor parking facilities. Data on the number of vehicles parked and returned by valet was also provided.

Parking demand was calculated based on actual demand rather than the size of the existing facilities. The redevelopment will remove 773 existing visitor parking spaces and 468 existing staff parking spaces. The new north parking ramp will have 800 spaces and the new south parking ramp will have 500 parking spaces. Including existing capacity that will remain, the redevelopment will provide a total capacity of 2,386 parking spaces. The parking capacity is sufficient to accommodate demand for all valet and self-parking visitors, and any spare capacity will be used as staff parking. Parking projections include an additional 10 percent buffer above the calculated demand and do not include any demand decrease related to future increases in telemedicine/virtual clinic visits or increased availability of transit.

Traffic Generation
Traffic volumes were estimated for existing 2018, no-build 2045, and projected 2045 scenarios using the ROCOG travel demand model.

The peak hours of traffic generated by the redevelopment will not occur at the same time as the peak hours of traffic on adjacent roadways. General traffic, employee arrivals, and visitor arrivals all peak at different times. However, to provide for a conservative analysis of worst-case traffic conditions, the peak hour development traffic was added to the peak hour for general traffic.

The main existing routes serving downtown Rochester are Civic Center Drive, 2nd Street, 3rd Avenue, 4th Avenue, and Broadway Avenue. An overall growth in traffic in the downtown area is expected even without redevelopment in the study area. In the no build scenario, traffic is expected to increase on all routes in the study area except 2nd Street, where capacity will be reduced to accommodate a bus rapid transit line. There is not a major difference between the no-build and projected scenarios in terms of overall traffic quantity, but the distribution of traffic will change when 3rd and 4th Avenues are closed. North-south through traffic will shift to 6th Avenue and Broadway. However, 3rd and 4th Avenues will still carry significant traffic even after they are disconnected between 2nd Street and Center Street, because most traffic is connecting to and from downtown rather than passing through.

Other Transportation Modes
Rochester Public Transit operates 40 weekday fixed bus routes and 8 weekend/holiday routes. The downtown transit center is located within the study area on 2nd Street SW between 1st Avenue and 3rd Avenue SW. Shuttle operators provide additional transit options on five fixed routes and additional on-demand services. A bus rapid transit line is being planned for 2nd Street SW that will connect between downtown and the west side of the city.

In existing conditions, sidewalks line most streets and internal sidewalks connect several of the existing buildings. The proposed development scenario will include a network of sidewalks and tunnels connecting the various medical facilities and parking ramps. Two scenarios are being considered for providing pedestrian connectivity across the site with the closure of 3rd and 4th Avenues. One would provide a pedestrian connection with the ground floor of the new building open to the public, and the other would redirect public pedestrian traffic to alternate routes such as 2nd Avenue. The first option would reduce the portion of the clinic area that is accessible within a 10-minute walk. The second option would have no impact on pedestrian accessibility. Shared spaces along the drop-off areas will allow active modes to coexist safely and easily with vehicle traffic. The nearest designated off-street paved trail is located approximately 0.25-mile northwest of the study area, on the west side of Cascade Creek or 0.25-mile east of the study area along the east side of the Zumbro River. Neither of these will be impacted by redevelopment within the study area.

There are existing bike lanes on 3rd and 4th Avenues. When these are closed, through bicycle traffic will shift to other routes to be coordinated with the City of Rochester and other stakeholders. However, as with car traffic, a large portion of bicycle traffic is headed to or from downtown rather than through it, so 3rd and 4th Avenues will still serve as important bicycle facilities connecting to downtown and the Mayo campus. The closure of 3rd and 4th Avenues does not have a major impact on bicycle accessibility. Bicycle racks for employees will be placed at staff entrances that will be accessible from the planned bike lanes. The share of patients arriving by bicycle is expected to be low.

Traffic Impacts

The intersections to include in the analysis were determined in discussions with the city and county. Turning movement counts were collected for the initial set of intersections in June 2022, and additional intersections were counted in April 2023. The following intersections are included in the study:

- 2nd St NW and 2nd Ave NW
- W Center St and 2nd Ave NW
- 2nd St SW and 2nd Ave SW
- 2nd St NW and 3rd Ave NW
- 1st St NW and 3rd Ave NW
- W Center St and 3rd Ave NW
- 3rd Ave SW and Parking Entrance
- 1st St SW and 3rd Ave SW
- 2nd St SW - 3rd Ave SW
- 2nd St NW - 4th Ave NW
- 1st St NW - 4th Ave NW
- W Center St - 4th Ave NW
- 4th Ave NW - Parking exit
- 1st St SW - 4th Ave SW
- 2nd St SW - 4th Ave SW
- 2nd St SW - 5th Ave SW
- Dropoff/Parking 83
- 1st St SW - 6th Ave SW
- 2nd St SW - 6th Ave SW
- Broadway Ave S - W Center St.
- 6th Ave SW - W Center St
- 6th Ave NW - 2nd St NW
- 6th Ave NW - Civic Center Dr NW
- 4th Ave NW - Civic Center Dr NW

Traffic was analyzed using VISSIM for the study area. Additional intersections were analyzed using Sidra when it was determined that potential traffic impacts would extend beyond the study area. The intersections included in the analysis are shown in **Figure 10**.

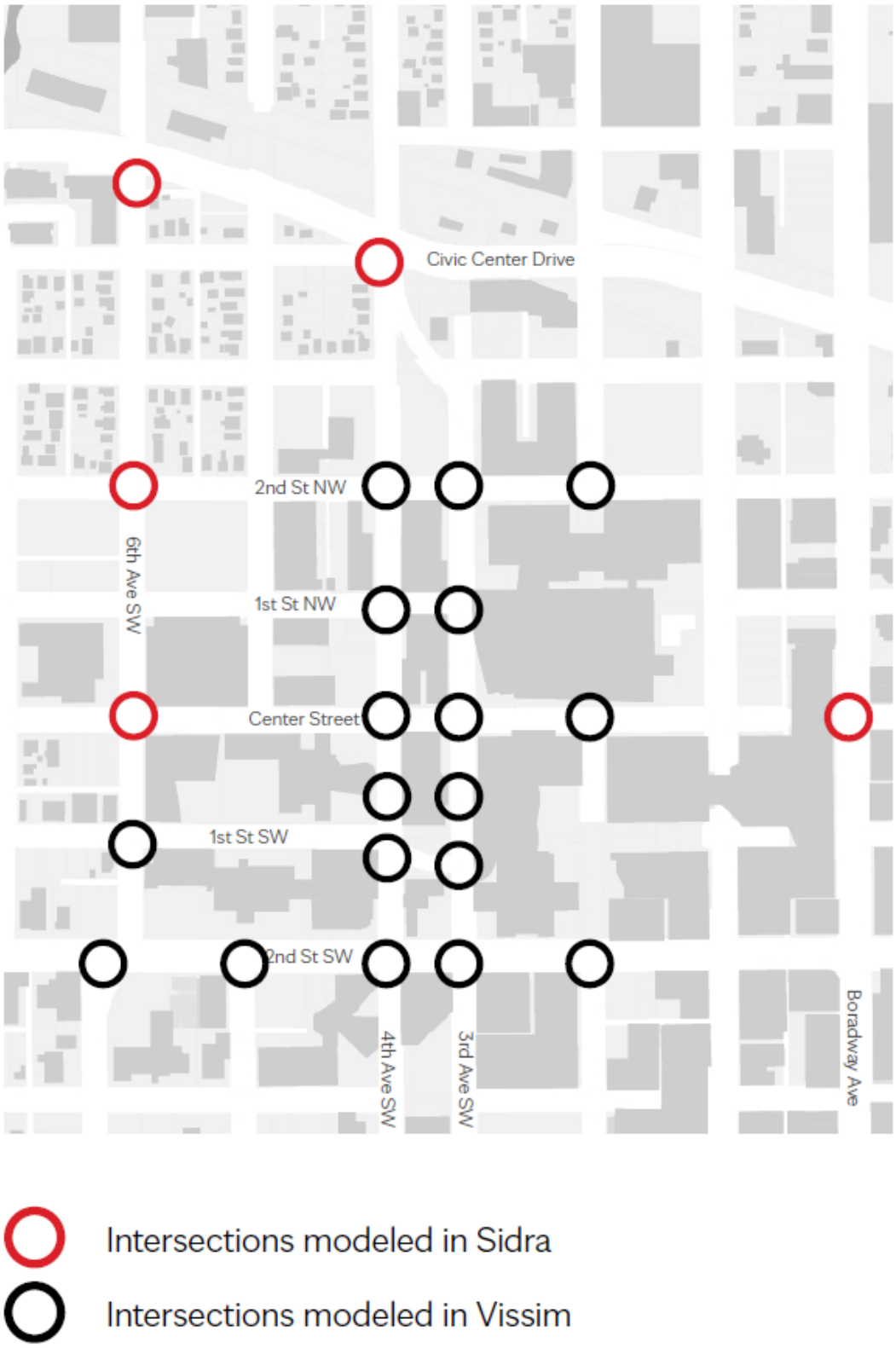


Figure 10. Intersections included in the traffic study area.

In the existing condition, all of the analyzed intersections operate acceptably overall in both the AM and PM peak periods, and there is no significant queueing. In the proposed redevelopment scenario, all intersections still operate acceptably overall, but there are some approaches with increased delays.

The simulations show that for east-west traffic, the intersections along Center Street will see the greatest operational impact. Capacity will be reduced on 2nd Street when bus lanes are added, so a larger portion of east-west traffic will use Center Street instead. Center Street has limited right of way that can only accommodate one lane in each direction with bicycle lanes. The level of service of all the analyzed intersections is within an acceptable range, but some westbound queueing appears in the simulations. The northbound left turn onto Center Street from 2nd Avenue has Level of Service (LOS) F in the redevelopment scenario. Potential mitigations for this could include adding turn lanes or constructing a mini-roundabout, but these would have significant impacts to the constrained surrounding area and may not be worthwhile, as the volume of traffic facing these delays is relatively low.

Sixth Avenue will see an increase in north-south traffic with the closure of 3rd and 4th Avenues. This causes delays and queues at the intersections with Center Street, 2nd Street NW, and Civic Center Drive in the redevelopment scenario. The Center Street intersection would operate at LOS E overall with significant delays on the northbound approach. The intersection with 2nd Street NW would operate at LOS F in the PM peak in the redevelopment scenario, with volumes on the east leg exceeding capacity. At Civic Center Drive, the high volume of northbound traffic would cause significant delays and queues on the south leg of the intersection.

Intersection level of service in the existing and projected scenarios is shown in **Table 8**. More information including level of service by traffic movement is included in the full traffic study document in **Appendix D**.

Table 8. Intersection Level of Service Summary.

		Existing				Project			
		AM		PM		AM		PM	
	INTERSECTIONS	Average Delay (sec)	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS	Average Delay (sec)	LOS
VISSIM	2nd St NW - 2nd Ave NW	0.7	A	0.6	A	0.9	A	0.9	A
	W Center St - 2nd Ave SW	22.1	C	26.3	C	38.9	D	12.7	B
	2nd St SW - 2nd Ave SW	22.6	C	21.8	C	22.6	C	16.6	B
	2nd St NW - 3rd Ave NW	13.0	B	26.3	C	15.9	B	20.4	C
	1 st St NW - 3rd Ave NW	13.3	B	17.8	B	26.4	C	30.8	C
	W Center St - 3rd Ave NW	23.4	C	17.8	B	31.5	C	18.2	B
	3rd Ave SW- Parking Entrance	6.6	A	3.1	A				
	1st St SW - 3rd Ave SW	16.2	C	16.6	C				
	2nd St SW - 3rd Ave SW	32.0	C	33.2	C	30.4	C	31.3	C
	2nd St NW - 4th Ave NW	18.4	B	17.1	B	23.5	C	18	B
	1 st St NW - 4th Ave NW	3.5	A	2.3	A	12.4	B	17.4	C
	W Center St - 4th Ave NW	18.2	B	22.3	C	27.8	C	28.9	C
	4th Ave NW - Parking exit	0.7	A	1.9	A				
	1st St SW - 4th Ave SW	2.1	A	6.4	A				
	2nd St SW - 4th Ave SW	48.4	D	45.0	D	22.40	C	26.60	C
	2nd St SW - 5th Ave SW	9.6	A	1.9	A	0.9	A	1	A
	Dropoff/Parking 83	4.6	A	4.8	A				
	1st St SW - 6th Ave SW	1.2	A	10.6	B	1.3	A	3.4	A
	2nd St SW - 6th Ave SW	33.7	C	29.2	C	29.5	C	33.5	C
SIDRA	Broadway Ave S - W Center St.	19.2	B	24.6	C	16.2	B	21.0	C
	4th Ave NW - Civic Center Dr NW	18.0	B	32.2	C	31.6	C	30.0	C
	6th Ave NW - Civic Center Dr NW	14.5	B	32.1	C	13.0	B	18.2	B
	6th Ave NW - 2nd St NW	21.8	C	18.3	C	10.6	B	20.1	C
	6th Ave SW - W Center St	20.7	C	18.6	C	19.9	B	40.0	D

In the models for the interim condition while construction is ongoing, traffic concentrates on Center Street between 2nd and 4th Avenues. The intersection of Center Street and 4th Avenue operates at LOS E with queues on both streets. Analysis of the intersection of Center Street and

6th Avenue in the interim condition indicated some approaches would also experience delays and queues there.

Mitigation Plan

The traffic analysis includes proposed mitigation measures for intersections and individual traffic movements that would not meet city standards for level of service.

Additional transportation mitigations and needs for further analysis were identified by the City of Rochester during the development and review of the traffic analysis. The city's letter of conditional approval of the traffic analysis includes the following mitigations for the final condition after project construction is complete:

- As streets are reconstructed, update the streetscape to meet design guidelines and convert on-street bicycle lanes to off-street protected cycle tracks
- Construct curb extensions in the northeast and southeast corners of the intersection of 4th Avenue NW and 1st Street NW
- Analyze traffic on 4th Street SW to determine traffic impacts and needs for any additional mitigation at the intersections with 3rd Avenue SW, 4th Avenue SW, and 6th Avenue SW
- Complete an Intersection Control Evaluation for the intersection of 2nd Street NW and 6th Avenue NW and construct the recommended mitigation. A roundabout or another form of traffic control may be recommended instead of the signal analyzed in the traffic study.
- Analyze future traffic at the intersection of Civic Center Drive and 6th Avenue NW to determine when the second northbound left turn lane proposed in the traffic study will be needed and ensure that this mitigation meets State Aid standards
- Redesign 2nd Avenue SW to prioritize pedestrian and bicycle movement*
- Construct a two-way off-street cycle track on West Center Street between 2nd Avenue and 4th Avenue
- Open the ground floor lobby of the new hospital to allow public pedestrian travel where 3rd Avenue SW and 4th Avenue SW are proposed to be vacated

*This mitigation needs to be vetted in detail with the City of Rochester and other stakeholders to determine the most appropriate alternate route based on safety, available space, and conformance to the City of Rochester's Active Transportation Plan.

The mitigations proposed for the interim condition during construction are:

- Complete an Intersection Control Evaluation for the intersection of West Center Street and 6th Avenue and construct the recommended mitigation. A roundabout or another form of traffic control may be recommended instead of the signal analyzed in the traffic study. The recommended intersection control will remain in place after construction is complete, as mitigation will also be needed at this intersection in the final condition.
- Modify the traffic signal at 2nd Street SW and 2nd Avenue SW to include signal indications for the new southbound approach. Modify the signal again after construction is complete.
- Update the coordinated signal timing along the 2nd Street SW corridor
- Update the signal timing at the intersections of West Center Street with 3rd Avenue and 4th Avenue
- Modify the pavement marking on West Center Street from west of 4th Avenue to the east through the intersection with 3rd Avenue to remove the parking lane, add a dedicated eastbound through lane at 4th Avenue SW, add a dedicated eastbound left-turn lane at 3rd Avenue SW, and move the bike lane to the curb between 3rd Avenue SW and 4th Avenue SW. Modify the pavement markings again after construction is complete.

21. Cumulative Potential Effects

Because the AUAR process by its nature is intended to deal with cumulative potential effects from all future developments within the AUAR area, it is presumed that the responses to all items on the EAW form automatically encompass the impacts from all anticipated developments within the AUAR area.

Cumulative effects are impacts on the environment resulting from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of whom undertakes said actions. Areas considered for cumulative effects are those that are adjacent to the study area and considers projects that would be constructed in the foreseeable future.

Mayo Clinic has developed and regularly updates a 5-year plan which outlines planning efforts throughout its Medical Institutional Campus and Mayo Support Campus Special Districts. The City and Mayo Clinic use this information to review existing infrastructure and plan for necessary improvements. No unanticipated cumulative potential effects are expected.

22. Other Potential Environmental Effects

If the project may cause any additional environmental effects not addressed by Items 1 to 19, describe the effects here, discuss the how the environment will be affected, and identify measures that will be taken to minimize and mitigate these effects.

No other potential environmental effects are anticipated.

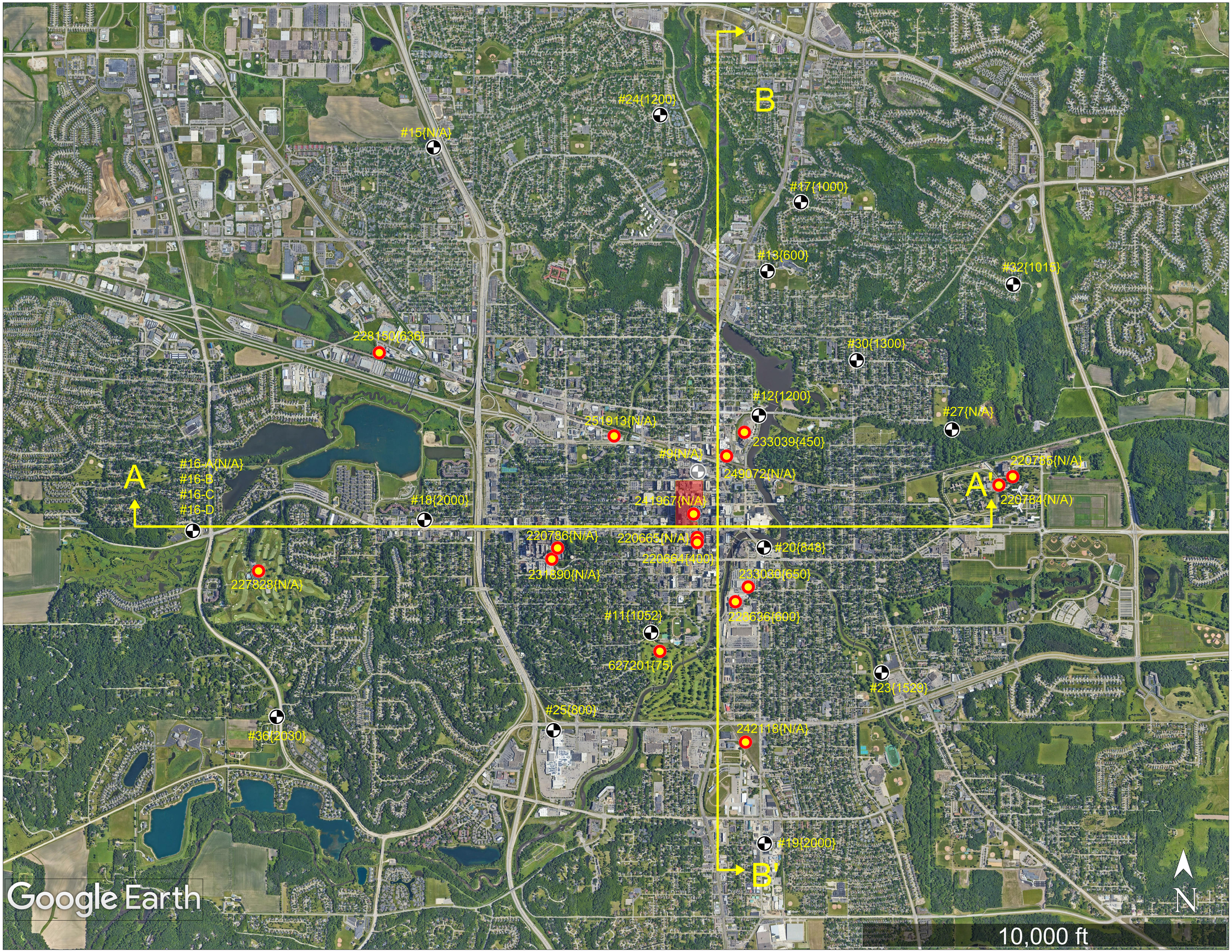
APPENDIX A

Well Logs

Salas O'Brien

APPENDIX A

FIGURES



LEGEND

- ROCHESTER PUBLIC UTILITY (RPU) SUPPLY WELLS
- INACTIVE RPU WELLS
- PUBLIC SUPPLY/ NON-COMMUNITY WELLS
- 233023 — MINNESOTA UNIQUE WELL NUMBER
- #18 — ROCHESTER PUBLIC UTILITY WELL No.
- {555} — PUMPING RATE (gpm)
- CROSS SECTION
- STUDY AREA

DRAFT

CLIENT

Burns and McDonnell Engineering Inc.

PROJECT

Mayo Clinic Downtown Masterplan PH 2 - Open Loop Feasibility Study

200 First Street SW, Rochester, MN

TITLE

SITE, WELL AND CROSS SECTION LOCATIONS

FIGURE

A1

Salas O'Brien

Mayo Clinic
Downtown

West

A

East

A'

#16-A {N/A}
#16-B
#16-C
#16-D

CASCADE
CREEK

227828 {N/A}

#18 {2000}

231890 {N/A}

220786 {N/A}

220664 {N/A}

#9 {N/A}

241967 {N/A}

#20 {848}

SOUTH FORK
ZUMBRO RIVER

#27 {N/A}

SHAKOPEE AQUIFER

ONEOTA CONFINING UNIT

JORDAN AQUIFER

JORDAN CONFINING UNIT

ST. LAWRENCE CONFINING UNIT

TUNNEL CITY AQUIFER

TUNNEL CITY CONFINING UNIT

WONEWOC AQUIFER

EAU CLAIRE CONFINING UNIT

MT. SIMON AQUIFER

ELEVATION (feet)

1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100

0
2500
5000
7500
10000
12500
15000
17500
20000
22500
24000

DISTANCE (ft)

1. CROSS SECTION A - A '

LEGEND

WATER/MONITORING WELL

WELL WITH NO WATER LEVEL/PUMPING DATA

WELL SCREEN

220662 — MINNESOTA UNIQUE WELL NO.

#14 — ROCHESTER PUBLIC UTILITY (RPU) SUPPLY WELL NO.

{1000} — PUMPING RATE (gpm)

MT. SIMON GROUNDWATER LEVEL

GROUNDWATER FLOW PATH

AQUITARD

DRAFT

CLIENT

Burns and McDonnell Engineering Inc.

PROJECT

Mayo Clinic Downtown Masterplan Ph 2 - Open Loop Feasibility Study

200 First Street SW, Rochester, MN

TITLE

GEOLOGICAL CROSS SECTION A - A'

FIGURE

A2

Salas O'Brien

North

B

South

B'

SITE LOCATION

SOUTH FORK ZUMBRO RIVER

SOUTH FORK ZUMBRO RIVER

SOUTH FORK ZUMBRO RIVER

#24 {1200}

#13 {600}

#12 {700}

233039 {450}

249072 {N/A}

#9 {N/A}

241967 {N/A}

220664 {N/A}

#20 {848} (offset by 1300 ft)

233030 {650}

228636 {600}

#11 {1052}

627201 {75}

242118 {N/A}

#19 {2000}

SHAKOPEE AQUIFER

ONEOTA CONFINING UNIT

JORDAN AQUIFER

JORDAN CONFINING UNIT

ST. LAWRENCE CONFINING UNIT

TUNNEL CITY AQUIFER

TUNNEL CITY CONFINING UNIT

WONEWOC AQUIFER

EAU CLAIRE CONFINING UNIT

MT. SIMON AQUIFER

ELEVATION (feet)

1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100

0
2500
5000
7500
10000
12500
15000
17500
20000
22500

DISTANCE (ft)

1. CROSS SECTION B - B '

LEGEND

WATER/MONITORING WELL

WELL WITH NO WATER LEVEL/PUMPING DATA

220662 MINNESOTA UNIQUE WELL NO.

#14 ROCHESTER PUBLIC UTILITY (RPU) SUPPLY WELL NO.

{1000} PUMPING RATE (gpm)

AQUITARD

DRAFT

CLIENT

Burns and McDonnell Engineering Inc.

PROJECT

Mayo Clinic Downtown Masterplan Ph 2 - Open Loop Feasibility Study

200 First Street SW, Rochester, MN

TITLE

GEOLOGICAL CROSS SECTION B - B'

FIGURE

A3

Salas O'Brien

Salas O'Brien

APPENDIX B

WATER WELL RECORDS

Salas O'Brien

ROCHESTER PUBLIC UTILITY
WELL RECORDS

Minnesota Unique Well Number

220666

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 12/28/1989
Update Date 07/31/2018
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ROCHESTER 11	106	14	W	2	CAADCD

Elevation 999 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

Contact ROCHESTER MN 55901
Well ROCHESTER MN 55901

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	7	YELLOW	
SAND & GRAVEL	7	15		
LIME	15	23	WHITE	V.HARD
LIME	23	108	PINK	M.HARD
SAND & ROCK	108	119		SOFT
LIME	119	130		HARD
LIME	130	170		SOFT
LIME	170	176		V.HARD
LIME, BROKEN AND	176	290		
LIME	290	318	BLUE	HARD
SAND ROCK	318	380		SOFT
SAND ROCK	380	385		HARD
SAND ROCK	385	395		HARD
ALT. LAYERS OF SAND,	395	397		
ALT. LAYERS OF SAND,	397	455		

Remarks
GAMMA LOGGED BY MGS 12-23-1987.

Well Depth 455 ft. **Depth Completed** 455 ft. **Date Well Completed** 05/00/1948
Drill Method **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter 20 in. To 140 ft. **Weight** lbs./ft. **Hole Diameter** 19. in. To 455 ft.

Open Hole From 140 ft. To 455 ft.
Screen? ☐ **Type** **Make**

Static Water Level
19 ft. land surface Measure 05/00/1948

Pumping Level (below land surface)
163 ft. 8 hrs. Pumping at 1052 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 125 Volt
Length of drop pipe 190 ft Capacity g.p. Typ Turbine

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien-
Last Strat St.Lawrence Formation Depth to Bedrock 15 ft
Located by Minnesota Department of Health
Locate Method GPS Differentially Corrected (25 meters)
System UTM - NAD83, Zone 15, Meters X 542524 Y 4873410
Unique Number Verification Information from Input Date 06/08/1995

Angled Drill Hole

Well Contractor
Thein Well Co. 55079 THEIN, P.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

220833

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 01/25/1988
Update Date 05/31/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ROCHESTER 12	107	14	W	35	ADDADB

Elevation 984 ft. **Elev. Method** Surveyed

Address

Well ROCHESTER MN
Contact ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SAND FILL	0	20		
SAND & GRAVEL	20	51		
LIMEROCK	51	72		
SAND & LIME	72	80	YELLOW	
LIMESTONE	80	91	BLUE	HARD
LIMESTONE	91	93	BLUE	HARD
LIMESTONE	93	260		HARD
LIMESTONE	260	288	BLUE	HARD
SANDSTONE	288	391		HARD
LIMEROCK	391	401		HARD
LIMEROCK &	401	464		
LIMEROCK	464	495		
LIMESTONE & SHALE	495	497		
SHALE	497	525	BLU/GRN	
LIMESTONE & SHALE	525	565		
LIMESTONE	565	580		
SHALE	580	590		HARD
LIMESTONE	590	650		HARD
SANDSTONE	650	680		
SHALE	680	689		
SHALE & SANDROCK	689	700		
SANDROCK	700	705		
SHALE	705	715		
SHALE & SANDSTONE	715	725		
SANDSTONE	725	735		
SHALE	735	752		

Remarks
PCA GWQ-118.

Well Depth 752 ft. **Depth Completed** 752 ft. **Date Well Completed** 00/00/1960
Drill Method **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter **Weight**
14 in. To 307 ft. lbs./ft.

Open Hole From 307 ft. To 752 ft.
Screen? ☐ **Type** **Make**

Static Water Level
42 ft. land surface Measure 00/00/1969

Pumping Level (below land surface)
214 ft. hrs. Pumping at 700 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Jordan-Wonewoc
Last Strat Eau Claire Formation Depth to Bedrock 51 ft
Located by Minnesota Department of Health
Locate Method GPS Differentially Corrected (25 meters)
System UTM - NAD83, Zone 15, Meters X 543326 Y 4875360
Unique Number Verification Information from Input Date 01/27/1993

Angled Drill Hole

Well Contractor
Thein Well Co. 34050
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

222525

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/24/1991
Update Date 03/10/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ROCHESTER 13	107	14	W	26	DADAAC

Elevation 1013.1 **Elev. Method** Surveyed

Address

Contact ROCHESTER MN
Well ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DIRT	0	1	BLACK	
CLAY	1	6		
LIMEROCK	6	100		
SANDROCK	100	110		
LIMEROCK	110	124		
SANDROCK	124	130		
LIMEROCK	130	320		
SANDSTONE	320	346		
SANDSTONE	346	410		
SANDSTONE	410	430		
LIMEROCK	430	442		

Remarks

GAMMA LOGGED 3-19-1984. M.G.S. NO. 6.
GWQ NO. 119.

Well Depth	Depth Completed	Date Well Completed
442 ft.	442 ft.	03/04/1954

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below** 2 ft.

Casing Diameter		Weight
20 in. To	141 ft.	lbs./ft.
24 in. To	19 ft.	lbs./ft.

Open Hole From 141 ft. To 442 ft.

Screen? ☐ **Type** **Make**

Static Water Level
40 ft. land surface Measure 03/04/1954

Pumping Level (below land surface)
90 ft. hrs. Pumping at 600 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien-
Last Strat St.Lawrence Formation Depth to Bedrock 6 ft
Located by Minnesota Department of Health
Locate Method GPS Differentially Corrected (25 meters)
System UTM - NAD83, Zone 15, Meters X 543327 Y 4876593
Unique Number Verification Information from Input Date 06/19/1995

Angled Drill Hole

Well Contractor
Keys Well Co. 62012
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

222528

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/28/1989
Update Date 03/10/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ROCHESTER 15	107	14	W	27	BABBAB

Elevation 1044.5 **Elev. Method** Surveyed

Address

Contact ROCHESTER MN
Well ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT	0	36		
DRIFT	36	40		
LIMESTONE	40	78		
LIMESTONE	78	90		HARD
LIMESTONE &	90	105		
LIMESTONE &	105	140		
LIMESTONE	140	155		HARD
LIMESTONE &	155	185		
LIMESTONE	185	192		HARD
LIMESTONE	192	235	GRAY	HARD
LIMESTONE	235	300	BLUE	HARD
LIMESTONE	300	318		HARD
LIMESTONE	318	340	BLUE	HARD
LIMESTONE & SHALE	340	360		
SANDSTONE	360	430		
LIMESTONE	430	432		

Remarks

GAMMA LOGGED 2-6-1995.

Well Depth 432 ft. **Depth Completed** 432 ft. **Date Well Completed** 00/00/1957

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter **Weight**
24 in. To 154 ft. lbs./ft.
30 in. To 41 ft. lbs./ft.

Open Hole From 154 ft. To 432 ft.

Screen? ☐ **Type** **Make**

Static Water Level

Pumping Level (below land surface)

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed

Manufacturer's name

Model Number HP Volt

Length of drop pipe ft Capacity g.p. Typ

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien-
Last Strat St.Lawrence Formation Depth to Bedrock 36 ft
Located by Minnesota Department of Health
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 540612 Y 4877614
Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Layne Well Co. 27010
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

220827

County Olmsted
Quad Douglas
Quad ID 50D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/28/1989
Update Date 03/03/2021
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ROCHESTER 16	107	14	W	32	DADCDC

Elevation 1044 **Elev. Method** Surveyed

Address

Contact ROCHESTER MN
Well ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
WEATHERED	0	6		
ST. PETER	6	14		
ST. PETER	14	25		
ST. PETER	25	58		
ST. PETER, HARD	58	75		
LIMESTONE	75	76		HARD
LIMESTONE	76	375		HARD
JORDAN SANDSTONE	375	377		
JORDAN SANDSTONE	377	427		
JORDAN SANDSTONE	427	484		
ST. LAWRENCE SHALE	484	485	BLUE	HARD
ST. LAWRENCE SHALE	485	550	BLUE	HARD
ST. LAWRENCE SHALE	550	565	BLUE	HARD
ST. LAWRENCE SHALE	565	725	BLUE	HARD
SHALE & SANDSTONE	725	736		
SHALE & SANDSTONE	736	762		
SHALE STICKY	762	794	GREEN	HARD
SHALE STICKY	794	796	GREEN	HARD
SHALE & SANDSTONE	796	798		
SHALE & SANDSTONE	798	940		
SANDSTONE	940	945	GRAY	
SHALE	945	955	GREEN	
SANDSTONE	955	1022	GRY/GRN	
SANDSTONE	1022	1037	LT. GRY	
SANDSTONE COARSE	1037	1060		

Remarks

GAMMA LOGGED BY MGS 12-23-1987, 3-26-2001, & 2-22-2017.
BLASTED & BALED IN MT SIMON.
MULTI TOOL, CALIPER, FLOW METER, & VIDEO RAN 2-22-2017.
MULTI, CALIPER, FLOW METER, VIDEO LOGGED ON 2-25-2021

Well Depth 1060 ft. **Depth Completed** 1060 ft. **Date Well Completed** 04/14/1958

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter **Weight**
16 in. To 487 ft. lbs./ft.
24 in. To 45 ft. lbs./ft.

Open Hole From 487 ft. To 1060 ft.

Screen? ☐ **Type** **Make**

Static Water Level
71 ft. land surface Measure 04/14/1958

Pumping Level (below land surface)
253 ft. hrs. Pumping at g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
neat cement	27	Cubic yards	0 ft.	487 ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock St.Peter Sandstone Aquifer multiple
Last Strat Mt.Simon Sandstone Depth to Bedrock 14 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 538439 Y 4874803
Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor
Layne Well Co. 27010
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

220822

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 12/28/1989
Update Date 07/23/2018
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ROCHESTER 17	107	14	W	25	BBDDCC

Elevation 1102.7 **Elev. Method** Surveyed

Address

Well ROCHESTER MN
Contact ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
SANDSTONE	0	106		
SANDSTONE &	106	109		
LIMEROCK	109	160		
LIMEROCK &	160	167		
LIMEROCK	167	197		
LIMEROCK, SMALL	197	203		
LIMEROCK &	203	209		
SANDROCK	209	218		
LIMEROCK	218	263		
LIMEROCK & SOME	263	435		
SANDROCK	435	504		
LIMEROCK	504	520		
SHALE	520	524		
LIMEROCK	524	554		HARD
SANDROCK	554	558		
LIMEROCK & SHALE &	558	579		
LIMEROCK & SHALE &	579	595		
LIMEROCK & SHALE	595	628		
SHALE & SANDROCK	628	648		
LIMEROCK & STICKY	648	652		
LIMEROCK &	652	745		
LIMEROCK &	745	810		
LIMEROCK &	810	852		
SHALE	852	871		HARD
SHALE & SANDROCK	871	904		

Remarks

Well Depth 904 ft. **Depth Completed** 904 ft. **Date Well Completed** 02/01/1960

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter		Weight
16 in. To	429 ft.	lbs./ft.
24 in. To	102 ft.	lbs./ft.

Open Hole From 429 ft. To 904 ft.

Screen? ☐ **Type** **Make**

Static Water Level
136 ft. land surface Measure 01/22/1960

Pumping Level (below land surface)
292 ft. 29. hrs. Pumping at 1000 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock St.Peter Sandstone Aquifer Prairie du Chien-
Last Strat Eau Claire Formation Depth to Bedrock 0 ft
Located by Minnesota Department of Health
Locate Method GPS SA Off (averaged) (15 meters)
System UTM - NAD83, Zone 15, Meters X 543668 Y 4877246
Unique Number Verification Information from Input Date 06/08/1995

Angled Drill Hole

Well Contractor
Bergerson-Caswell 27058
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

222527

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/28/1989
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ROCHESTER 18	107	14	W	34	CDCCAD

Elevation 1010.6 **Elev. Method** Surveyed

Address

Contact ROCHESTER MN
Well ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DIRT	0	4	BLACK	
SANDROCK	4	30		
LIMEROCK &	30	35		
LIMEROCK	35	40		
LIMEROCK &	40	49		
LIMEROCK	49	72		SOFT
LIMEROCK &	72	100		
LIMEROCK	100	166		HARD
LIMEROCK &	166	199		
LIMEROCK	199	315		
LIMEROCK &	315	326		
SANDROCK	326	408		
LIMEROCK &	408	441		
LIMEROCK & SHALE	441	576		
SHALE	576	690		
SHALE & SANDROCK	690	705		
SANDROCK	705	725		
SHALE & SANDROCK	725	735		
SHALE	735	806		

Remarks

Well Depth 806 ft. **Depth Completed** 806 ft. **Date Well Completed** 03/05/1963

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
24 in. To 343 ft.	lbs./ft.	30 in. To 312 ft.
30 in. To 31 ft.	lbs./ft.	24 in. To 806 ft.

Open Hole From 343 ft. To 806 ft.

Screen? ☐ **Type** **Make**

Static Water Level
16 ft. land surface Measure 03/05/1963

Pumping Level (below land surface)
225 ft. hrs. Pumping at 2000 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock St.Peter Sandstone Aquifer Jordan-Wonewoc
Last Strat Eau Claire Formation Depth to Bedrock 4 ft
Located by Minnesota Department of Health
Locate Method GPS Differentially Corrected (25 meters)
System UTM - NAD83, Zone 15, Meters X 540657 Y 4874473
Unique Number Verification Information from Input Date 06/08/1995

Angled Drill Hole

Well Contractor
Bergerson-Caswell 27058
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

220681

County Olmsted
Quad Simpson
Quad ID 28B

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 12/28/1989
Update Date 10/07/2020
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ROCHESTER 19	106	14	W	12	CBBCCD

Elevation 1020.6 **Elev. Method** Surveyed

Address

Well 17TH ST SE ROCHESTER MN
Contact ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
ST. PETER	0	10		
SANDSTONE	10	13		HARD
SANDSTONE	13	26		
LIMEROCK	26	52		V.HARD
SANDROCK LITE	52	57		
LIME & SANDROCK	57	63		
LIMEROCK	63	103		
LIMEROCK	103	129		V.HARD
SANDROCK	129	139	WHITE	M.HARD
LIMEROCK	139	162		HARD
LIMEROCK	162	190		MEDIUM
SOME SAND ROCK	190	195		
LIMEROCK	195	205		M.HARD
LIMEROCK	205	245		M.HARD
LIMEROCK	245	295		M.HARD
LIMEROCK	295	321		M.HARD
SANDROCK & SHALE	321	338		
SANDROCK & SHALE	338	345		
SANDROCK	345	354		
SANDROCK	354	420		
SANDROCK & SHALE	420	425		
LIMEROCK	425	435		
LIMEROCK & SHALE	435	450		
LIMEROCK & SHALE	450	493		
LIMEROCK & SHALE	493	520		
LIMEROCK & SHALE &	520	538		
LIMEROCK & SHALE &	538	576		
SHALE & SANDROCK-	576	597		
SHALE & SANDROCK-	597	620		
STICKY SHALE &	620	630		
STICKY SHALE &	630	685		
SANDROCK DRESBACK	685	705		HARD
SANDROCK SOME	705	720		HARD
SANDROCK SOME	720	754		HARD
SHALE, LAYERS OF	754	765	GREEN	
SHALE, LAYERS OF	765	780	GREEN	
STICKY SHALE	780	785		
STICKY SHALE	785	808		
STICKY SHALE, LPI FLE	808	813		
STICKY SHALE &	813	824		
STICKY SHALE &	824	830		
STICKY SHALE &	830	839	PNK/BRN	
STICKY SHALE &	839	855	PNK/BRN	
STICKY SHALE &	855	881		

Remarks 8.25 HR DURATION OF PIT FROM DRILLER NOTES 9/6/62

Well Depth 881 ft. **Depth Completed** 881 ft. **Date Well Completed** 09/14/1962

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
24 in. To 343 ft.	lbs./ft.	30 in. To 27 ft.
30 in. To 27 ft.	lbs./ft.	24 in. To 881 ft.

Open Hole From 343 ft. To 881 ft.

Screen? ☐ **Type** **Make**

Static Water Level
27 ft. land surface Measure 09/14/1962

Pumping Level (below land surface)
189. ft. 8.2 hrs. Pumping at 2000 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
		ft.	345 ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock St.Peter Sandstone Aquifer Jordan-Wonewoc
Last Strat Eau Claire Formation Depth to Bedrock 0 ft
Located by Minnesota Department of Health
Locate Method GPS Differentially Corrected (25 meters)
System UTM - NAD83, Zone 15, Meters X 543430 Y 4871811
Unique Number Verification Information from Input Date 06/08/1995

Angled Drill Hole

Well Contractor
Bergerson-Caswell 27058
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Well Index Report **220681** Printed on 02/06/2023
HE-01205-15

Minnesota Unique Well Number

220662

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/28/1989
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ROCHESTER 20	106	14	W	1	BBBCAC

Elevation 989 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

Contact ROCHESTER MN
Well ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
FILL	0	7		
DRIFT	7	70		
LIMESTONE	70	296		
JORDAN SANDSTONE	296	366		
LIMESTONE	366	367		
JORDAN SANDSTONE	367	387		
JORDAN SANDSTONE	387	412		
JORDAN SANDSTONE	412	424		
SHALE & LIMESTONE	424	487		
SHALE & LIMESTONE	487	658		
SANDSTONE	658	684		
LIMESTONE	684	686		
SAND & SHALE	686	717		
DARK STICKY CLAY	717	726		
SAND	726	734		HARD
CLAY	734	740		
CLAY	740	786		
SHALE	786	826	GREEN	
SAND & CLAY	826	838		
SHALE	838	869		
SANDROCK	869	912		

Remarks

GAMMA LOGGED 8-1-1995.

Well Depth 912 ft. **Depth Completed** 912 ft. **Date Well Completed** 03/20/1964

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint**
Drive Shoe? Yes ☒ No ☐ **Above/Below**

Casing Diameter		Weight		Hole Diameter	
24 in. To 306 ft.		94.6 lbs./ft.		23. in. To 912 ft.	
30 in. To 70 ft.		118. lbs./ft.			

Open Hole From 306 ft. To 912 ft.

Screen? ☐ **Type** **Make**

Static Water Level
48 ft. land surface Measure 00/00/1969

Pumping Level (below land surface)
252 ft. hrs. Pumping at 848 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 150 Volt
Length of drop pipe 280 ft Capacity 1000 g.p. Typ Turbine

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien-
Last Strat Mt.Simon Sandstone Depth to Bedrock 70 ft
Located by Minnesota Department of Health
Locate Method GPS Differentially Corrected (25 meters)
System UTM - NAD83, Zone 15, Meters X 543456 Y 4874267
Unique Number Verification Information from Input Date 06/08/1995

Angled Drill Hole

Well Contractor
Mueller Well Co. 96460
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

220660

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 12/28/1989
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ROCHESTER 23	106	14	W	1	DBDCCB

Elevation 1006.8 **Elev. Method** Surveyed

Address

Contact ROCHESTER MN
Well ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT	0	20		
SHAKOPEE	20	47		
SANDSTONE & SHALE	47	58		SOFT
SHAKOPEE-ONEOTA	58	312		
SANDY SHALE	312	325	GREEN	
SANDSTONE	325	398		
SANDSTONE	398	436		
SHALEY LIMESTONE	436	440		
SHALEY LIMESTONE	440	512		
SHALE	512	532	GREEN	
SANDSTONE, SHALE	532	640		
SHALE	640	644		
SANDSTONE	644	662		
SHALE	662	672		
SANDSTONE	672	677		
SHALE	677	682		
SANDSTONE	682	707		
SANDSTONE & SHALE	707	730		
SHALE FROM	730	751		
SHALE	751	806		

Remarks

GAMMA LOGGED 3-19-1984 & 7-25-1995. THE LOG HAS EXTENSIVE PUMP TEST DATA.
RECONSTRUCTED 1984 BY BERGERSON CASWELL, JORDAN SS BLASTED AND BAILED
GROUT PLACED 806' - 707', SAND 707' - 512', AND GROUT FROM 512' - 436'

Well Depth 806 ft. **Depth Completed** 436 ft. **Date Well Completed** 02/10/1967

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
24 in. To 326 ft.	lbs./ft.	30 in. To 24 ft.
30 in. To 24 ft.	lbs./ft.	24 in. To 806 ft.

Open Hole From 326 ft. To 436 ft.

Screen? ☐ **Type** **Make**

Static Water Level
16 ft. land surface Measure 02/10/1967

Pumping Level (below land surface)
217 ft. hrs. Pumping at 1529 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 150 Volt
Length of drop pipe 220 ft Capacity 1000 g.p. Typ Turbine

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien-
Last Strat Eau Claire Formation Depth to Bedrock 20 ft
Located by Minnesota Department of Health
Locate Method GPS Differentially Corrected (25 meters)
System UTM - NAD83, Zone 15, Meters X 544404 Y 4873246
Unique Number Verification Information from Input Date 06/19/1995

Angled Drill Hole

Well Contractor
Tri-state Well Co. 27118 BRADFORD, A.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

220819

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/28/1989
Update Date 08/18/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ROCHESTER 24	107	14	W	23	CDADAC

Elevation 997 ft. **Elev. Method** Surveyed

Address

Well ROCHESTER MN
Contact ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT	0	4		
LIMEROCK	4	28		HARD
LIMEROCK	28	44		
LIMEROCK &	44	54		
LIMEROCK	54	75		HARD
LIMEROCK CREVICES	75	80		
LIMEROCK	80	87		
SANDROCK	87	92		
LIMEROCK CREVICES	92	103		
LIMEROCK &	103	108		
LIMEROCK	108	122		
LIMEROCK CREVICES	122	145		
LIMEROCK	145	211		
LIMEROCK CREVICED	211	248		
LIMEROCK & SHALE	248	280		
LIMEROCK &	280	300		
SANDROCK	300	390		
LIMEROCK	390	395		
LIMEROCK & SHALE	395	484		
SANDROCK & SHALE	484	499		
SHALE	499	503		
SANDROCK	503	505		
SHALE & SANDROCK	505	548		
STICKY SHALE	548	558		
SANDROCK & SHALE	558	563		
SHALE	563	568		
LIMEROCK &	568	574		
LIMEROCK &	574	588		
LIMEROCK & SHALE	588	593		
LIMEROCK &	593	600		
SHALE	600	603	BROWN	
SHALE & LIMEROCK	603	618	GREEN	
SANDROCK & SHALE	618	642		
SANDROCK	642	678		
STICKY SHALE	678	685		

Remarks

OLD P.A. 69-0030.

Well Depth 685 ft. **Depth Completed** 685 ft. **Date Well Completed** 05/07/1968

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter **Weight**
24 in. To 309 ft. lbs./ft.

Open Hole From 309 ft. To 685 ft.

Screen? ☐ **Type** **Make**

Static Water Level
36 ft. land surface Measure 05/07/1968

Pumping Level (below land surface)
242 ft. 24 hrs. Pumping at 1200 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 200 Volt
Length of drop pipe ft Capacity g.p. Typ Turbine

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Prairie du Chien-
Last Strat Eau Claire Formation Depth to Bedrock 4 ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:12,000) (>15 meters)
System UTM - NAD83, Zone 15, Meters X 542532 Y 4877905
Unique Number Verification Information from Input Date 04/24/1995

Angled Drill Hole

Well Contractor
Mueller Well Co. 96460
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Well Index Report | **220819** | Printed on 02/06/2023 HE-01205-15

Minnesota Unique Well Number

220675

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 12/28/1989
Update Date 11/19/2015
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ROCHESTER 25	106	14	W	10	AAABDB

Elevation 1009.6 **Elev. Method** Surveyed

Address

Contact 4000 EAST RIVER RD NE ROCHESTER MN 55906
Well ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT	0	65		
LIMEROCK	65	129		
ROOT VALLEY	129	135		
DOLOMITE	135	339		
SANDROCK (JORDAN)	339	410		
SANDROCK (JORDAN)	410	425		
SANDROCK (JORDAN)	425	449		
SHALE (ST.	449	690		
SANDROCK & SHALE	690	765		
SANDROCK & SHALE	765	770		
SHALE	770	793		
SANDROCK & SHALE	793	803		
SHALE	803	850		

Remarks

M.G.S. NO. 652. OLD P.A. NO. 69-0031.

Well Depth 850 ft. **Depth Completed** 850 ft. **Date Well Completed** 01/10/1969

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
24 in. To 345 ft.	lbs./ft.	29 in. To 281 ft.
30 in. To 65.5 ft.	lbs./ft.	23 in. To 850 ft.

Open Hole From 345 ft. To 850 ft.

Screen? ☐ **Type** **Make**

Static Water Level

14 ft. land surface Measure 01/10/1969

Pumping Level (below land surface)

75 ft. 2 hrs. Pumping at 800 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement	800 Sacks	0 ft.	345 ft.

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed

Manufacturer's name

Model Number HP 150 Volt

Length of drop pipe ft Capacity g.p. Typ Turbine

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Prairie Du Chien Group Aquifer Prairie du Chien-
Last Strat Eau Claire Formation Depth to Bedrock 65 ft
Located by Olmsted Cty.
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 541662 Y 4872724
Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Keys Well Co. 62012 O'BRIEN, F.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

224212

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 01/25/1988
Update Date 10/30/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ROCHESTER 27	107	13	W	31	BCCCCB

Elevation 1016 **Elev. Method** Surveyed

Address

Contact 4000 EAST RIVER RD ROCHESTER MN 55904
Well ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GLACIAL DRIFT	0	32		
SHAKOPEE DOLOMITE	32	135		
ROOT VALLEY	135	153		
SHAKOPEE DOLOMITE	153	247		
ONEOTA DOLOMITE	247	320		
SHALE	320	331	BLUE	
JORDAN SANDSTONE	331	395		
JORDAN SANDSTONE	395	428		
ST. LAWRENCE	428	448		

Remarks
GAMMA LOGGED 3-7-1997. M.G.S. NO. 1546.

Well Depth	Depth Completed	Date Well Completed
448 ft.	448 ft.	12/14/1979

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter		Weight
30 in. To	32 ft.	lbs./ft.
24 in. To	345 ft.	lbs./ft.

Open Hole From 345 ft. To 448 ft.

Screen? ☐ **Type** **Make**

Static Water Level
25 ft. land surface Measure 12/14/1979

Pumping Level (below land surface)

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
neat cement	42	Cubic yards	0 ft.	345 ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien-
Last Strat St.Lawrence Formation Depth to Bedrock 32 ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 544999 Y 4875256
Unique Number Verification Information from Input Date 04/24/1995

Angled Drill Hole

Well Contractor
Layne Well Co. 27010 HOLLEN, G.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

239761

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 04/03/1992
Update Date 03/10/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ROCHESTER 30	107	14	W	36	ABBCCD

Elevation 1006 **Elev. Method** Surveyed

Address

Contact ROCHESTER MN
Well ROCHESTER MN 55903

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT	0	5		
SAND & SHALE	5	48		
SAND & SHALE	48	58		
LIMEROCK	58	91		
SANDSTONE	91	108		
LIMEROCK	108	305		
SANDROCK	305	360		
SANDROCK	360	400		
SHALE	400	402		

Remarks
GAMMA LOGGED 6-8-1994. M.G.S. NO. 2170.

Well Depth 402 ft. **Depth Completed** 402 ft. **Date Well Completed** 03/26/1984

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint** Welded
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
36 in. To 64 ft.	lbs./ft.	30 in. To 319 ft.
24 in. To 319 ft.	lbs./ft.	23 in. To 402 ft.

Open Hole From 319 ft. To 402 ft.

Screen? ☐ **Type** **Make**

Static Water Level
30 ft. land surface Measure 03/26/1984

Pumping Level (below land surface)
120 ft. 8 hrs. Pumping at 1300 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement	1019 Sacks	0 ft.	319 ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Jordan
Last Strat St.Lawrence Formation Depth to Bedrock 48 ft
Located by Minnesota Department of Health
Locate Method GPS Differentially Corrected (25 meters)
System UTM - NAD83, Zone 15, Meters X 544197 Y 4875846
Unique Number Verification Information from Input Date 04/24/1995

Angled Drill Hole

Well Contractor
Keys Well Co. 62012 HANSON, D.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

506819

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 08/17/1992
Update Date 03/10/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ROCHESTER 32	107	13	W	30	CACDBD

Elevation 1129.4 **Elev. Method** Surveyed

Address

Contact 4000 EAST RIVER RD ROCHESTER MN 55904
Well ROCHESTER MN 55904

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT	0	5		
DECORAH	5	10	GREEN	MEDIUM
PLATTEVILLE	10	28	GRAY	MEDIUM
GLENWOOD	28	33	BLUE	MEDIUM
ST. PETER	33	135	BROWN	MEDIUM
SHAKOPEE	135	235	BROWN	MEDIUM
ROOT VALLEY	235	240	GRAY	MEDIUM
ONEOTA	240	433	BROWN	MEDIUM
JORDAN	433	470	GRAY	MEDIUM
JORDAN	470	540	GRAY	MEDIUM

Remarks

CORNER OF PARKWOOD HILLS DR. AND 22ND AVE.
GAMMA LOGGED BY B.A. LEISCH & ASSOC.

Well Depth	Depth Completed	Date Well Completed
540 ft.	540 ft.	12/15/1989

Drill Method Non-specified Rotary **Drill Fluid** Other

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint** Welded
Drive Shoe? Yes ☐ No ☒ **Above/Below** 2 ft.

Casing Diameter	Weight	Hole Diameter
36 in. To 11 ft.	lbs./ft.	29 in. To 453 ft.
24 in. To 453 ft.	lbs./ft.	23 in. To 540 ft.

Open Hole From 453 ft. To 540 ft.
Screen? ☐ **Type** **Make**

Static Water Level
141 ft. land surface Measure 12/11/1989

Pumping Level (below land surface)
334. ft. 24 hrs. Pumping at 1015 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement	59 Cubic yards	1 ft.	453 ft.

Nearest Known Source of Contamination
50 feet Direction Septic tank/drain field Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Decorah Shale Aquifer Jordan
Last Strat Jordan Sandstone Depth to Bedrock 5 ft
Located by Minnesota Department of Health
Locate Method GPS Differentially Corrected (25 meters)
System UTM - NAD83, Zone 15, Meters X 545506 Y 4876480
Unique Number Verification Information from Input Date 08/24/1995

Angled Drill Hole

Well Contractor
Thein Well Co. 55079 VANHOUTEN, D.
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

601336

County Olmsted
Quad Douglas
Quad ID 50D

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 10/09/2000
Update Date 04/30/2018
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ROCHESTER 36	106	14	W	4	CDDDDB

Elevation 1044.4 **Elev. Method** Surveyed

Address

Contact 4000 EAST RIVER RD NE ROCHESTER MN 55906
Well WEST CIRCLE DR ROCHESTER MN 55902

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT	0	52	GRAY	MEDIUM
CLAY & GRAVEL	52	77		
LIMESTONE	77	373	BROWN	MEDIUM
LIMESTONE	373	384	GRAY	MEDIUM
SANDSTONE	384	475	GRAY	MEDIUM
LIMESTONE	475	478	BLUE	MEDIUM

Remarks

Well Depth 478 ft. **Depth Completed** 478 ft. **Date Well Completed** 08/07/2000

Drill Method Non-specified Rotary **Drill Fluid** Foam

Use public supply/community **Status** Active

Well Hydrofractured? Yes ☐ No ☒ **From** **To**

Casing Type Step down **Joint** Welded
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
24 in. To 397 ft.	lbs./ft.	36 in. To 79 ft.
30 in. To 79 ft.	lbs./ft.	30 in. To 397 ft.
		24 in. To 478 ft.

Open Hole From 397 ft. To 478 ft.

Screen? ☐ **Type** **Make**

Static Water Level
38 ft. land surface Measure 08/04/2000

Pumping Level (below land surface)
106 ft. 20 hrs. Pumping at 2030 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
pearock	5	Cubic yards	0 ft.	397 ft.
neat cement	37	Cubic yards	0 ft.	397 ft.

Nearest Known Source of Contamination
50 feet Direction Type
Well disinfected upon completion? ☒ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☒ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☒ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Jordan
Last Strat St.Lawrence Formation Depth to Bedrock 77 ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 539345 Y 4872825
Unique Number Verification Information from Input Date 04/02/2002

Angled Drill Hole

Well Contractor
Thein Well Co. 55079 VANHOUTEN, D.
Licensee Business Lic. or Reg. No. Name of Driller

Salas O'Brien

PRIVATE WELL RECORDS

Minnesota Unique Well Number

220664

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 08/07/1989
Update Date 07/21/2022
Received Date

Well Name	Township	Range	Dir	Section	Subsection
KAHLER	106	14	W	2	ABABCA

Elevation 1005 **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

Well 220 2ND AV SW ROCHESTER MN
Contact ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
NO RECORD	0	17		
LIMESTONE	17	19		
SHELL LIMESTONE	19	22		
SHELL LIMESTONE	22	62		
LIMESTONE	62	253		
SANDSTONE	253	337		
LIMESTONE	337	390		
LIMESTONE	390	406		
LIMESTONE	406	460		
SHALE	460	528		

Remarks

GAMMA LOGGED 2-4-1988.
NORTH WELL, WELL NO.2.
JAN. 1954, WELL HAD FILLED IN ABOUT 40'
TREATMENT: SOFTENING-SODIUM ZEOLITO-HOT WATER
WELL LOCATED BY INFO FROM OWNER

Well Depth	Depth Completed	Date Well Completed
528 ft.	528 ft.	07/31/1926

Drill Method Cable Tool **Drill Fluid**

Use public supply/non-community **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below** 0 ft.

Casing Diameter		Weight
24 in. To	23 ft.	lbs./ft.
20 in. To	150 ft.	lbs./ft.

Open Hole From 150 ft. To 528 ft.

Screen? ☐ **Type** **Make**

Static Water Level
36 ft. land surface Measure 01/00/1954

Pumping Level (below land surface)
236 ft. hrs. Pumping at 400 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☒ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name POMONA
Model Number VT 600 HP 0 Volt
Length of drop pipe ft Capacity g.p. Typ Turbine

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer multiple
Last Strat St.Lawrence-Tunnel City Depth to Bedrock 22 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 542832 Y 4874331
Unique Number Verification Information from Input Date 11/02/2000

Angled Drill Hole

Well Contractor
Mccarthy Well Co. 27022
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Well Index Report | **220664** | Printed on 02/08/2023 HE-01205-15

Minnesota Unique Well Number

220665

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 08/07/1989
Update Date 05/22/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
KAHLER CORP.	106	14	W	2	ABABDC

Elevation 1005 **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
NO RECORD	0	19		
LIMESTONE	19	111		
SANDSTONE	111	122		
LIMESTONE	122	175		
SANDSTONE	175	390		
SANDSTONE	390	406		
SANDSTONE	406	430		

Remarks

GEOLOGY FROM GAMMA LOG OF NORTH WELL (#220664).
SOUTH WELL IS WELL NO. 1.

Well Depth 430 ft. **Depth Completed** 430 ft. **Date Well Completed** 07/31/1926

Drill Method Cable Tool **Drill Fluid**

Use commercial **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below** 0 ft.

Casing Diameter		Weight
20 in. To	150 ft.	lbs./ft.
24 in. To	ft.	lbs./ft.

Open Hole From 150 ft. To 430 ft.

Screen? ☐ **Type** **Make**

Static Water Level
36 ft. land surface Measure 00/00/1926

Pumping Level (below land surface)

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☒ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 0 Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer multiple
Last Strat St.Lawrence Formation Depth to Bedrock 19 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 542833 Y 4874313
Unique Number Verification Information from Input Date 11/02/2000

Angled Drill Hole

Well Contractor
Mccarthy Well Co. 27022
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Well Index Report | **220665** | Printed on 02/08/2023 HE-01205-15

Minnesota Unique Well Number

220784

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 01/25/1988
Update Date 10/01/2021
Received Date

Well Name	Township	Range	Dir	Section	Subsection
OLMSTED CTY 1	107	13	W	31	CCAAAB

Elevation 1017 **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

C/W ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
FILL	0	14		
COARSE SAND	14	70		
LIMEROCK	70	132		
SANDROCK	132	140		
LIMEROCK	140	327		
SANDROCK	327	437		
LIMEROCK	437	441		

Remarks

10 IN CASING INSTALLED AND GROUTED WITH CEMENT TO 318 FT IN 1957.

TOP OF 16 IN CASING IS AT 63 FT 4 IN. 16 IN CASING NOT GROUTED.
APRIL 2017 VIDEO LOG: BOTTOM 418 FT; 10 IN CASING TO 318 FT; SWL 26 FT.

SEALED 05-17-2021 BY 1404

Well Depth 441 ft. **Depth Completed** 441 ft. **Date Well Completed** 00/00/1935

Drill Method Cable Tool **Drill Fluid**

Use public supply/community **Status** Sealed

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Telescoping **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter		Weight
20 in. To 70 ft.		lbs./ft.
16 in. To 225 ft.		lbs./ft.
10 in. To 318 ft.		lbs./ft.

Open Hole From 225 ft. To 441 ft.

Screen? ☐ **Type** **Make**

Static Water Level
35 ft. land surface Measure 00/00/1957

Pumping Level (below land surface)

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien-
Last Strat St.Lawrence Formation Depth to Bedrock 70 ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 545348 Y 4874797
Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor
Mccarthy Well Co. 27022
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

220786

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 01/25/1988
Update Date 09/16/2020
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ST. MARY'S	106	14	W	3	AAACDA

Elevation 1044 **Elev. Method** 7.5 minute topographic map (+/- 5 feet)

Address

C/W ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT	0	9		
ST. PETER	9	60		
MEDIUM GRAINED	60	69		
MEDIUM-GRAINED	69	80		
LIGHT GRAY	80	150		
LIGHT GRAY	150	200		
SANDY DOLOMITE	200	250		
LIGHT GRAY	250	270		
SANDY DOLOMITE	270	290		
SANDY, LIGHT GRAY	290	328		
SANDY, LIGHT GRAY	328	340		
GRAY DOLOMITE	340	365		
CALCAREOUS,	365	395	WHITE	
CALCAREOUS,	395	420	WHITE	
CALCAREOUS, VERY	420	423	WHITE	
CALCAREOUS, VERY	423	480	WHITE	
CALCAREOUS	480	500		
CALCAREOUS SANDY	500	502		

Remarks

GAMMA LOGGED BY THEIN WELL CO. PRIOR TO 1989.
SEALED IN EARLY 1980'S ACCORDING TO CARL VON WALD-ASST. CHIEF ENGINEER AT MAYO
PREVIOUS USE CODE: OT (OTHER (SPECIFY IN REMARKS)) 9/16/2020.

Well Depth 502 ft. **Depth Completed** 502 ft. **Date Well Completed** 00/00/1942

Drill Method **Drill Fluid**

Use public supply/non-comm.-non-transient **Status** Sealed

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below** 0 ft.

Casing Diameter **Weight**
14 in. To 150 ft. lbs./ft.

Open Hole From 150 ft. To 502 ft.

Screen? ☐ **Type** **Make**

Static Water Level
62 ft. land surface Measure 00/00/1942

Pumping Level (below land surface)

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☒ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 0 Volt
Length of drop pipe ft Capacity 500 g.p. Typ Turbine

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock St.Peter Sandstone Aquifer multiple
Last Strat St.Lawrence Formation Depth to Bedrock 9 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 541656 Y 4874244
Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor
Minnesota Department of | MDH | NELSON, G.
Licensee Business | Lic. or Reg. No. | Name of Driller

Minnesota Unique Well Number

227828

County Olmsted
Quad Douglas
Quad ID 50D

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 01/25/1988
Update Date 04/08/2019
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ROCHESTER	106	14	W	4	BDABBA

Elevation 1085 **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

C/W ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT	0	21		
PLATTEVILLE	21	39		
ST PETER	39	141		
SHAKOPEE	141	218		

Remarks

SEALED 12-13-2017 BY 2293

Well Depth 218 ft. **Depth Completed** 218 ft. **Date Well Completed** 00/00/1970

Drill Method **Drill Fluid**

Use irrigation **Status** Sealed

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint**

Drive Shoe? Yes ☐ No ☐ **Above/Below** 0 ft.

Casing Diameter				Weight
8	in. To	143	ft.	lbs./ft.
10	in. To	21	ft.	lbs./ft.

Open Hole From 143 ft. To 218 ft.

Screen? ☐ **Type** **Make**

Static Water Level

85 ft. land surface Measure 04/14/1987

Pumping Level (below land surface)

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☒ No ☐ Not Specified

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed

Manufacturer's name

Model Number HP 0 Volt

Length of drop pipe ft Capacity g.p. Typ

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Platteville Formation Aquifer Prairie Du Chien

Last Strat Prairie Du Chien Group Depth to Bedrock 21 ft

Located by Minnesota Geological Survey

Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)

System UTM - NAD83, Zone 15, Meters X 539211 Y 4873986

Unique Number Verification Information from Input Date 02/13/1995

Angled Drill Hole

Well Contractor

Rowland Well Co. 23124

Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

228150

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 01/25/1988
Update Date 10/03/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
STAUFFER	107	14	W	34	BBBCBA

Elevation 1009 **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
PIPE ABOVE GROUND	0	2		
CLAY-SANDY	2	41	YELLOW	
LIMEROCK	41	46	TAN	
LIMEROCK & STREAKS	46	153		
LIMEROCK	153	250	BROWN	

Remarks

VALLEY HIGH 3RD ADN LOTS-1-2 ; PRODUCTION WELL

Well Depth 250 ft. **Depth Completed** 250 ft. **Date Well Completed** 01/27/1970

Drill Method **Drill Fluid**

Use commercial **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**

Drive Shoe? Yes ☐ No ☐ **Above/Below** 0 ft.

Casing Diameter	Weight	Hole Diameter
16 in. To 47 ft.	lbs./ft.	15 in. To 250 ft.

Open Hole From 47 ft. To 250 ft.

Screen? ☐ **Type** **Make**

Static Water Level

13 ft. land surface Measure 01/27/1970

Pumping Level (below land surface)

40.2 ft. 2 hrs. Pumping at 636 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☒ Not Specified

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed

Manufacturer's name

Model Number HP 0 Volt

Length of drop pipe ft Capacity g.p. Typ

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien

Last Strat Prairie Du Chien Group Depth to Bedrock 41 ft

Located by Minnesota Geological Survey

Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)

System UTM - NAD83, Zone 15, Meters X 540183 Y 4875899

Unique Number Verification Information from Input Date 01/01/1990

Angled Drill Hole

Well Contractor

Keys Well Co. 62012

Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

228636

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 07/27/1992
Update Date 05/22/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
A.M.P.I. NO.1	106	14	W	2	ADACCC

Elevation 993 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

C/W 700 1ST AV SE ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
NO RECORD	0	70		
SHAKOPEE - ONEOTA	70	300		
JORDAN SANDSTONE	300	401		

Remarks

WELL REBUILT 1963. SPECS REMAINED THE SAME. ORIGINALLY ROCHESTER DAIRY.
WELL NO.1.

Well Depth 401 ft. **Depth Completed** 401 ft. **Date Well Completed** 00/00/1945

Drill Method Cable Tool **Drill Fluid**

Use public supply/non-comm.-non-transient **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Step down **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below** 0 ft.

Casing Diameter		Weight
16 in. To 315 ft.		lbs./ft.
20 in. To 70 ft.		lbs./ft.

Open Hole From 315 ft. To 401 ft.

Screen? ☐ **Type** **Make**

Static Water Level
128 ft. land surface Measure 00/00/1945

Pumping Level (below land surface)
66 ft. hrs. Pumping at 600 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement	8 Cubic yards	ft.	ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP 0 Volt
Length of drop pipe ft Capacity 700 g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Jordan
Last Strat Jordan Sandstone Depth to Bedrock 70 ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:12,000) (>15 meters)
System UTM - NAD83, Zone 15, Meters X 543197 Y 4873806
Unique Number Verification Information from Input Date 11/16/2000

Angled Drill Hole

Well Contractor
Layne Well Co. 27010 HOLLAND, J
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

231890

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 10/03/1994
Update Date 09/16/2020
Received Date

Well Name	Township	Range	Dir	Section	Subsection
ST MARY'S	106	14	W	3	AADBAC

Elevation 1049 **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

C/W ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT	0	9		
ST PETER SANDSTONE	9	69		
SHAKOPEE & ONEOTA	69	366		
JORDAN SANDSTONE	366	460		

Remarks

6 IN. DROP PIPE W/HOOK 335-398FT.

PREVIOUS USE CODE: OT (OTHER (SPECIFY IN REMARKS)) 9/16/2020.

Well Depth 460 ft. **Depth Completed** 460 ft. **Date Well Completed** 00/00/1964

Drill Method **Drill Fluid**

Use public supply/non-comm.-non-transient **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Step down **Joint**

Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter		Weight
20 in.	To 48 ft.	lbs./ft.
12 in.	To 372 ft.	lbs./ft.
16 in.	To 85 ft.	lbs./ft.

Open Hole From ft. To ft.

Screen? ☒ **Type** **Make**

Diameter	Slot/Gauze	Length	Set	
6 in.		73 ft.	383 ft.	456 ft.

Static Water Level

52 ft. land surface Measure 00/00/1964

Pumping Level (below land surface)

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade

☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☒ Not Specified

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed

Manufacturer's name

Model Number HP 0 Volt

Length of drop pipe 285 ft Capacity g.p. Typ Turbine

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock St.Peter Sandstone Aquifer Jordan

Last Strat Jordan Sandstone Depth to Bedrock 9 ft

Located by Minnesota Geological Survey

Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or

System UTM - NAD83, Zone 15, Meters X 541640 Y 4874158

Unique Number Verification Information from Input Date 09/21/2016

Angled Drill Hole

Well Contractor

Thein Well Co. 55079

Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

233030

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 07/27/1992
Update Date 03/10/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
A.M.P.I. NO.3	106	14	W	2	ADABDA

Elevation 999.6 **Elev. Method** Surveyed

Address

C/W 700 1ST AV SE ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT	0	10		
LIMEROCK	10	15		
LIMEROCK	15	110		
SANDROCK	110	117		SOFT
SANDROCK	117	300		HARD
LIMEROCK & SHALE	300	310		
JORDAN SANDSTONE	310	370		
JORDAN SANDSTONE	370	410		HARD
SANDY SHALE	410	425		HARD

Remarks

ORIGINALLY ROCHESTER DAIRY. ORIGINAL LOG HAS SWL AT 27 FT
WELL #3

Well Depth	Depth Completed	Date Well Completed
425 ft.	425 ft.	04/28/1947

Drill Method **Drill Fluid**

Use public supply/non-comm.-non-transient **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type Step down **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below** 0 ft.

Casing Diameter		Weight
24 in. To 61 ft.		lbs./ft.
34 in. To 13 ft.		lbs./ft.

Open Hole From 61 ft. To 425 ft.

Screen? ☐ **Type** **Make**

Static Water Level

115 ft. land surface Measure 04/28/1947

Pumping Level (below land surface)

63 ft. hrs. Pumping at 650 g.p.m.

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount		From	To
neat cement	11	Cubic yards	0 ft.	61 ft.

Nearest Known Source of Contamination

feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed

Manufacturer's name

Model Number HP 0 Volt

Length of drop pipe ft Capacity 975 g.p. Typ

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien-
Last Strat St.Lawrence Formation Depth to Bedrock 10 ft
Located by Minnesota Department of Health
Locate Method Digitization (Screen) - Map (1:12,000) (>15 meters)
System UTM - NAD83, Zone 15, Meters X 543265 Y 4873943
Unique Number Verification Information from Input Date 11/16/2000

Angled Drill Hole

Well Contractor

Licensee Business	Lic. or Reg. No.	Name of Driller
Layne Well Co.	27010	HOLLAND, J.

Minnesota Unique Well Number

233039

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 01/25/1988
Update Date 05/09/2018
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SILVER LAKE	107	14	W	35	ADDCDA

Elevation 986 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
FILL	0	4		
SAND & GRAVEL	4	33		
CLAY	33	42		
LIMESTONE	42	79		
SANDSTONE	79	91		
LIMEROCK &	91	131		
LIMESTONE	131	250		

Remarks

SUPPLIES COOLING UNIT-4 ; WELL IS SW OF COOLING UNIT-3 AND WEST RR

TRCKS

SEALED 1-9-2018 BY 2293.

Well Depth 250 ft. **Depth Completed** 250 ft. **Date Well Completed** 07/00/1969

Drill Method **Drill Fluid**

Use industrial **Status** Sealed

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below** 0 ft.

Casing Diameter	Weight	Hole Diameter
30 in. To 42 ft.	lbs./ft.	29 in. To 12 ft.
		16 in. To 196 ft.

Open Hole From 42 ft. To 250 ft.

Screen? ☐ **Type** **Make**

Static Water Level
24.8 ft. land surface Measure 07/00/1969

Pumping Level (below land surface)
48 ft. 0.5 hrs. Pumping at 450 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☒ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name RED JACKET
Model Number HP 40 Volt 460
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien
Last Strat Prairie Du Chien Group Depth to Bedrock 42 ft
Located by Minnesota Geological Survey
Locate Method Digitized - scale 1:24,000 or larger (Digitizing Table)
System UTM - NAD83, Zone 15, Meters X 543261 Y 4875243
Unique Number Verification Input Date 01/01/1990

Angled Drill Hole

Well Contractor
Keys Well Co. 62012
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

241967

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 01/16/1992
Update Date 02/13/2017
Received Date

Well Name	Township	Range	Dir	Section	Subsection
DNR OB 55002	107	14	W	35	DCDBDB

Elevation 998 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

C/W CENTER ST ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
DRIFT	0	24		
SHAKOPEE DOLOMITE	24	101	TAN	
ROOT VALLEY	101	112	WHT/TAN	
ONEOTA	112	340	GRY/PNK	
JORDAN SANDSTONE	340	427	WHITE	
ST LAWRENCE	427	552	TAN	

Remarks

WATER LEVELS AFFECTED BY REGIONAL PUMPING. NESTED WELL. OBWELL 55002
KAHLER CORPORATION

Well Depth 552 ft. **Depth Completed** 552 ft. **Date Well Completed** 11/30/1927

Drill Method Cable Tool **Drill Fluid**

Use observation well **Status** Unknow

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below** 0 ft.

Casing Diameter **Weight**
15 in. To 150 ft. lbs./ft.

Open Hole From 150 ft. To 517 ft.

Screen? ☐ **Type** **Make**

Static Water Level
39.7 ft. land surface Measure 03/29/1957

Pumping Level (below land surface)

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☒ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP 0 Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Pr.du Chien-
Last Strat St.Lawrence-Tunnel City Depth to Bedrock 24 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 542852 Y 4874548
Unique Number Verification Input Date 06/02/2000

Angled Drill Hole

Well Contractor
United States Geological USGS
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

242118

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 02/02/1994
Update Date 07/06/2020
Received Date

Well Name	Township	Range	Dir	Section	Subsection
SENECA FOODS	106	14	W	11	AAACDB

Elevation 1001 **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

C/W 1217 3RD AV SE ROCHESTER MN 55904

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GRAVEL	0	14		
SOFT LIME ROCK	14	20		SOFT
HARD LIME ROCK	20	32		HARD
GRAY LIME-WATER	32	44	GRAY	
HARD LIME ROCK	44	46		HARD
SAND ROCK	46	50		
LIME ROCK	50	56		
LIME ROCK (POROUS)	56	119		
SAND ROCK	119	126		
HARD LIME ROCK	126	310		HARD
SAND ROCK-WATER	310	410		

Remarks

MAY BE TWO WELLS THERE.

WELL DRILLED FOR REID-MURDOCK & CO.

RECORD NOTES THE SPACE BETWEEN THE 20" AND 24" CASINGS IS FILLED WITH
CONCRETE GROUTING.

WELL REAMED, RECASED & GROUTED BY BERGERSON-CASSWELL 4-88 TO 5-88.
SEALED 05-29-2020 BY 1767

Well Depth 410 ft. **Depth Completed** 410 ft. **Date Well Completed** 00/00/1931

Drill Method **Drill Fluid**

Use industrial **Status** Sealed

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
20 in. To 22 ft.	lbs./ft.	20 in. To 410 ft.
24 in. To 22 ft.	lbs./ft.	
14 in. To 318 ft.	lbs./ft.	

Open Hole From ft. To ft.

Screen? ☐ **Type** **Make**

Static Water Level
10 ft. land surface Measure null

Pumping Level (below land surface)

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
well grouted, type unknown		ft.	318 ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☒ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Jordan
Last Strat Jordan Sandstone Depth to Bedrock 14 ft
Located by Olmsted Cty.
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 543276 Y 4872616
Unique Number Verification Input Date 02/14/1995

Angled Drill Hole

Well Contractor
Bergerson-Caswell 27058 GUST NELSON
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

249072

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date 02/02/1994
Update Date 10/03/2016
Received Date

Well Name	Township	Range	Dir	Section	Subsection
MARIGOLD	107	14	W	35	DABDCA

Elevation 986 ft. **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

C/W ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
NO RECORD	0	205		

Remarks

Well Depth 205 ft. **Depth Completed** 205 ft. **Date Well Completed** 00/00/1952

Drill Method **Drill Fluid**

Use industrial **Status** Active

Well Hydrofractured? **Yes** ☐ **No** ☐ **From** **To**

Casing Type **Joint**
Drive Shoe? **Yes** ☐ **No** ☐ **Above/Below**

Casing Diameter **Weight**
6 in. To ft. lbs./ft.

Open Hole From ft. To ft.

Screen? ☐ **Type** **Make**

Static Water Level

Pumping Level (below land surface)

Wellhead Completion
Pitless adapter manufacturer Model
☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☐ Not Specified

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Aquifer indeterminate
Last Strat no record Depth to Bedrock ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 543118 Y 4875050
Unique Number Verification Site Plan Input Date 10/03/2016

Angled Drill Hole

Well Contractor
Minnesota Dept. of Natural MNDNR
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

251913

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH

WELL AND BORING REPORT

Minnesota Statutes Chapter 1031

Entry Date
Update Date 02/14/2014
Received Date

Well Name	Township	Range	Dir	Section	Subsection
LEITZEN	107	14	W	35	CBAAAB

Elevation 994 ft. **Elev. Method** CALC FROM 2-FOOT COUNTY DEM

Address

Well ROCHESTER MN

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
GLACIAL DRIFT	0	23		
PRAIRIE DU CHIEN	23	112		
PRAIRIE DU CHIEN	112	335		
JORDAN SANDSTONE	335	428		
ST. LAWRENCE	428	441		

Remarks

GAMMA LOGGED 7-27-2004.
WELL SEALING NO. H-217600.

Well Depth 441 ft. **Depth Completed** 441 ft. **Date Well Completed**

Drill Method **Drill Fluid**

Use industrial **Status** Inactive

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint**
Drive Shoe? Yes ☐ No ☐ **Above/Below**

Casing Diameter	Weight	Hole Diameter
4 in. To 80 ft.	lbs./ft.	4 in. To 441 ft.

Open Hole From 80 ft. To 441 ft.

Screen? ☐ **Type** **Make**

Static Water Level

18 ft. land surface Measure 07/27/2004

Pumping Level (below land surface)

Wellhead Completion

Pitless adapter manufacturer Model

☐ Casing Protection ☐ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☐ Yes ☐ No ☒ Not Specified

Nearest Known Source of Contamination

0 feet Direction Type

Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed

Manufacturer's name

Model Number HP Volt

Length of drop pipe ft Capacity g.p. Typ

Abandoned

Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance

Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous

First Bedrock Prairie Du Chien Group Aquifer multiple
Last Strat St.Lawrence Formation Depth to Bedrock 23 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 542138 Y 4875199
Unique Number Verification Information from Input Date 07/27/2004

Angled Drill Hole

Well Contractor

Minnesota Geological Survey MGS
Licensee Business Lic. or Reg. No. Name of Driller

Minnesota Unique Well Number

627201

County Olmsted
Quad Rochester
Quad ID 49C

MINNESOTA DEPARTMENT OF HEALTH
WELL AND BORING REPORT
Minnesota Statutes Chapter 1031

Entry Date 06/24/1999
Update Date 08/06/2018
Received Date 05/05/1999

Well Name	Township	Range	Dir	Section	Subsection
MW 10B	106	14	W	2	DBCCBB

Elevation 997 ft. **Elev. Method** LiDAR 1m DEM (MNDNR)

Address

Contact 403 CENTER ST ROCHESTER MN 55904
Well 244 SOLDIERS FIELD DR SW ROCHESTER MN 55904

Stratigraphy Information

Geological Material	From	To (ft.)	Color	Hardness
CLAY	0	10	YELLOW	
SAND, GRAVEL	10	15	YELLOW	
WEATHERED	15	25	YELLOW	
LIMESTONE	25	45	GRAY	HARD
LIMESTONE,	45	80	GRAY	M.HARD
LIMESTONE	80	110	GRAY	V.HARD
SANDSTONE	110	118	GRAY	SOFT
LIMESTONE,	118	140	VARIED	M.HARD
LIMESTONE,	140	170	GRY/WHT	HARD
LIMESTONE	170	210	GRAY	V.HARD

Remarks

Well Depth 210 ft. **Depth Completed** 210 ft. **Date Well Completed** 03/25/1999

Drill Method Non-specified Rotary **Drill Fluid**

Use monitor well **Status** Active

Well Hydrofractured? Yes ☐ No ☐ **From** **To**

Casing Type Single casing **Joint** Welded
Drive Shoe? Yes ☒ No ☐ **Above/Below** 2 ft.

Casing Diameter	Weight	Hole Diameter
4 in. To 140 ft.	lbs./ft.	8.5 in. To 140 ft.
		4 in. To 210 ft.

Open Hole From 140 ft. To 210 ft.

Screen? ☐ **Type** **Make**

Static Water Level
32 ft. land surface Measure 03/25/1999

Pumping Level (below land surface)
ft. hrs. Pumping at 75 g.p.m.

Wellhead Completion
Pitless adapter manufacturer Model
☒ Casing Protection ☒ 12 in. above grade
☐ At-grade (Environmental Wells and Borings ONLY)

Grouting Information Well Grouted? ☒ Yes ☐ No ☐ Not Specified

Material	Amount	From	To
neat cement	39 Sacks	0 ft.	140 ft.

Nearest Known Source of Contamination
feet Direction Type
Well disinfected upon completion? ☐ Yes ☐ No

Pump ☐ Not Installed Date Installed
Manufacturer's name
Model Number HP Volt
Length of drop pipe ft Capacity g.p. Typ

Abandoned
Does property have any not in use and not sealed well(s)? ☐ Yes ☐ No

Variance
Was a variance granted from the MDH for this well? ☐ Yes ☐ No

Miscellaneous
First Bedrock Prairie Du Chien Group Aquifer Prairie Du Chien
Last Strat Prairie Du Chien Group Depth to Bedrock 15 ft
Located by Minnesota Geological Survey
Locate Method Digitization (Screen) - Map (1:24,000) (15 meters or
System UTM - NAD83, Zone 15, Meters X 542595 Y 4873288
Unique Number Verification Site Plan Input Date 01/18/2018

Angled Drill Hole

Well Contractor
Stevens Well Drilling Co. Inc. 86654 JOHNSON, R.
Licensee Business Lic. or Reg. No. Name of Driller

APPENDIX B

Agency Correspondence

DEPARTMENT OF NATURAL RESOURCES

Minnesota Department of Natural Resources
Division of Ecological & Water Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155-4025

March 13, 2024
Correspondence # MCE 2024-00010

Lucas Wandrie
WSB & Associates, Inc.

RE: Natural Heritage Review of the proposed **Mayo Unbound AUAR,**
T106N R14W Sections 2 and 35; Olmsted County

Dear Lucas Wandrie,

As requested, the Minnesota Natural Heritage Information System has been reviewed to determine if the proposed project has the potential to impact any rare species or other significant natural features. Based on the project details provided with the request, the following rare features may be impacted by the proposed project:

State-listed Species

- Peregrine falcons (*Falco peregrinus*), a state-listed species of special concern, have been documented nesting for multiple years on the Mayo, Plumber, and Guggenheim buildings. In urban areas, peregrine falcons nest on tall buildings, bridges, and smokestacks. Provided the project footprint doesn't change, it is unlikely that the construction activities will affect these birds. If any nests are found within the project boundary, please contact the MN DNR Central Region Nongame Specialist Erica Hoaglund (erica.hoaglund@state.mn.us).

- Please visit the DNR Rare Species Guide for more information on the habitat use of these species and recommended measures to avoid or minimize impacts.

Federally Protected Species

- The area of interest overlaps with a U.S Fish and Wildlife Service (USFWS) Rusty Patched Bumble Bee High Potential Zone. The rusty patched bumble bee *(Bombus affinis)* is federally listed as endangered and is likely to be present in suitable habitat within High Potential Zones. From April through October this species uses underground nests in upland grasslands, shrublands, and forest edges, and forages where nectar and pollen are available. From October

through April the species overwinters under tree litter in upland forests and woodlands. The rusty patched bumble bee may be impacted by a variety of land management activities including, but not limited to, prescribed fire, tree-removal, haying, grazing, herbicide use, pesticide use, land-clearing, soil disturbance or compaction, or use of non-native bees. If applicable, **the DNR recommends reseeding disturbed soils with native species of grasses and forbs using** BWSR Seed Mixes **or** MnDOT Seed Mixes**.**

To ensure compliance with federal law, please conduct a federal regulatory review using the U.S. Fish and Wildlife Service's online Information for Planning and Consultation (IPaC) tool. Please note that all projects, regardless of whether there is a federal nexus, are subject to federal take prohibitions. The IPaC review will determine if prohibited take is likely to occur and, if not, will generate an automated letter. The USFWS RPBB guidance provides guidance on avoiding impacts to rusty patched bumble bee and a key for determining if actions are likely to affect the species; the determination key can be found in the appendix.

Environmental Review and Permitting

- Given the potential presence of state protected species, we encourage submission of Natural Heritage Review requests to ensure avoidance of take for these species and to determine survey needs as individual projects are planned.
- Please include a copy of this letter and the MCE-generated Final Project Report in any state or local license or permit application. Please note that measures to avoid or minimize disturbance to the above rare features may be included as restrictions or conditions in any required permits or licenses.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available, and is the most complete source of data on Minnesota's rare or otherwise significant species, native plant communities, and other natural features. However, the NHIS is not an exhaustive inventory and thus does not represent all of the occurrences of rare features within the state. Therefore, ecologically significant features for which we have no records may exist within the project area. If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are only valid for the project location and project description provided with the request. **If project details change or the project has not occurred within one year, please resubmit the project for review within one year of initiating project activities.**

The Natural Heritage Review does not constitute project approval by the Department of Natural Resources. Instead, it identifies issues regarding known occurrences of rare features and potential impacts to these rare features. Visit the Natural Heritage Review website for additional information regarding this process, survey guidance, and other related information. For information on the environmental review process or other natural resource concerns, you may contact your DNR Regional Environmental Assessment Ecologist.

Thank you for consulting us on this matter and for your interest in preserving Minnesota's rare natural resources.

Sincerely,



Molly Barrett
Natural Heritage Review Specialist
Molly.Barrett@state.mn.us

Cc: Melissa Collins, Regional Environmental Assessment Ecologist, Region 3 (Central)

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Minnesota-Wisconsin Ecological Services Field Office
3815 American Blvd East
Bloomington, MN 55425-1659
Phone: (952) 858-0793 Fax: (952) 646-2873

In Reply Refer To:
Project Code: 2024-0033843
Project Name: Mayo Unbound AUAR

January 08, 2024

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

This response has been generated by the Information, Planning, and Conservation (IPaC) system to provide information on natural resources that could be affected by your project. The U.S. Fish and Wildlife Service (Service) provides this response under the authority of the Endangered Species Act of 1973 (16 U.S.C. 1531-1543), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d), the Migratory Bird Treaty Act (16 U.S.C. 703-712), and the Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq.*).

Threatened and Endangered Species
The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and may be affected by your proposed project. The species list fulfills the requirement for obtaining a Technical Assistance Letter from the U.S. Fish and Wildlife Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

Consultation Technical Assistance
Please refer to refer to our Section 7 website for guidance and technical assistance, including step-by-step instructions for making effects determinations for each species that might be present and for specific guidance on the following types of projects: projects in developed areas, HUD, CDBG, EDA, USDA Rural Development projects, pipelines, buried utilities, telecommunications, and requests for a Conditional Letter of Map Revision (CLOMR) from FEMA.

We recommend running the project (if it qualifies) through our **Minnesota-Wisconsin Federal Endangered Species Determination Key (Minnesota-Wisconsin ("D-key"))**. A demonstration video showing how-to access and use the determination key is available. Please note that the Minnesota-Wisconsin D-key is the third option of 3 available d-keys. D-keys are tools to help Federal agencies and other project proponents determine if their proposed action has the potential to adversely affect federally listed species and designated critical habitat. The Minnesota-Wisconsin D-key includes a structured set of questions that assists a project proponent in determining whether a proposed project qualifies for a certain predetermined consultation outcome for all federally listed species found in Minnesota and Wisconsin (except for the northern long-eared bat- see below), which includes determinations of “no effect” or “may affect, not likely to adversely affect." In each case, the Service has compiled and analyzed the best available information on the species’ biology and the impacts of certain activities to support these determinations.

If your completed d-key output letter shows a "No Effect" (NE) determination for all listed species, print your IPaC output letter for your files to document your compliance with the Endangered Species Act.

For Federal projects with a “Not Likely to Adversely Affect” (NLAA) determination, our concurrence becomes valid if you do not hear otherwise from us after a 30-day review period, as indicated in your letter.

If your d-key output letter indicates additional coordination with the Minnesota-Wisconsin Ecological Services Field Office is necessary (i.e., you get a “May Affect” determination), you will be provided additional guidance on contacting the Service to continue ESA coordination outside of the key; ESA compliance cannot be concluded using the key for “May Affect” determinations unless otherwise indicated in your output letter.

Note: Once you obtain your official species list, you are not required to continue in IPaC with d-keys, although in most cases these tools should expedite your review. If you choose to make an effects determination on your own, you may do so. If the project is a Federal Action, you may want to review our section 7 step-by-step instructions before making your determinations.

Using the IPaC Official Species List to Make No Effect and May Affect Determinations for Listed Species

1. If IPaC returns a result of “There are no listed species found within the vicinity of the project,” then project proponents can conclude the proposed activities will have **no effect** on any federally listed species under Service jurisdiction. Concurrence from the Service is not required for **no effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.
2. If IPaC returns one or more federally listed, proposed, or candidate species as potentially present in the action area of the proposed project – other than bats (see below) – then project proponents must determine if proposed activities will have **no effect** on or **may affect** those species. For assistance in determining if suitable habitat for listed, candidate, or proposed species occurs within your project area or if species may be affected by project activities, you can obtain Life History Information for Listed and Candidate Species on our office website. If no impacts will occur to a species on the IPaC species list (e.g., there is no habitat present in the project area), the appropriate determination is **no effect**. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.

3. Should you determine that project activities **may affect** any federally listed, please contact our office for further coordination. Letters with requests for consultation or correspondence about your project should include the Consultation Tracking Number in the header. Electronic submission is preferred.

Northern Long-Eared Bats
Northern long-eared bats occur throughout Minnesota and Wisconsin and the information below may help in determining if your project may affect these species.

This species hibernates in caves or mines only during the winter. In Minnesota and Wisconsin, the hibernation season is considered to be November 1 to March 31. During the active season (April 1 to October 31) they roost in forest and woodland habitats. Suitable summer habitat for northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥3 inches dbh for northern long-eared bat that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of forested/wooded habitat. Northern long-eared bats have also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat and evaluated for use by bats. If your project will impact caves or mines or will involve clearing forest or woodland habitat containing suitable roosting habitat, northern long-eared bats could be affected.

Examples of unsuitable habitat include:

- Individual trees that are greater than 1,000 feet from forested or wooded areas,
- Trees found in highly developed urban areas (e.g., street trees, downtown areas),
- A pure stand of less than 3-inch dbh trees that are not mixed with larger trees, and
- A monoculture stand of shrubby vegetation with no potential roost trees.

If IPaC returns a result that northern long-eared bats are potentially present in the action area of the proposed project, project proponents can conclude the proposed activities **may affect** this species **IF** one or more of the following activities are proposed:

- Clearing or disturbing suitable roosting habitat, as defined above, at any time of year,
- Any activity in or near the entrance to a cave or mine,
- Mining, deep excavation, or underground work within 0.25 miles of a cave or mine,
- Construction of one or more wind turbines, or
- Demolition or reconstruction of human-made structures that are known to be used by bats based on observations of roosting bats, bats emerging at dusk, or guano deposits or stains.

If none of the above activities are proposed, project proponents can conclude the proposed activities will have **no effect** on the northern long-eared bat. Concurrence from the Service is not required for **No**

Effect determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.

If any of the above activities are proposed, and the northern long-eared bat appears on the user's species list, the federal project user will be directed to either the range-wide northern long-eared bat D-key or the Federal Highways Administration, Federal Railways Administration, and Federal Transit Administration Indiana bat/ Northern long-eared bat D-key, depending on the type of project and federal agency involvement. Similar to the Minnesota-Wisconsin D-key, these d-keys helps to determine if prohibited take might occur and, if not, will generate an automated verification letter.

Please note: On November 30, 2022, the Service published a proposal final rule to reclassify the northern long-eared bat as endangered under the Endangered Species Act. On January 26, 2023, the Service published a 60-day extension for the final reclassification rule in the Federal Register, moving the effective listing date from January 30, 2023, to March 31, 2023. This extension will provide stakeholders and the public time to preview interim guidance and consultation tools before the rule becomes effective. When available, the tools will be available on the Service's northern long-eared bat website (https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis). Once the final rule goes into effect on March 31, 2023, the 4(d) D-key will no longer be available (4(d) rules are not available for federally endangered species) and will be replaced with a new Range-wide NLEB D-key (range-wide d-key). For projects not completed by March 31, 2023, that were previously reviewed under the 4(d) d-key, there may be a need for reinitiation of consultation. For these ongoing projects previously reviewed under the 4(d) d-key that may result in incidental take of the northern long-eared bat, we recommend you review your project using the new range-wide d-key once available. If your project does not comply with the range-wide d-key, it may be eligible for use of the Interim (formal) Consultation framework (framework). The framework is intended to facilitate the transition from the 4(d) rule to typical Section 7 consultation procedures for federally endangered species and will be available only until spring 2024. Again, when available, these tools (new range-wide d-key and framework) will be available on the Service's northern long-eared bat website.

Whooping Crane

Whooping crane is designated as a non-essential experimental population in Wisconsin and consultation under Section 7(a)(2) of the Endangered Species Act is only required if project activities will occur within a National Wildlife Refuge or National Park. If project activities are proposed on lands outside of a National Wildlife Refuge or National Park, then you are not required to consult. For additional information on this designation and consultation requirements, please review "Establishment of a Nonessential Experimental Population of Whooping Cranes in the Eastern United States."

Other Trust Resources and Activities

Bald and Golden Eagles - Although the bald eagle has been removed from the endangered species list, this species and the golden eagle are protected by the Bald and Golden Eagle Act and the Migratory Bird Treaty Act. Should bald or golden eagles occur within or near the project area please contact our office for further coordination. For communication and wind energy projects, please refer to additional guidelines below.

Migratory Birds - The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Service. The Service has the responsibility under the MBTA to proactively prevent the

mortality of migratory birds whenever possible and we encourage implementation of recommendations that minimize potential impacts to migratory birds. Such measures include clearing forested habitat outside the nesting season (generally March 1 to August 31) or conducting nest surveys prior to clearing to avoid injury to eggs or nestlings.

Communication Towers - Construction of new communications towers (including radio, television, cellular, and microwave) creates a potentially significant impact on migratory birds, especially some 350 species of night-migrating birds. However, the Service has developed voluntary guidelines for minimizing impacts.

Transmission Lines - Migratory birds, especially large species with long wingspans, heavy bodies, and poor maneuverability can also collide with power lines. In addition, mortality can occur when birds, particularly hawks, eagles, kites, falcons, and owls, attempt to perch on uninsulated or unguarded power poles. To minimize these risks, please refer to guidelines developed by the Avian Power Line Interaction Committee and the Service. Implementation of these measures is especially important along sections of lines adjacent to wetlands or other areas that support large numbers of raptors and migratory birds.

Wind Energy - To minimize impacts to migratory birds and bats, wind energy projects should follow the Service's Wind Energy Guidelines. In addition, please refer to the Service's Eagle Conservation Plan Guidance, which provides guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities.

State Department of Natural Resources Coordination
While it is not required for your Federal section 7 consultation, please note that additional state endangered or threatened species may also have the potential to be impacted. Please contact the Minnesota or Wisconsin Department of Natural Resources for information on state listed species that may be present in your proposed project area.

Minnesota
Minnesota Department of Natural Resources - Endangered Resources Review Homepage
Email: Review.NHIS@state.mn.us

Wisconsin
Wisconsin Department of Natural Resources - Endangered Resources Review Homepage
Email: DNRERReview@wi.gov

We appreciate your concern for threatened and endangered species. Please feel free to contact our office with questions or for additional information.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

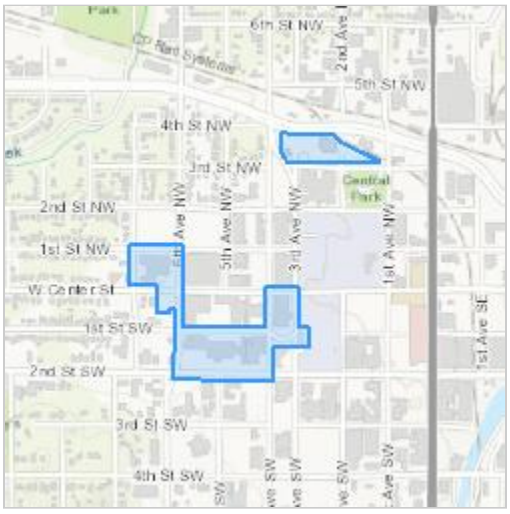
This species list is provided by:

Minnesota-Wisconsin Ecological Services Field Office
3815 American Blvd East
Bloomington, MN 55425-1659
(952) 858-0793

PROJECT SUMMARY

Project Code: 2024-0033843
Project Name: Mayo Unbound AUAR
Project Type: Commercial Development
Project Description: Industrial Redevelopment Project
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@44.02669145,-92.4666601552029,14z



Counties: Olmsted County, Minnesota

ENDANGERED SPECIES ACT SPECIES

There is a total of 5 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

BIRDS

NAME	STATUS
Whooping Crane *Grus americana* Population: U.S.A. (AL, AR, CO, FL, GA, ID, IL, IN, IA, KY, LA, MI, MN, MS, MO, NC, NM, OH, SC, TN, UT, VA, WI, WV, western half of WY) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/758	Experimental Population, Non-Essential

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate
Rusty Patched Bumble Bee *Bombus affinis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9383 General project design guidelines: https://ipac.ecosphere.fws.gov/project/RRVY425VPNDEFKAP6X4WZIUICU/documents/generated/5967.pdf	Endangered

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

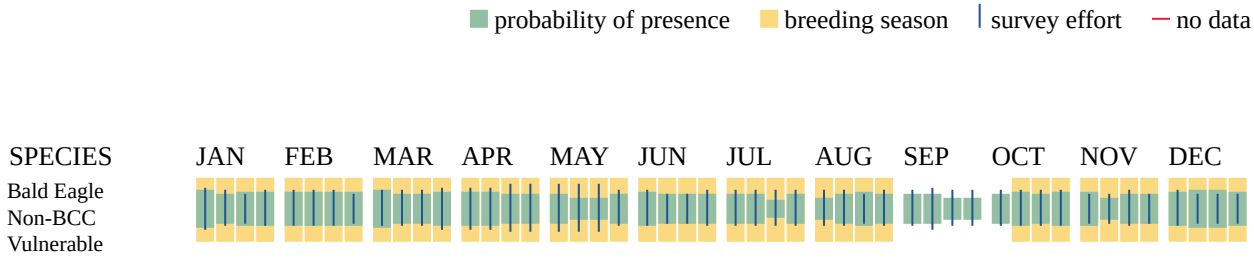
Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Black-billed Cuckoo *Coccyzus erythropthalmus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10

NAME	BREEDING SEASON
Cerulean Warbler *Dendroica cerulea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/2974	Breeds Apr 21 to Jul 20
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Pectoral Sandpiper *Calidris melanotos* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9561	Breeds elsewhere
Prothonotary Warbler *Protonotaria citrea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9439	Breeds Apr 1 to Jul 31
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Rusty Blackbird *Euphagus carolinus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9478	Breeds elsewhere
Short-billed Dowitcher *Limnodromus griseus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Wood Thrush *Hylocichla mustelina* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9431	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental

Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

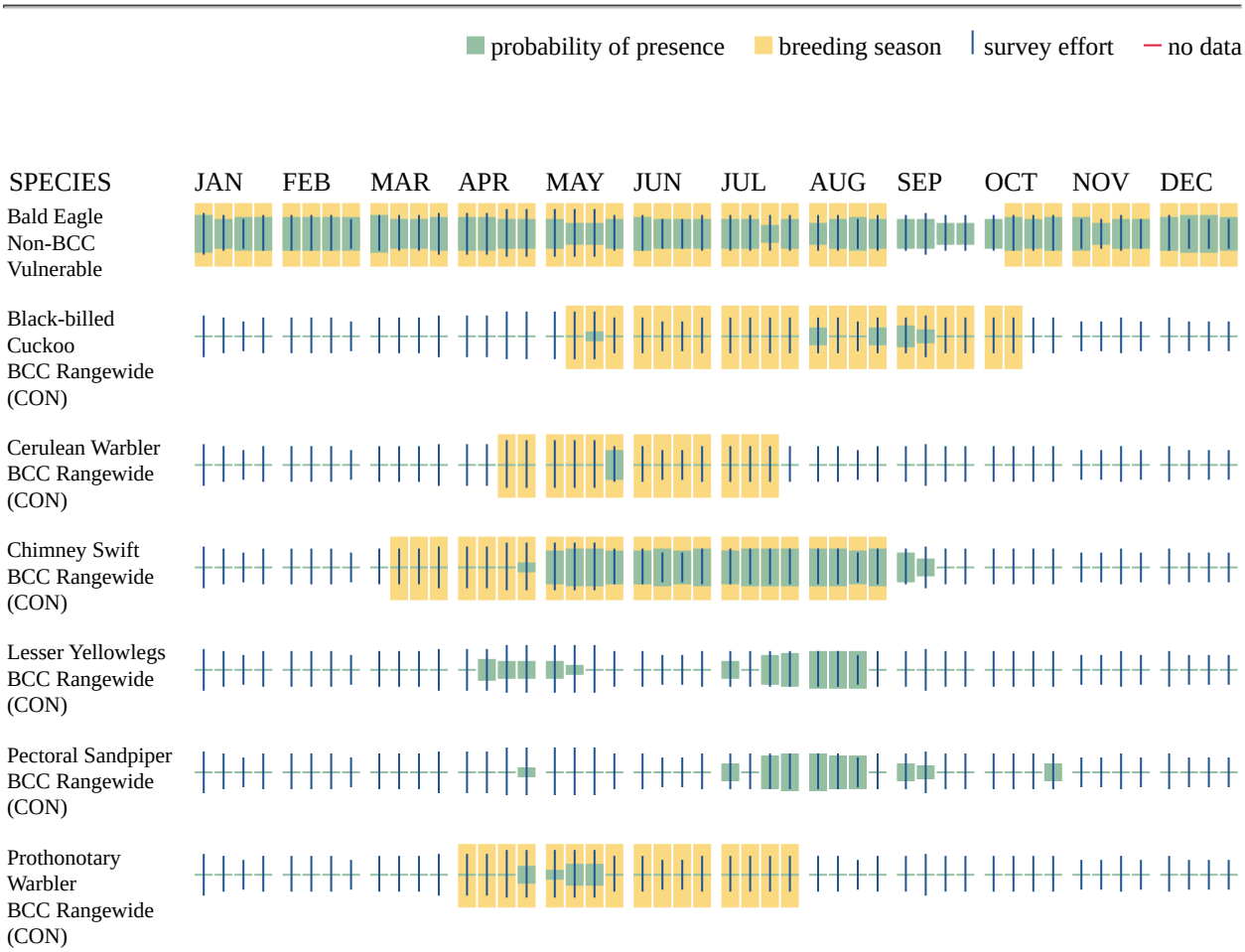
Probability of Presence (■)

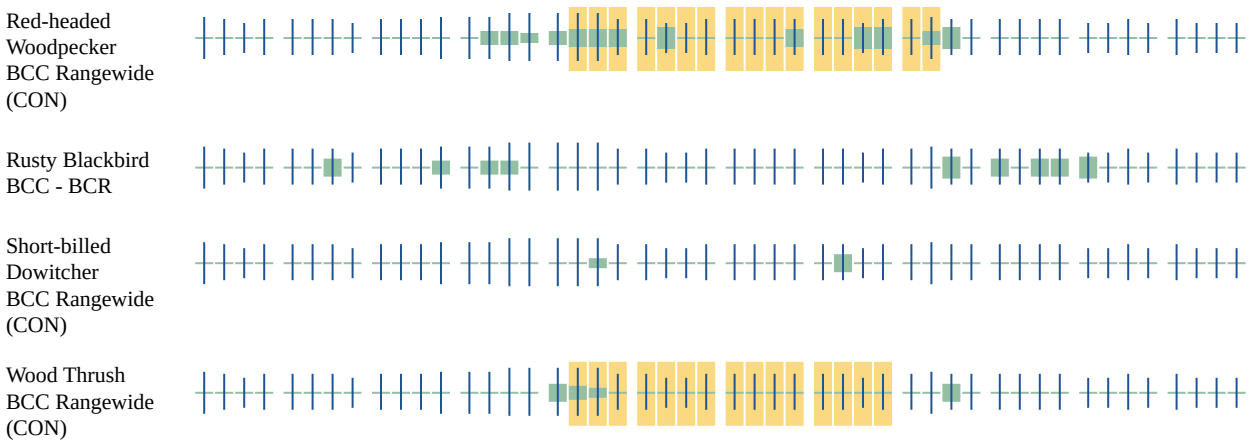
Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.





Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

THERE ARE NO WETLANDS WITHIN YOUR PROJECT AREA.

IPAC USER CONTACT INFORMATION

Agency: WSB
Name: Lucas Wandrie
Address: 701 Xenia Ave S, Ste 300
City: Golden Valley
State: MN
Zip: 55416
Email lwandrie@wsbeng.com
Phone: 6124520540

MINNESOTA
INDIAN AFFAIRS COUNCIL

161 St. Anthony Ave, Suite 919 Saint Paul, MN 55103
MIAC.Culturalresources@state.mn.us

Date: 05/15/2024

Elliot Mohler
City of Rochester
507.328.2941
communitydevelopment@rochestermn.gov

Karl Corrigan
Mayo Clinic
507.284.2382
corrigan.karl@mayo.edu

Project Name:
Bold. Forward.
Unbound. In
Rochester

Submitter's Project ID:

Known or Suspected Cemeteries
☐ Platted Cemeteries ☐ Unplatted Cemeteries ☐ Burial File ☐ Authenticated Burial
Notes/Comments
Thank you for the opportunity to comment on the above listed project. I have reviewed this project pursuant to the responsibilities given to the Minnesota Indian Affairs Council by the Private Cemeteries Act (MS 307.08), and the Minnesota Field Archaeology Act (MS 138.31-.41). There are no known or suspected burial sites that may be affected by this project. Please have an unanticipated discovery plan in place.
Recommendations

☒ Not Applicable

☒ No Concerns

☐ Monitoring

☐ Avoidance

☐ Phase Ia – Literature Review

☐ Phase I – Reconnaissance survey

☐ Phase II – Evaluation

☐ Phase III – Data Recovery

☐ Other

If you require additional information or have questions, comments, or concerns please contact our office.

Sincerely,

Lilly Geraghty
Cultural Resource Manager
MIAC
161 Rondo Avenue, Ste. 919
Saint Paul MN 55103
651-539-2202
lilly.geraghty@state.mn.us

APPENDIX C

GHG Emissions Analysis

GHG ANAYLSIS ASSUMPTIONS

Building	GSF	Use	Waste Generation sheet	Energy Use (Summary sheet)
Existing PUP	33,759	Utility plant - electric generation	Exclude - Burns & McDonnell analysis accounts for GHG emissions.	
Existing Damon Site	-	Parking	Assume negligible waste generation	Omitted - EnergyStar Portfolio Manager does not calculate parking structure energy use
Existing Ozmun Site	236,846	GSF excudes parking	Hospital	Hospital
Existing Lourdes HS	120,802	Previously a school, vacant for the last 10 years. Assume building is still maintained.	Assume Office waste generation	Assume K-12 energy use
Existing Lot 26	-	Parking	Assume negligible waste generation	Omitted - EnergyStar Portfolio Manager does not calculate parking structure energy use
Proposed PUP	90,000	Utility plant - electric generation	Exclude - Burns & McDonnell analysis accounts for GHG emissions.	
Proposed Damon Site	450,000	Hospital, primary in-patient clinic space	Hospital	Hospital
Proposed Ozmun Site	1,400,000	Hospital, primary in-patient clinic space	Hospital	Hospital
Proposed West Logistics Center	115,000	Logistics for hospital including pharmacy, linens, and sterile processing	Assume Commercial waste generation	Assume Medical Office energy use
Proposed Switchgear Building (Lot 26)	5,000	Electrical equipment	Assume negligible waste generation	Assume Electricity/Power Station energy use

Full-Build Greenhouse Gas Emissions, Mayo Unbound AUAR

Emission Factors and Conversions

Emission Sources and Conversion Factors	Data Source	Unit	kBtu	CO_2 (kg)	CH_4 (kg)	N_2O (kg)	GHG (kg)
Global Warming Potential (100-year data)	A, Table 11			1	25	298	
Emission Sources and Conversion Factors							
Xcel Energy, electricity:							
2018	B & A, Table 6 [1]	kWh	3.413	0.366	4.7E-05	6.8E-06	0.369
2020			3.413	0.271	4.7E-05	6.8E-06	0.272
2021			3.413	0.285	4.9E-05	6.8E-06	0.286
Natural gas	A	Therms	100.0				5.302
Gasoline	A	US gallon	125.0	8.78	0.01	0.02	8.81
E-10 gasoline [2]	Calculated	US gallon	120.9				8.51
E-85 gasoline	Calculated	US gallon	118.9				8.35
Diesel (distillate fuel oil #4)	A	US gallon	146.0	10.96	11.00	26.82	11.00
B-5 diesel [2]	Calculated	US gallon	142.9				10.74
Ethanol	A	US gallon	84.0	5.75	2.25	2.98	5.76
Aviation fuel	A	US gallon	135.0	10.15	10.25	23.84	10.18
Business travel and employee commute, passenger cars	D	Mile					0.44

Conversion Factors	Data Source	Number
Therms/kBtu	C	0.010
kWh/kBtu	C	0.293

	Date Sources	Link
A	"Emission Factors for Greenhouse Gas Inventories," USEPA, April 2022.	https://www.epa.gov/system/files/documents/2022-04/ghg_emission_factors_hub.pdf
B	Xcel emission factors for CO2 are for Xcel's wholly owned generating company, NSP. Report for 2022 is not yet available.	https://www.xcelenergy.com/staticfiles/xe-responsive/Environment/Carbon/Carbon-Emission-Intensities-Info-Sheet.pdf
C	Greenhouse Gases Equivalencies Calculator - Calculations and References, USEPA	https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references
D	GHG emissions equal 0.441 kg per vehicle mile travelled for passenger cars and other light-duty vehicles, which will be the dominant vehicle used. Source: Minnesota Infrastructure Carbon Estimator, Version 1.2,	https://www.dot.state.mn.us/sustainability/ghg-analysis.html

Notes:

1 Xcel provides CO_2 in tonnes/MWh. CH_4 and N_2O are from eGRID/MROW in lbs./kWh. CO_2e (aka GHG) is in kg/kWh. There are 0.4536 kg/lb. Source: https://www.epa.gov/egrid

2 Since 2003, the State of Minnesota requires gasoline and diesel fuels sold in the state be oxygenated by 10% and 5% ethanol respectively.

No-Build 2045 Greenhouse Gas Emissions, Mayo Unbound AUAR

Project Components

Use	Quantity	Units
Uses:		
Medical Office	-	sqft
Hospital*	95	beds
School	120,802	sqft
Electricity/Power Station	-	sqft

*See 'Waste Generation.' Assumes 2,500 sqft per bed (0.0004 beds per sqft).

No-Build 2045 Greenhouse Gas Emissions, Mayo Unbound AUAR

Emission Source	Scope*	Data Source Notes**	Amount	Units	Site Energy Use Index (kBtu/sq. ft.) [3]	Emission Factors	GHG (tonnes)	GHG (kg/sq. ft.)	Percent of Total GHG
Uses and project average daily vehicle miles traveled (ADVMT):									
Operational emissions, mobile equipment, after project is operational	1	2	14,331	ADVMT		0.44	2,311	6.46	32.6%
Combustion, stationary equipment, natural gas (therms/sq. ft./yr.):	1			therms					
Hospital		3	236,846	sq. ft.	157.9	1.58	1,982	8.37	
Medical Office		3	-	sq. ft.	34.8	0.35	-	-	
School		3	120,802	sq. ft.	25.9	0.26	166	1.37	
Electricity/Power Station		3	-	sq. ft.	15.5	0.16	-	-	
Subtotal			**357,648**	sq. ft.			**2,148**	**6.01**	30.3%
Combustion area (diesel, back-up generators, GHG kg/gal.)	1	1 & 2	**40**	gallons		10.74	**0.4**		0.0%
Off-site electricity, Xcel 2021 (GHG kg/sq. ft.)	2			kWh					
Hospital		3	236,846	sq. ft.	113.8	33.37	2,264	9.56	
Medical Office		3	-	sq. ft.	65.2	19.11	-	-	
School		3	120,802	sq. ft.	23.8	6.98	241	2.00	
Electricity/Power Station		3	-	sq. ft.	26.1	7.64	-	-	
Subtotal			**357,648**	sq. ft.			**2,505**	**7.01**	35.3%
Off-site waste management	3	2	**390**	tons of waste			**129**	**0.36**	1.8%
Total emissions (tonnes)							**7,094**	**19.8**	100%

***Scope:**

For an explanation of Emissions scopes, please reference the following:

•Scope 1: “Scope 1 emissions are direct greenhouse (GHG) emissions that occur from sources that are controlled or owned by an organization (e.g., emissions associated with fuel combustion in boilers, furnaces, vehicles).” (EPA, http://www.epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance)

•Scope 2: “Scope 2 emissions are indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling.” (EPA, http://www.epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance)

•Scope 3: “Scope 3 emissions are the result of activities from assets not owned or controlled by the reporting organization, but that the organization indirectly impacts in its value chain. Scope 3 emissions include all sources not within an organization’s scope 1 and 2 boundary. The scope 3 emissions for one organization are the scope 1 and 2 emissions of another organization. Scope 3 emissions, also referred to as value chain emissions, often represent the majority of an organization’s total GHG emissions.” (EPA: https://www.epa.gov/climateleadership/scope-3-inventory-guidance)

**** Data Source Notes:**

1 EPA Simplified GHG Emissions Calculator ("the Calculator"), https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

2 Refer to the sheet "Mobile Equipment." ADVMT = Average Daily Vehicle Miles Traveled.

3 Source (Zip Code: 55902): US EPA Energy Star Portfolio Manager Target Finder. Refer to Energy Finder sheet. https://www.energystar.gov/buildings/resources_audience/service_product_providers/commercial_new_construction/target_finder

No-Build 2045 Greenhouse Gas Emissions, Mayo Unbound AUAR

Waste Generation

Solid Waste Generation	Data Source	Amount	Units	Emission Factor (tonnes/ton)	Waste Amounts	Waste (kg per sq. ft. per yr.)
Uses:						
Hospital (kg @ 7.26 kg/bed/day)	7, 8	95	beds		251,219	1.1
Commercial (kg @ 0.993 kg/sq. ft./yr.)	8	-	sq. ft.		-	-
Offices (kg @ 0.848 kg/sq. ft./yr.)	2	120,802	sq. ft.		102,440	0.8
Subtotals (kg)		**357,648**	**sq. ft.**		**353,659**	**1.0**
Waste (tons)					**390**	
Landfilled waste, 1.8% (tons) and emission factor	4, 5, 6	7	tons	0.54	4	
Waste to energy, 61.9% (tons) and emission factor	4, 5, 6	241	tons	0.52	125	
Subtotal emissions (tonnes)					**129**	

Notes:

2 Source: Table 21, "Targeted Statewide Waste Characterization Study: Waste Disposal and Diversion Findings for Selected Industry Groups , 2006. https://www2.calrecycle.ca.gov/Publications/Details/1184

4 Source: "2022 SCORE REPORT," Olmsted County 2022 waste generation, MPCA Data Services, https://public.tableau.com/app/profile/mpca.data.services/viz/SCOREOverview/SCOREOverview

5 Source for emission factor for landfilled waste: "Documentation for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model (WARM), Organic Materials Chapters," Exhibit 1-10, U.S. Environmental Protection Agency Office of Resource Conservation and Recovery, February 2016. https://www.epa.gov/warm/documentation-chapters-greenhouse-gas-emission-energy-and-economic-factors-used-waste

6 Source for emissions from the Hennepin Energy Recovery Center: https://www.pca.state.mn.us/air/permitted-facility-air-emissions-data. Source for tons processed by the HERC: https://www.pca.state.mn.us/waste/report-2019-score-programs. Assume Olmsted County WTE has similar emission factor.

7 Source for estimate of gross square feet (GSF) per staffed hospital bed (2,500 GSF / bed): https://www.bdcnetwork.com/oversized-healthcare-how-did-we-get-here-and-how-do-we-right-size

8 Source for hospital waste generation per staffed bed (16 lb/bed/day = 7.26 kg/bed/day); Commercial (0.006 lb/sqft/day): https://www2.calrecycle.ca.gov/WasteCharacterization/General/Rates

No-Build 2045 Greenhouse Gas Emissions, Mayo Unbound AUAR

Backup Generator Fuel Consumption

Building	Size	Generator Size (kW) [1]	Diesel Consumption (gal.) [2]	GHG (kg)
All Uses (sq. ft.)	357,648	1,838	40	426
Total			**40**	**426**

Notes:

1 Backup generator: Assume 50 kW + 5 W per sq. ft. (source: https://woodstockpower.com/blog/how-to-size-a-generator-for-commercial-building/).

2 Diesel consumption per hour from chart below. Monthly testing for 30 minutes (source: https://www.health.state.mn.us/facilities/regulation/engineering/docs/lscgensets.pdf)

Generator Size	1/4 Load (gal/hr)	1/2 Load (gal/hr)	3/4 Load (gal/hr)	Full Load (gal/hr)
20	0.6	0.9	1.3	1.6
30	1.3	1.8	2.4	2.9
40	1.6	2.3	3.2	4.0
60	1.8	2.9	3.8	4.8
75	2.4	3.4	4.6	6.1
100	2.6	4.1	5.8	7.4
125	3.1	5.0	7.1	9.1
135	3.3	5.4	7.6	9.8
150	3.6	5.9	8.4	10.9
175	4.1	6.8	9.7	21.7
200	4.7	7.7	11.0	14.4
230	5.3	8.8	12.5	16.6
250	5.7	9.5	13.6	18.0
300	6.8	11.3	16.1	21.5
350	7.9	13.1	18.7	25.1
400	8.9	14.9	21.3	28.6
500	11.0	18.5	26.4	35.7
600	13.2	22.0	31.5	42.8
750	16.3	27.4	39.3	53.4
1000	21.6	36.4	52.1	71.1
1250	26.9	45.3	65.0	88.8
1500	32.2	54.3	77.8	106.5
1750	37.5	63.2	90.7	124.2
2000	42.8	72.2	103.5	141.9
2250	48.1	81.1	116.4	159.6

Source: https://www.uspeglobal.com/pages/resources

No-Build 2045 Greenhouse Gas Emissions, Mayo Unbound AUAR

Average daily vehicle miles traveled (ADVMT) in the vicinity of the site

Category	ADVMT	GHG (kg)
ADVMT	14,331	2,310,673

No-Build Conditions - ADVMT Calculation

Segment	Segment Length (ft)	Segment Length (mi)	Partitions	Direction	Daily Trips 1	Daily Trips 2	Daily Trips 3	Daily Trips 4	Daily Trips 5	Daily Trips 6	Daily Trips 7	Daily Trips 8	Daily Trips 9	ADVMT	ADVMT (total)
3RD STREET NW	720	0.136	4	Direction 1	1561	1765	3062	3363						332.4	819
				Direction 2	2414	2645	4463	4751						486.6	
2ND STREET NW	175	0.033	2	Direction 1	4606	4621								152.9	270
				Direction 2	3462	3574								116.6	
1ST STREET NW - WEST	375	0.071	2	Direction 1	2256	1941								149.0	292
				Direction 2	2044	1972								142.6	
1ST STREET NW - EAST	165	0.031	1	Direction 1	2239									70.0	138
				Direction 2	2180									68.1	
CENTER STREET W	1300	0.246	9	Direction 1	2773	2754	3509	3229	3174	2958	2987	5710	5773	899.1	1,655
				Direction 2	2477	2462	3339	3092	3032	3541	3554			756.1	
1ST STREET SW	1080	0.205	7	Direction 1	2068	2034	2059	2407	2159	2128	2056			435.7	974
				Direction 2	2471	2433	2388	2904	2652	2641	2934			538.3	
2ND STREET SW	980	0.186	5	Direction 1	2905	2136	5071	5551	5551					787.5	1,841
				Direction 2	5630	5238	5174	6169	6169					1053.5	
7TH AVENUE	700	0.133	3	Direction 1	2674	2674	2100							329.1	671
				Direction 2	2834	2837	2076							342.4	
6TH AVENUE	1030	0.195	5	Direction 1	2717	2575	2990	2946	3307					567.1	1,133
				Direction 2	2472	2502	2998	2996	3525					565.4	
4TH AVENUE	1950	0.369	9	Direction 1	7354	7358	10900	8487	8501	8451	8252	8625	10406	3214.5	3,214
3RD AVENUE	1950	0.369	8	Direction 1	6895	2830	7500	10427	10443	10491	13900	9485		3322.5	3,323
2ND AVENUE	200	0.038	1	Direction 1	17									0.6	2
				Direction 2	30									1.1	
														TOTAL	**14,331**

Full-Build Greenhouse Gas Emissions, Mayo Unbound AUAR

Project Components

Use	Quantity	Units
Uses:		
Medical Office	115,000	sqft
Hospital*	740	beds
School	-	sqft
Electricity/Power Station	5,000	sqft

*See 'Waste Generation.' Assumes 2,500 sqft per bed (0.0004 beds per sqft).

Full-Build Greenhouse Gas Emissions, Mayo Unbound AUAR

Emission Source	Scope*	Data Source Notes**	Amount	Units	Site Energy Use Index (kBtu/sq. ft.) [3]	Emission Factors	GHG (tonnes)	GHG (kg/sq. ft.)	Percent of Total GHG
Uses and project average daily vehicle miles traveled (ADVMT):									
Operational emissions, mobile equipment, after project is operational	1	2	11,932	ADVMT		0.44	1,924	0.98	5.2%
Combustion, stationary equipment, natural gas (therms/sq. ft./yr.):	1			therms					
Hospital		3	1,850,000	sq. ft.	157.9	1.58	15,484	8.37	
Medical Office		3	115,000	sq. ft.	34.8	0.35	212	1.85	
School		3	-	sq. ft.	25.9	0.26	-	-	
Electricity/Power Station		3	5,000	sq. ft.	15.5	0.16	4	0.82	
Subtotal			**1,970,000**	sq. ft.			**15,700**	**7.97**	42.8%
Combustion area (diesel, back-up generators, GHG kg/gal.)	1	1 & 2	**214**	gallons		10.74	**2**		0.0%
Off-site electricity, Xcel 2021 (GHG kg/sq. ft.)	2			kWh					
Hospital		3	1,850,000	sq. ft.	113.8	33.37	17,684	9.56	
Medical Office		3	115,000	sq. ft.	65.2	19.11	630	5.47	
School		3	-	sq. ft.	23.8	6.98	-	-	
Electricity/Power Station		3	5,000	sq. ft.	26.1	7.64	11	2.19	
Subtotal			**1,970,000**	sq. ft.			**18,324**	**9.30**	49.9%
Off-site waste management	3	2	**2,289**	tons of waste			**759**	**0.39**	2.1%
Total emissions (tonnes)							**36,709**	**18.6**	100%

***Scope:**

For an explanation of Emissions scopes, please reference the following:

•Scope 1: “Scope 1 emissions are direct greenhouse (GHG) emissions that occur from sources that are controlled or owned by an organization (e.g., emissions associated with fuel combustion in boilers, furnaces, vehicles).” (EPA, http://www.epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance)

•Scope 2: “Scope 2 emissions are indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling.” (EPA, http://www.epa.gov/climateleadership/scope-1-and-scope-2-inventory-guidance)

•Scope 3: “Scope 3 emissions are the result of activities from assets not owned or controlled by the reporting organization, but that the organization indirectly impacts in its value chain. Scope 3 emissions include all sources not within an organization’s scope 1 and 2 boundary. The scope 3 emissions for one organization are the scope 1 and 2 emissions of another organization. Scope 3 emissions, also referred to as value chain emissions, often represent the majority of an organization’s total GHG emissions.” (EPA: https://www.epa.gov/climateleadership/scope-3-inventory-guidance)

**** Data Source Notes:**

1 EPA Simplified GHG Emissions Calculator ("the Calculator"), https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

2 Refer to the sheet "Mobile Equipment." ADVMT = Average Daily Vehicle Miles Traveled.

3 Source (Zip Code: 55902): US EPA Energy Star Portfolio Manager Target Finder. Refer to Energy Finder sheet. https://www.energystar.gov/buildings/resources_audience/service_product_providers/commercial_new_construction/target_finder

Full-Build Greenhouse Gas Emissions, Mayo Unbound AUAR

Waste Generation

Solid Waste Generation	Data Source	Amount	Units	Emission Factor (tonnes/ton)	Waste Amounts	Waste (kg per sq. ft. per yr.)
Uses:						
Hospital (kg @ 7.26 kg/bed/day)	7, 8	740	beds		1,962,269	1.1
Commercial (kg @ 0.993 kg/sq. ft./yr.)	8	115,000	sq. ft.		114,195	1.0
Offices (kg @ 0.848 kg/sq. ft./yr.)	2	-	sq. ft.		-	-
Subtotals (kg)		**1,965,000**	**sq. ft.**		**2,076,464**	**1.1**
Waste (tons)					**2,289**	
Landfilled waste, 1.8% (tons) and emission factor	4, 5, 6	41		0.54	22	
Waste to energy, 61.9% (tons) and emission factor	4, 5, 6	1,417		0.52	737	
Subtotal emissions (tonnes)					**759**	
Notes:						

2 Source: Table 21, "Targeted Statewide Waste Characterization Study: Waste Disposal and Diversion Findings for Selected Industry Groups , 2006. https://www2.calrecycle.ca.gov/Publications/Details/1184

4 Source: "2022 SCORE REPORT," Olmsted County 2022 waste generation, MPCA Data Services, https://public.tableau.com/app/profile/mpca.data.services/viz/SCOREOverview/SCOREOverview

5 Source for emission factor for landfilled waste: "Documentation for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model (WARM), Organic Materials Chapters," Exhibit 1-10, U.S. Environmental Protection Agency Office of Resource Conservation and Recovery, February 2016. https://www.epa.gov/warm/documentation-chapters-greenhouse-gas-emission-energy-and-economic-factors-used-waste

6 Source for emissions from the Hennepin Energy Recovery Center: https://www.pca.state.mn.us/air/permitted-facility-air-emissions-data. Source for tons processed by the HERC: https://www.pca.state.mn.us/waste/report-2019-score-programs. Assume Olmsted County WTE has similar emission factor.

7 Source for estimate of gross square feet (GSF) per staffed hospital bed (2,500 GSF / bed): https://www.bdcnetwork.com/oversized-healthcare-how-did-we-get-here-and-how-do-we-right-size

8 Source for hospital waste generation per staffed bed (16 lb/bed/day = 7.26 kg/bed/day); Commercial (0.006 lb/sqft/day): https://www2.calrecycle.ca.gov/WasteCharacterization/General/Rates

Full-Build Greenhouse Gas Emissions, Mayo Unbound AUAR

Backup Generator Fuel Consumption

Building	Size	Generator Size (kW) [1]	Diesel Consumption (gal.) [2]	GHG (kg)
All Uses (sq. ft.)	1,970,000	9,900	214	2,296
Total			**214**	**2,296**

Notes:

1 Backup generator: Assume 50 kW + 5 W per sq. ft. (source: https://woodstockpower.com/blog/how-to-size-a-generator-for-commercial-building/).

2 Diesel consumption per hour from chart below. Monthly testing for 30 minutes (source: https://www.health.state.mn.us/facilities/regulation/engineering/docs/lscgensets.pdf)

Generator Size	1/4 Load (gal/hr)	1/2 Load (gal/hr)	3/4 Load (gal/hr)	Full Load (gal/hr)
20	0.6	0.9	1.3	1.6
30	1.3	1.8	2.4	2.9
40	1.6	2.3	3.2	4.0
60	1.8	2.9	3.8	4.8
75	2.4	3.4	4.6	6.1
100	2.6	4.1	5.8	7.4
125	3.1	5.0	7.1	9.1
135	3.3	5.4	7.6	9.8
150	3.6	5.9	8.4	10.9
175	4.1	6.8	9.7	21.7
200	4.7	7.7	11.0	14.4
230	5.3	8.8	12.5	16.6
250	5.7	9.5	13.6	18.0
300	6.8	11.3	16.1	21.5
350	7.9	13.1	18.7	25.1
400	8.9	14.9	21.3	28.6
500	11.0	18.5	26.4	35.7
600	13.2	22.0	31.5	42.8
750	16.3	27.4	39.3	53.4
1000	21.6	36.4	52.1	71.1
1250	26.9	45.3	65.0	88.8
1500	32.2	54.3	77.8	106.5
1750	37.5	63.2	90.7	124.2
2000	42.8	72.2	103.5	141.9
2250	48.1	81.1	116.4	159.6

Source: https://www.uspeglobal.com/pages/resources

Full-Build Greenhouse Gas Emissions, Mayo Unbound AUAR

Average daily vehicle miles traveled (ADVMT) in the vicinity of the site

Category	ADVMT	GHG (kg)
ADVMT	11,932	1,923,867

Full-Build Conditions - ADVMT Calculation

Segment	Segment Length (ft)	Segment Length (mi)	Partitions	Direction	Daily Trips 1	Daily Trips 2	Daily Trips 3	Daily Trips 4	Daily Trips 5	Daily Trips 6	Daily Trips 7	Daily Trips 8	Daily Trips 9	ADVMT	ADVMT (total)
3RD STREET NW	720	0.136	4	Direction 1	1630	1863	2729	3038						315.7	756
				Direction 2	2279	2545	3895	4184						439.9	
2ND STREET NW	175	0.033	2	Direction 1	4043	4081								134.6	259
				Direction 2	3666	3834								124.3	
1ST STREET NW - WEST	375	0.071	2	Direction 1	2204	1895								145.6	293
				Direction 2	2112	2047								147.7	
1ST STREET NW - EAST	165	0.031	1	Direction 1	1437									44.9	127
				Direction 2	2628									82.1	
CENTER STREET W	1300	0.246	9	Direction 1	2634	2622	3958	3787	3726	3325	3185	3576	3617	832.5	1,704
				Direction 2	2747	2743	4186	4027	3959	3524	3554	3537	3575	871.4	
1ST STREET SW	400	0.076	3	Direction 1	1565	1550	1488							116.2	238
				Direction 2	1606	1590	1613							121.4	
2ND STREET SW	980	0.186	5	Direction 1	7736	7736	7530	6549	6549					1340.1	2,686
				Direction 2	7940	7158	6972	7095	7095					1346.0	
7TH AVENUE	700	0.133	3	Direction 1	2735	3565	3565							436.0	860
				Direction 2	2399	3571	3626							424.1	
6TH AVENUE	1030	0.195	5	Direction 1	3283	3065	3837	3837	4495					722.4	1,452
				Direction 2	3046	3101	4031	3988	4524					729.2	
4TH AVENUE	1300	0.246	6	Direction 1	10118	8127	7702	7734	6874	6744				1940.9	1,941
3RD AVENUE	1300	0.246	6	Direction 1	6375	2484	6730	8277	8341	7146				1614.9	1,615
2ND AVENUE	200	0.038	1	Direction 1	32									1.2	2
				Direction 2	15									0.6	
														TOTAL	**11,932**

APPENDIX D

Traffic Studies

ROCHESTER PUBLIC WORKS
City of Rochester
Development Services and Infrastructure Center
4001 West River Parkway NW, STE 100
Rochester, MN 55901-7090
Phone: 507-328-2400
Fax: 507-328-2401

May 3, 2024

Public Works has reviewed the following traffic study, submitted in April 2024 for the interim scenarios to accommodate a change in drop off at the Gonda Building during construction of the Bold Forward Unbound project. The analysis and findings are acceptable, with the following exceptions:

- Public Works continues to have concerns with the discontinuity of the network of protected bicycle facilities into and through downtown. The proposed alternatives have severed the existing routes resulting in shared facilities with vehicular traffic, some of which are on private property and pedestrian plaza areas. City ordinance restricts bicycles from being ridden on sidewalks in the downtown business district, as defined in ordinance 11-3-2. Additional consideration needs to be given to maintaining the integrity of the bicycle facility network, including the identification of a new alignment for protected bike facilities and the potential construction of dedicated facilities along the selected route.

With the findings of the traffic study, the following conditions will be required for approval of the traffic study, and obligations for improvements shall be memorialized in an executed development agreement:

- Mayo Clinic and the City of Rochester must work together to identify a new route(s) to restore the protected bicycle network into and through downtown. This relates to the impacts to the existing bike facilities on West Center Street, 3rd Ave NW/SW, and 4th Ave NW/SW.
- An Intersection Control Evaluation (ICE) Report shall be completed for the intersection of West Center St and 6th Ave NW/SW, with the agreed upon mitigation constructed prior to the permanent closures of 3rd Ave SW and 4th Ave SW. The ICE Report shall study, at a minimum, both a traffic signal with the necessary turn lanes, and a mini-roundabout.
- The traffic signal at 2nd St SW and 2nd Ave SW shall be modified to include signal indications for the new southbound approach to the intersection. The traffic signal shall be modified again after completion of the interim scenarios for the final project.
- The coordinated traffic signal timings along the 2nd St SW corridor shall be updated to accommodate the signal modifications at 2nd Ave SW, and to enhance the operations of the signal at 6th Ave SW. Traffic signal timings upstream and downstream along 2nd St SW may also need to be adjusted to accommodate the change in traffic flows.
- Traffic signal timings at the intersections of West Center St with 3rd Ave NW/SW and 4th Ave NW/SW shall be updated to accommodate the change in traffic patterns.

- Pavement markings shall be modified on West Center St from west of 4th Ave SW to the east through the intersection with 3rd Ave SW to remove the parking lane, add a dedicated eastbound through lane at 4th Ave SW, add a dedicated eastbound left-turn lane at 3rd Ave SW, and move the bike lane to the curb between 3rd Ave SW and 4th Ave SW. The pavement markings shall be modified again after completion of the interim scenarios for the final project.



Dillon Dombrovski, PE

Deputy Public Works Director / City Engineer
City of Rochester, Minnesota

MAYO CLINIC

Bold. Forward.
Unbound. in Rochester

Traffic & Circulation Report

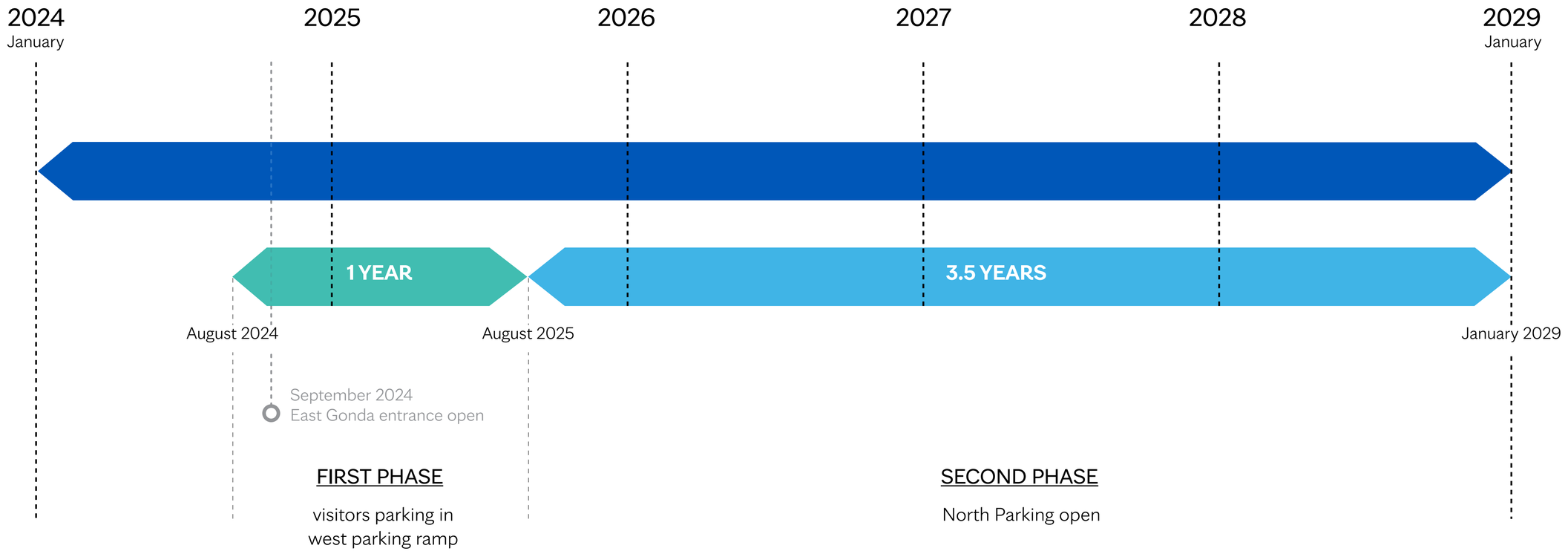
MIC HUB

November 2023

Description of Interim Scenarios

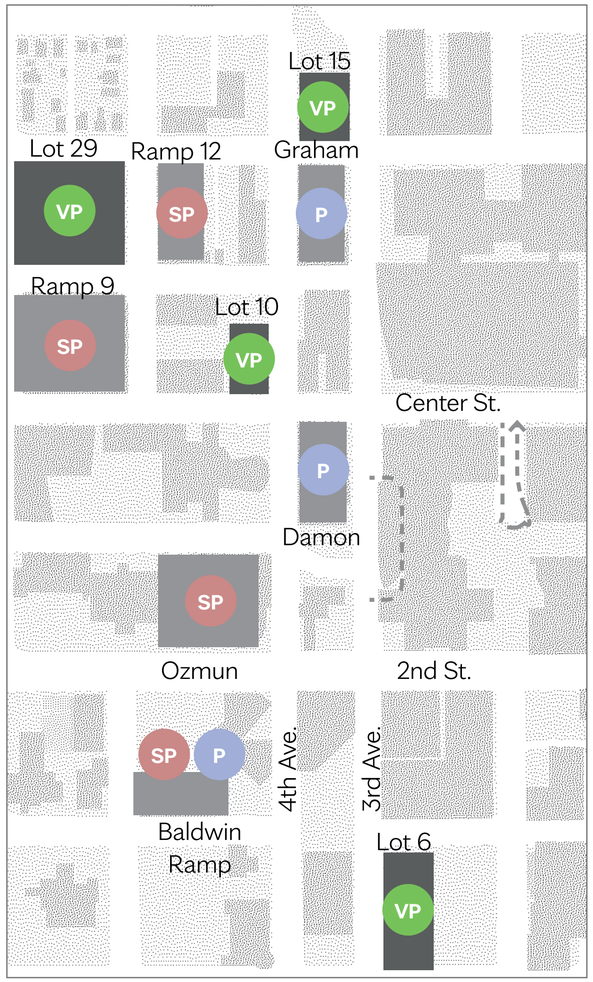
Introduction

The Bold Forward Unbound in Rochester project looks at developing new Hospital and clinic buildings in two phases. The first phase starts in August 2024 and lasts a year. The second phase envisages following 3.5 years to conclude the project on January 2029.

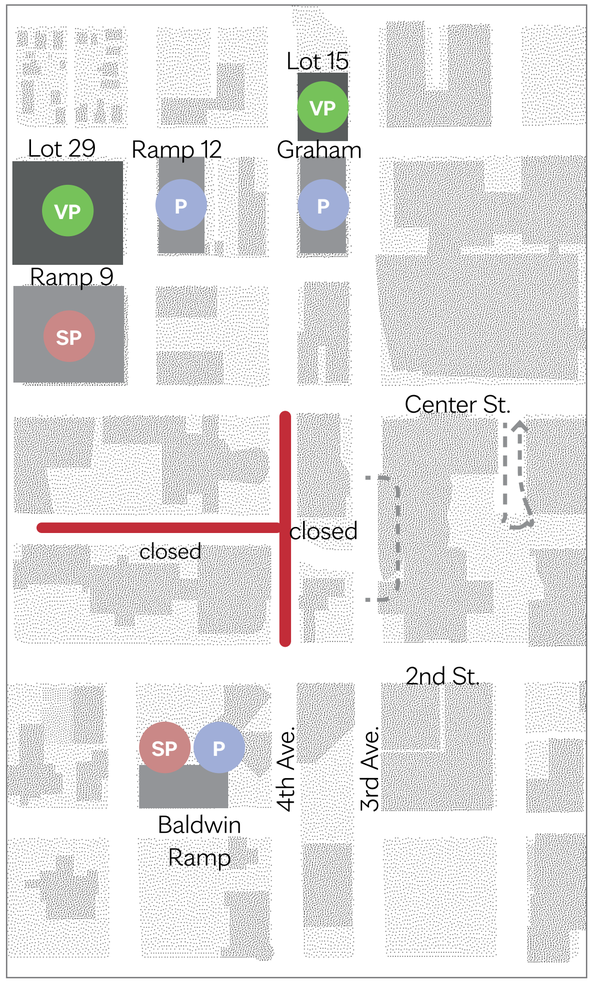


Parking Overview

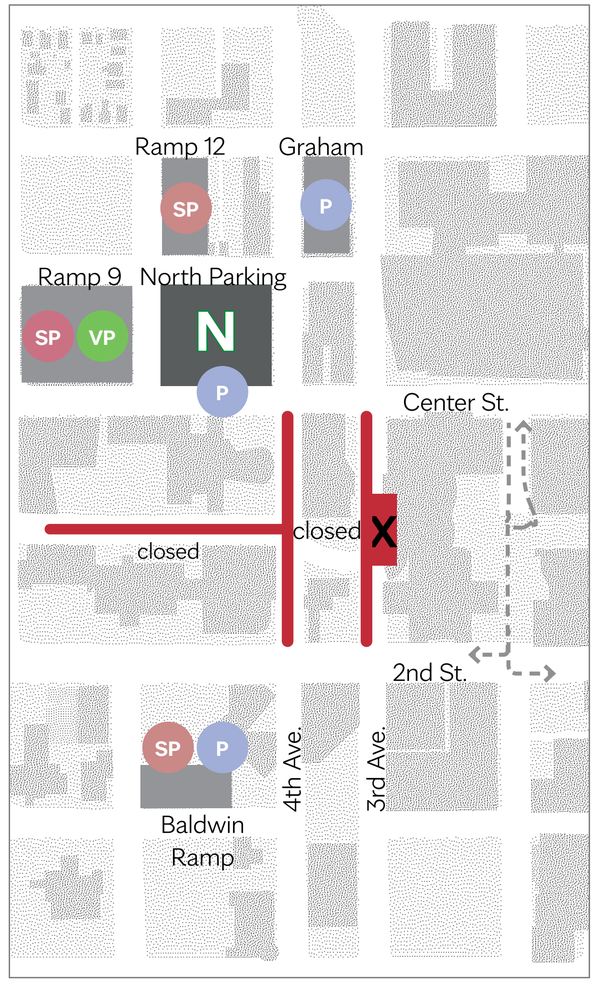
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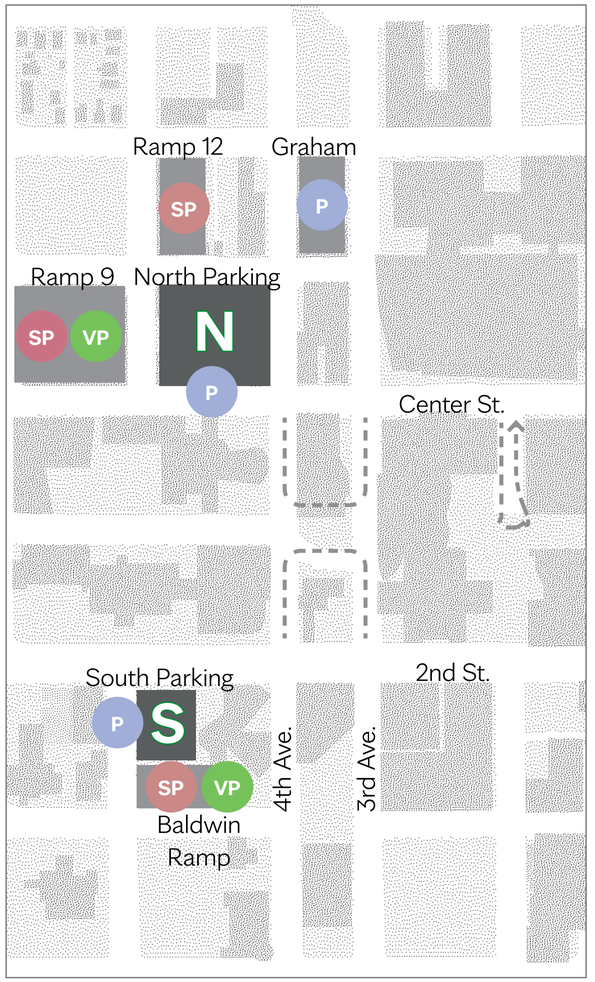
INTERIM PHASE 1 (2024-2025)



INTERIM PHASE 2 (2025-2029)



PROJECT (2045)



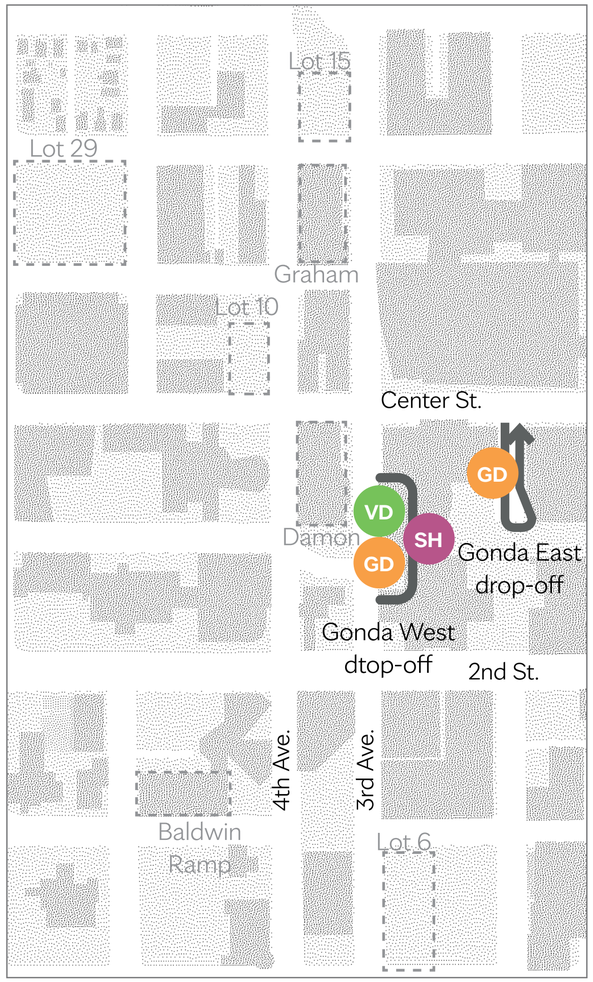
VP - Valet Parking
SP - Staff Parking
P - Visitor Parking

Visitors Car Parking Spaces (CPS):
Damon (demolished) 770 cps
Graham (existing) 926 cps

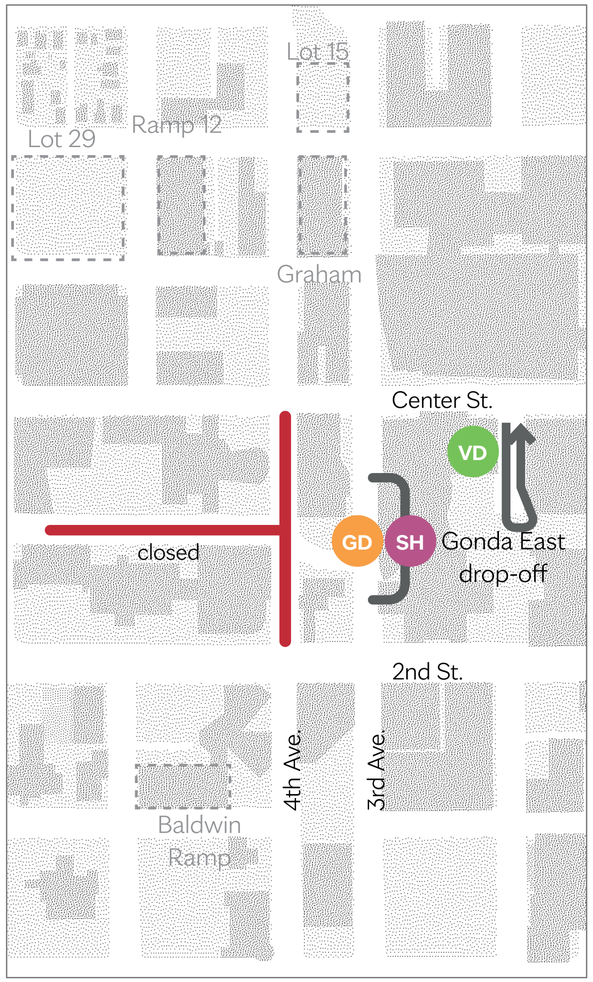
Baldwin (existing): 150 cps
North Parking (new): 800 cps
South Parking (new): 500 cps

Drop-off Overview

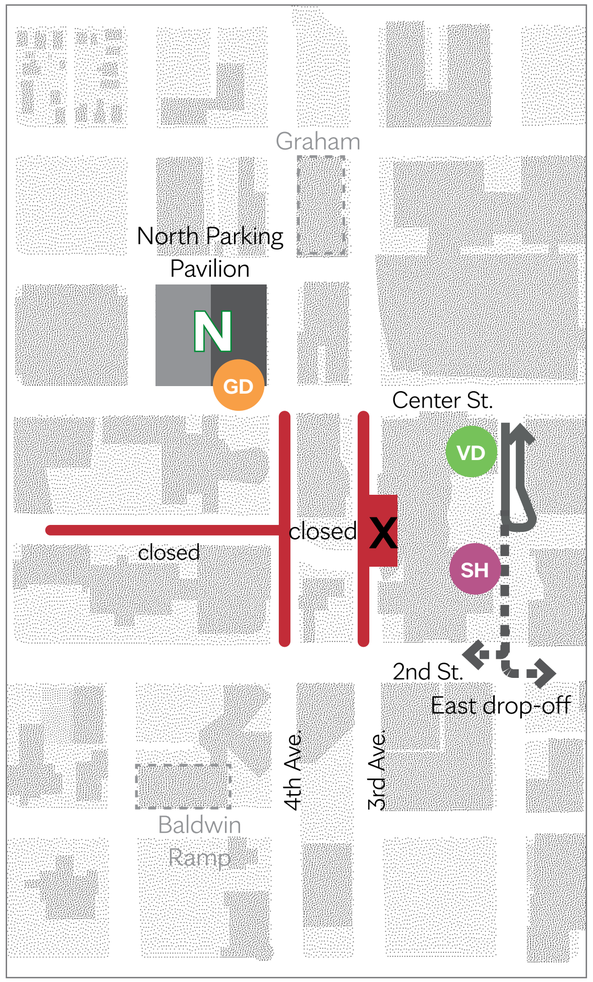
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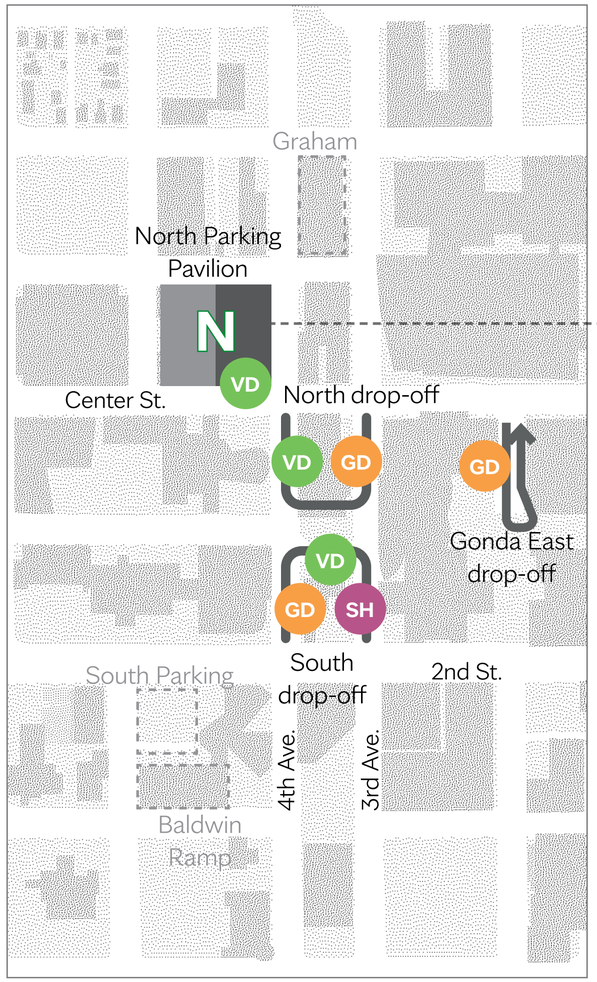
INTERIM PHASE 1 (2024-2025)



INTERIM PHASE 2 (2025-2029)



PROJECT (2045)

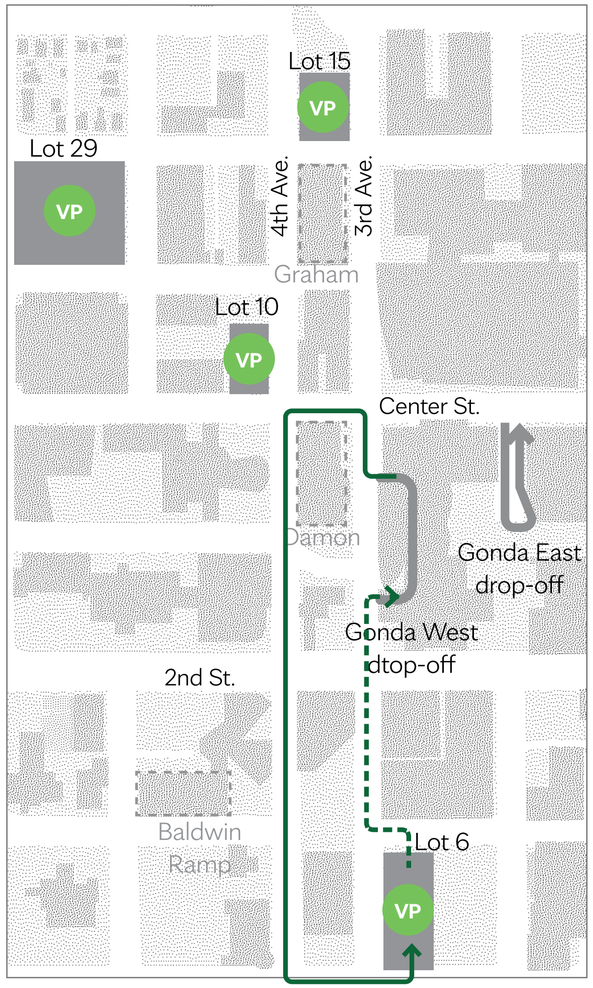


VD - Valet Drop-off
SH - Shuttle
GD - General Dropoff

The new north parking garage will also include a new drop-off point that will be directly connected via subway with the Clinic buildings: the North Pavilion

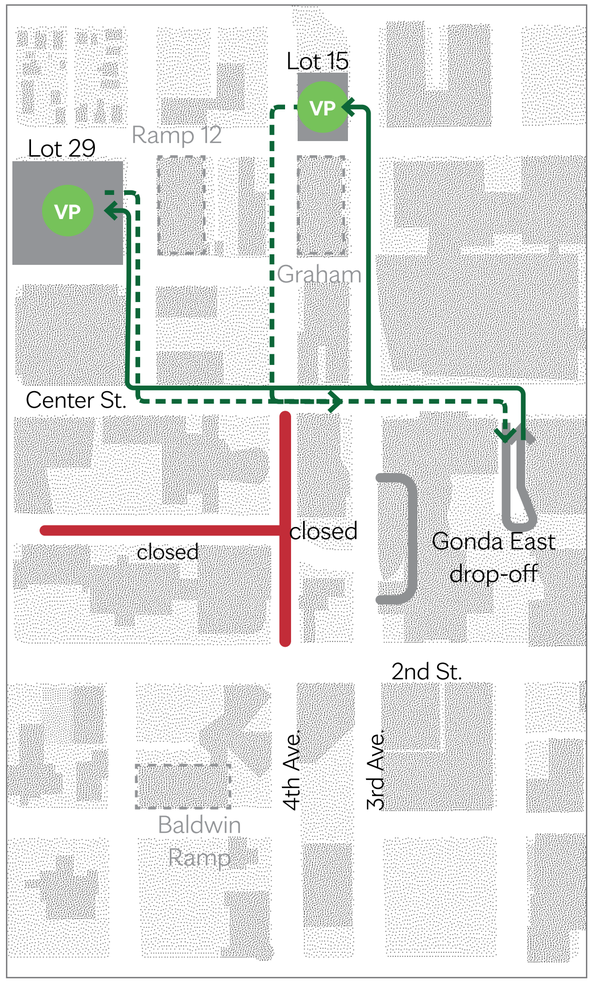
Valet Circulation

EXISTING



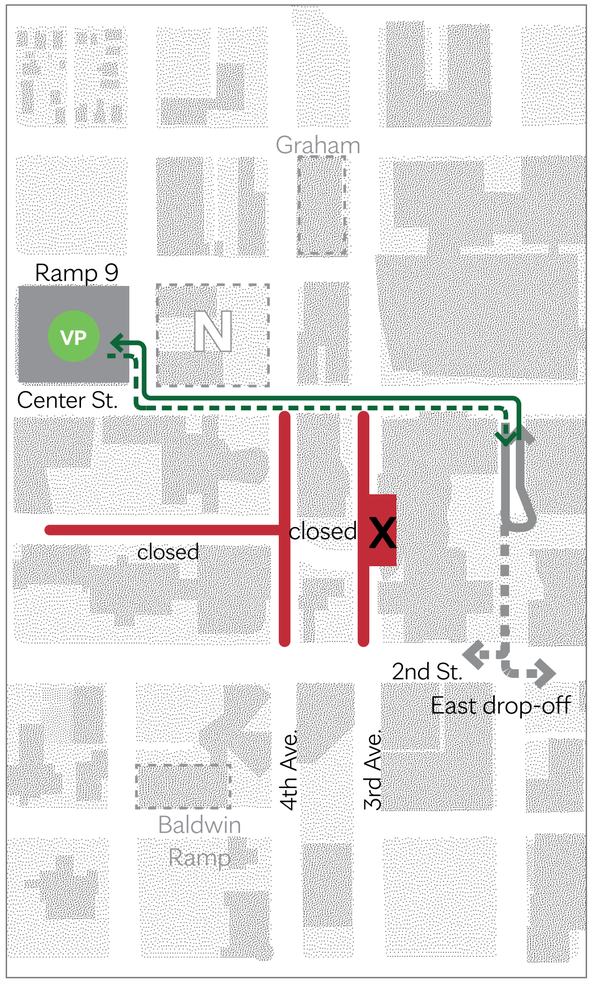
VP - Valet Parking
P - Visitor Parking

INTERIM PHASE 1 (2024-2025)



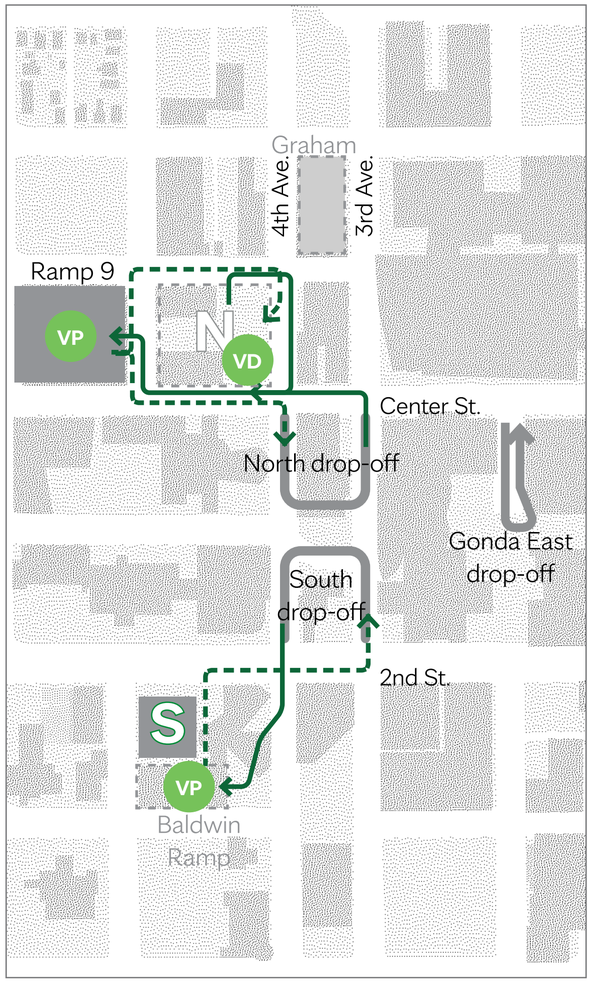
If there is no North pavilion, valet service (drop-off and pick-up) should occur in the East drop-off.

INTERIM PHASE 2 (2025-2029)



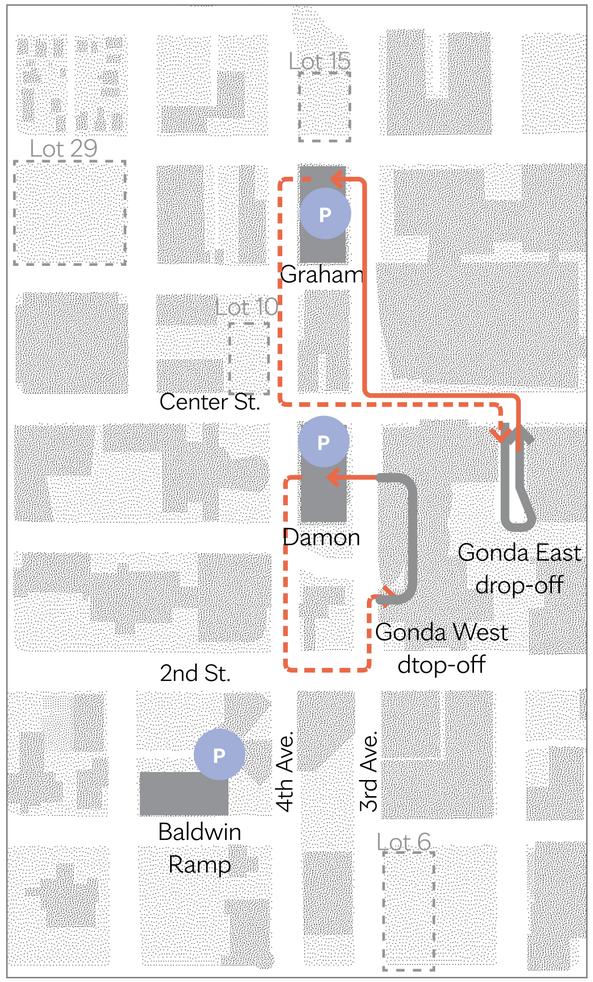
All the valet drop-off and parking will occur at the North parking pavilion. The New East entrance will be for taxis, shuttles, and general drop-off users.

PROJECT (2045)

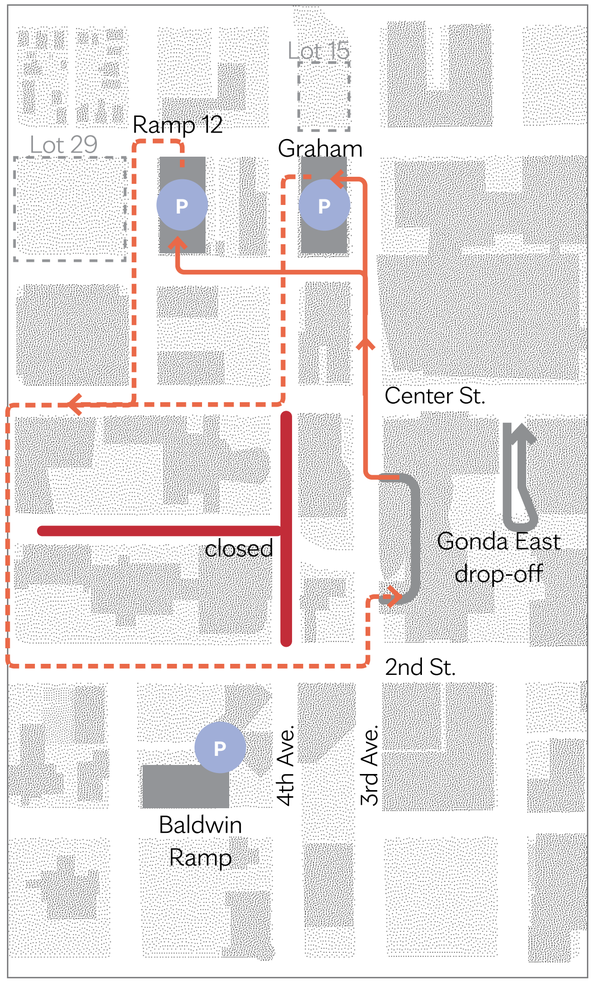


General drop-off Circulation

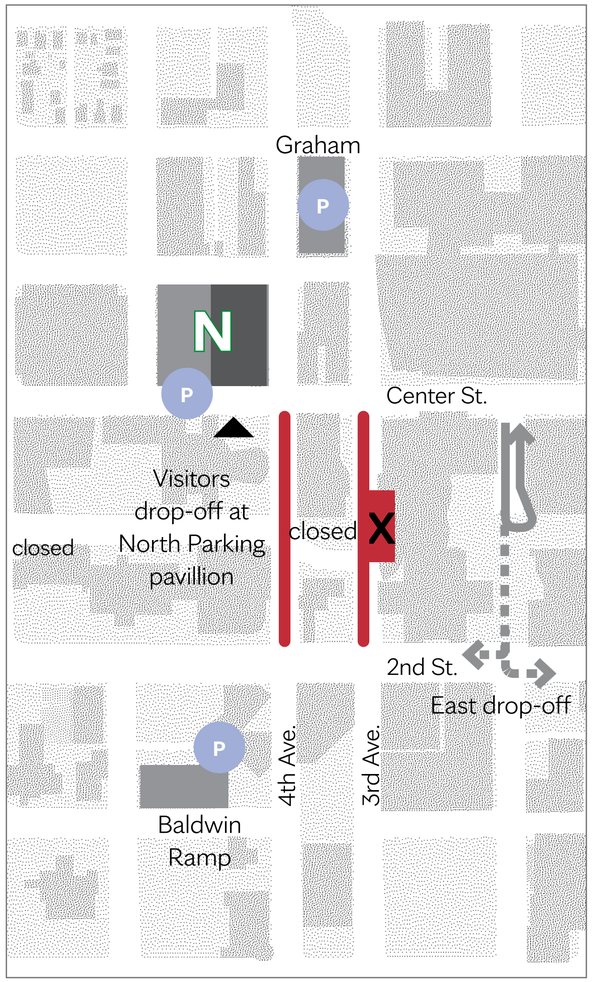
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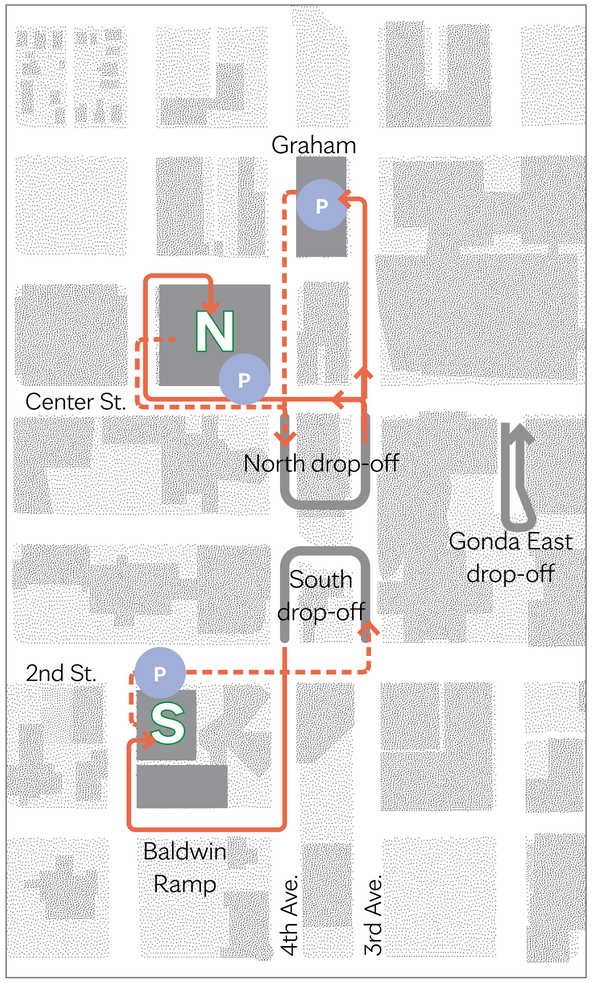
INTERIM PHASE 1 (2024-2025)



INTERIM PHASE 2 (2025-2029)



PROJECT (2045)



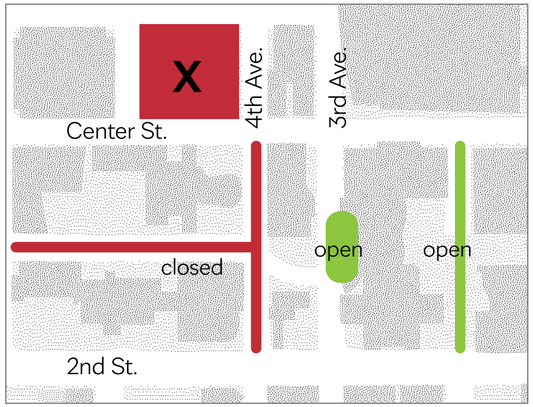
VP - Valet Parking
P - Visitor Parking

Disclaimer

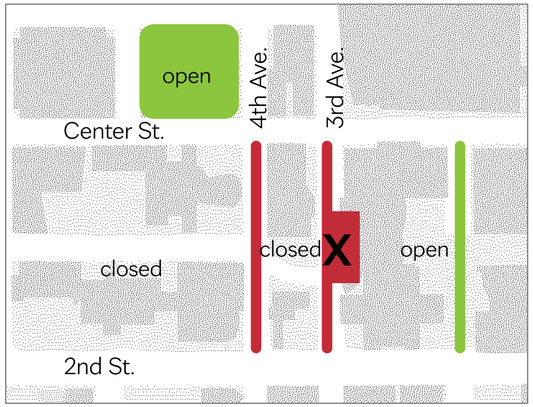
!!!

ACTUAL INTERIM SCENARIOS

INTERIM PHASE 1 (2024-2025)



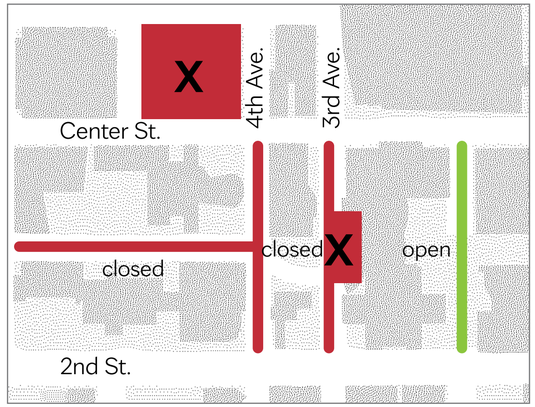
INTERIM PHASE 2 (2025-2029)



!!!

SIMULATED INTERIM SCENARIO

! From this point of the report we will analyze the worst-case condition in which both North Pavillion and West drop-off are closed simultaneously. As shown in previous phasing pages this will not occur, but to stay conservative, traffic analyzes were conducted following this worst-case condition. this condition will create more pressure on Center Street intersections which are the most critical points.

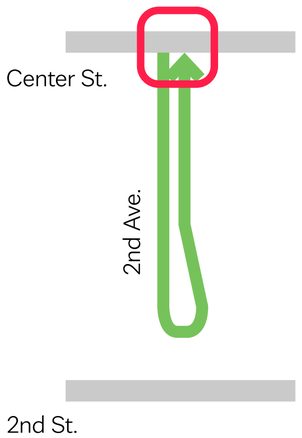


East Drop-off and North Pavilion - Valet

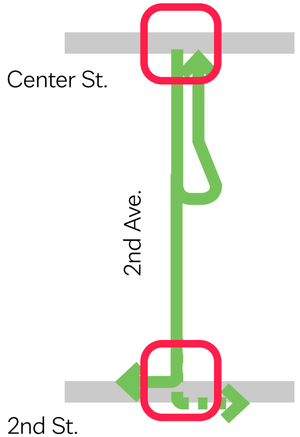
The two interim phases will be evaluated following the three drop-off options below.

Each interim phase and option will be analyzed from the point of view of VALET and GENERAL DROP-OFF user

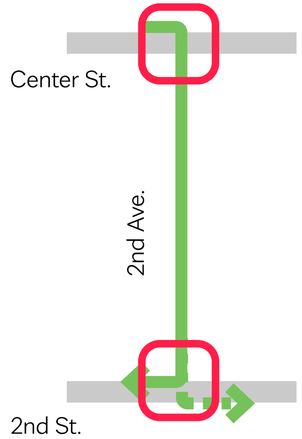
OPTION 1 - Enlarged/Extended roundabout (no connection with 2nd Street)



OPTION 2 - U-turn with one-way connection to 2nd Street

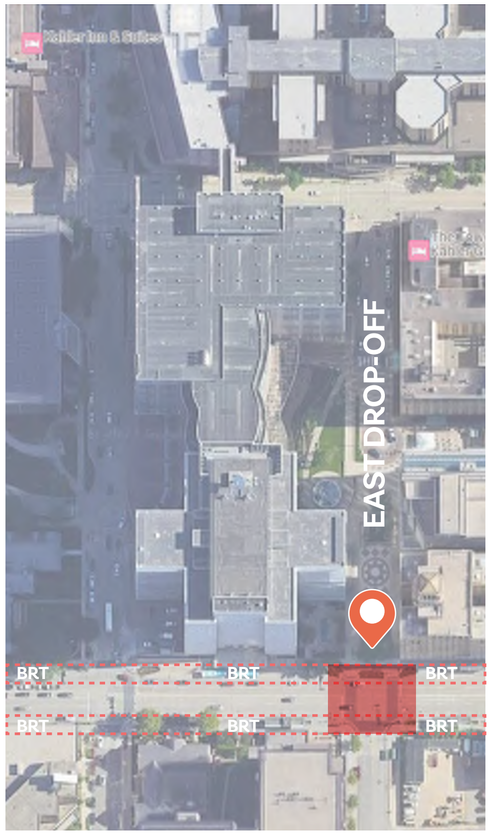


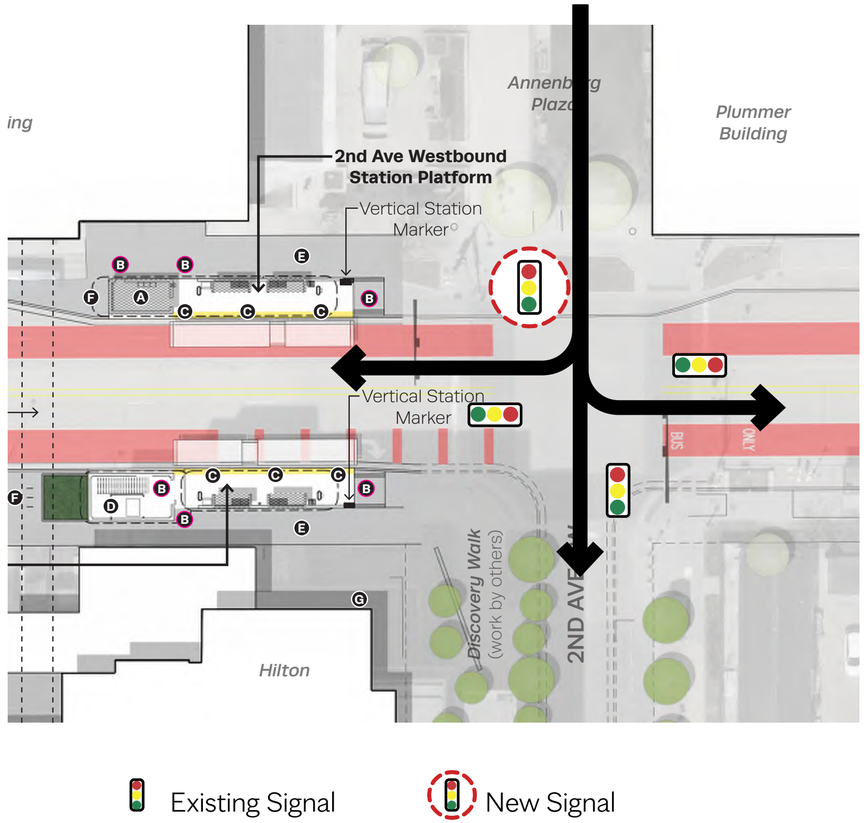
OPTION 3 - One-way connection to 2nd Street (no u-turn)



The New Intersection Configuration

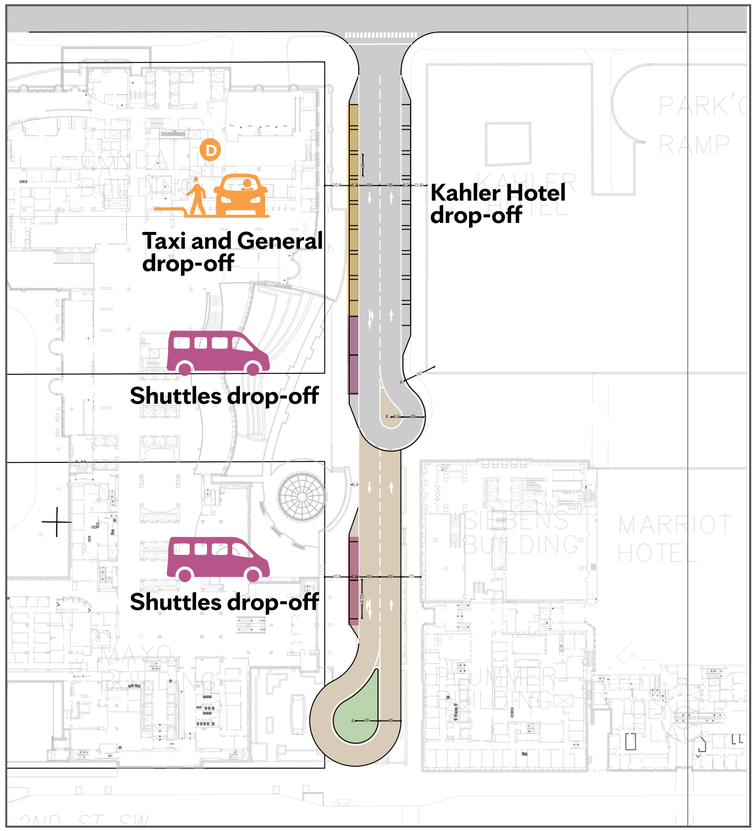
The new intersection configuration aligns with the BRT project proposal, giving enough roomto maintain bus operations unaltered.
A new signal is required to accommodate straight and left movements. This provides maximum flexibility in terms of flows distribution, but appropriate queuing space needs to be provided at the drop-off at the signal.





East Gonda Drop-off Options Capacity - Interim Phase 2

OPTION 1

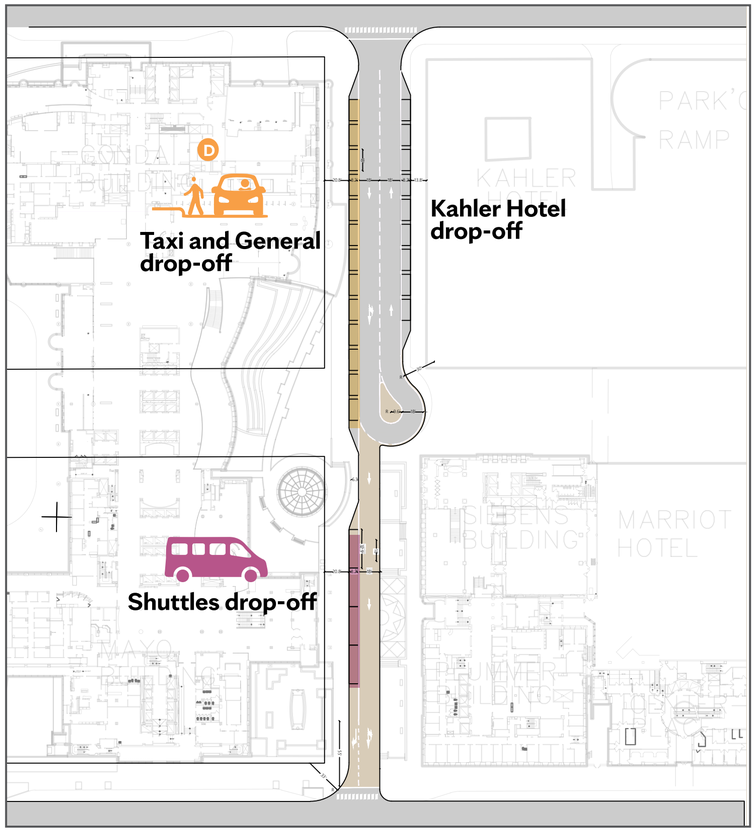


Capacity

General drop-off **8 bays**

Shuttle drop-off **4 bays**

OPTION 2

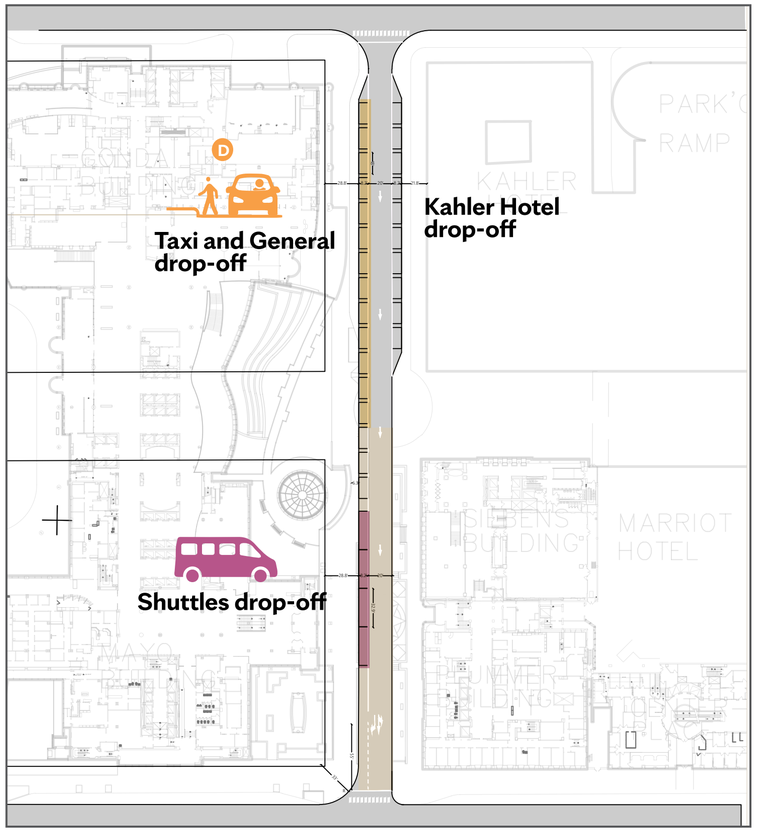


Capacity

General drop-off **13 bays**

Shuttle drop-off **4 bays**

OPTION 3



Capacity

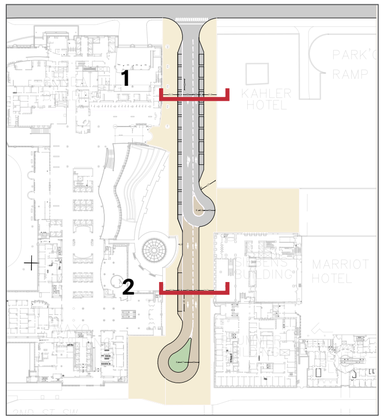
General drop-off **16 bays**

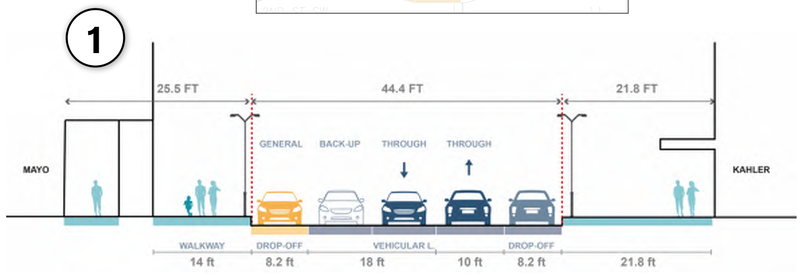
Shuttle drop-off **4 bays**

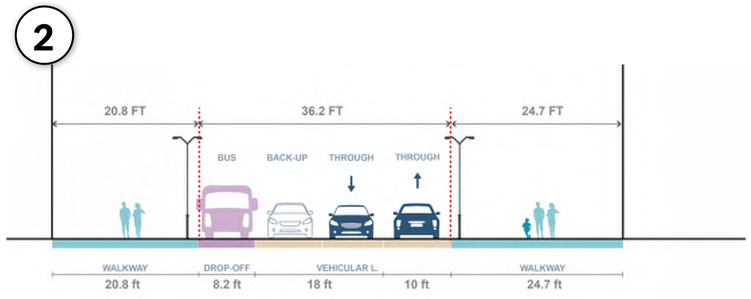
Cross Sections

More flexibility and capacity can be provided by designing wider lanes: in the existing West Gonda drop-off the three lanes are wide enough to fit a 4th lane during peaks. **This shouldn't be the common practice or encouraged**, however it could be a back-up option in case there is no space in the drop-off lane: cars can temporarily stop without preventing traffic to go through.

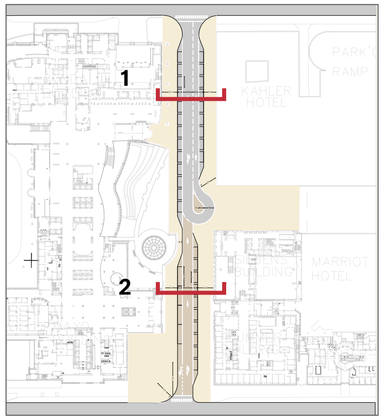
OPTION 1

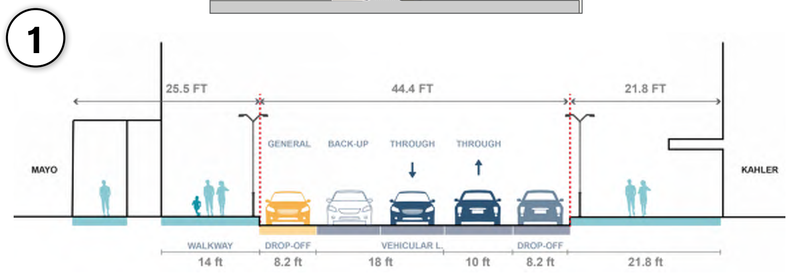


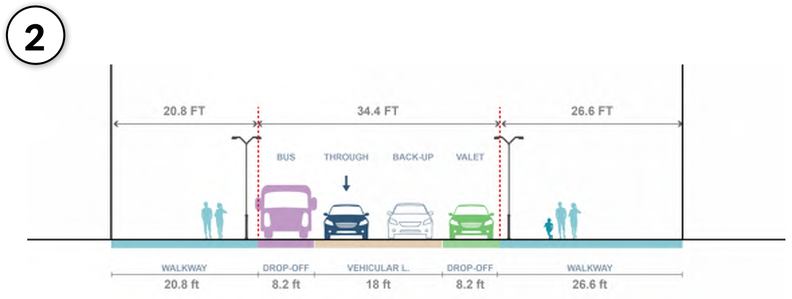




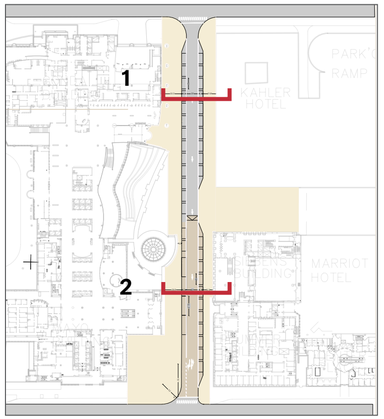
OPTION 2

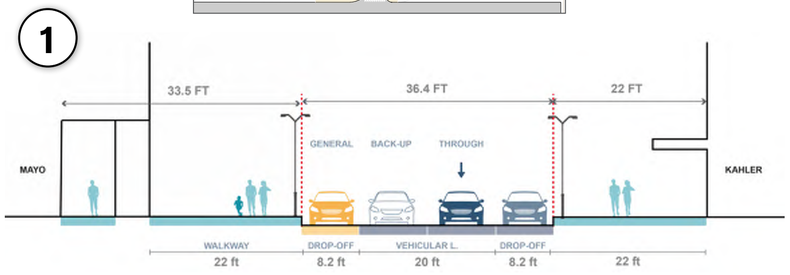


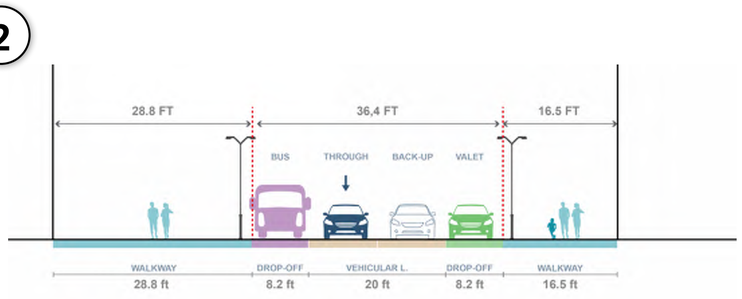




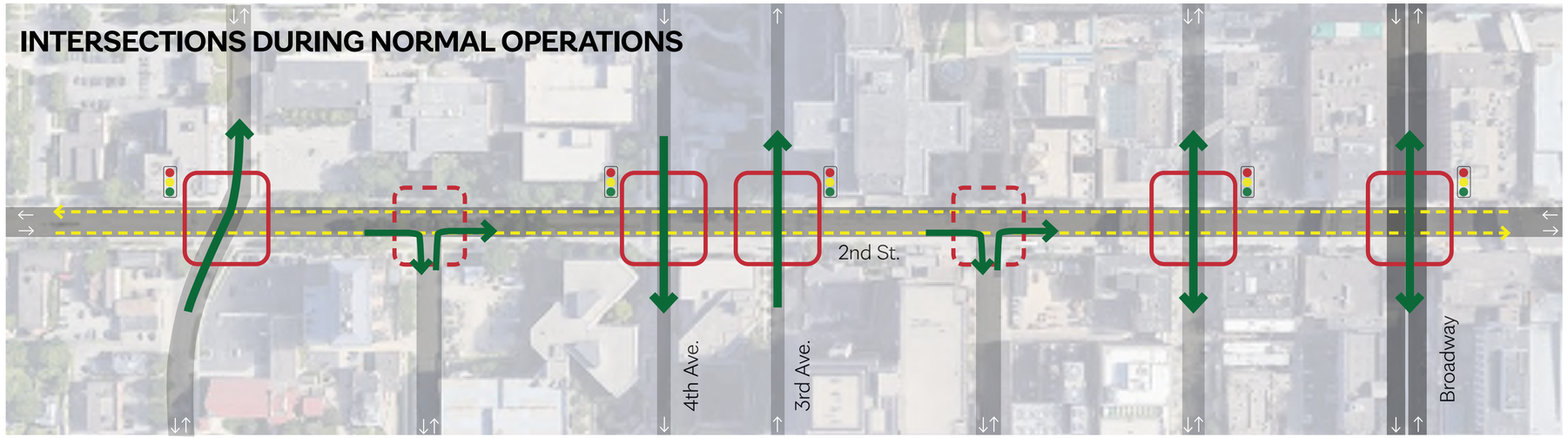
OPTION 3

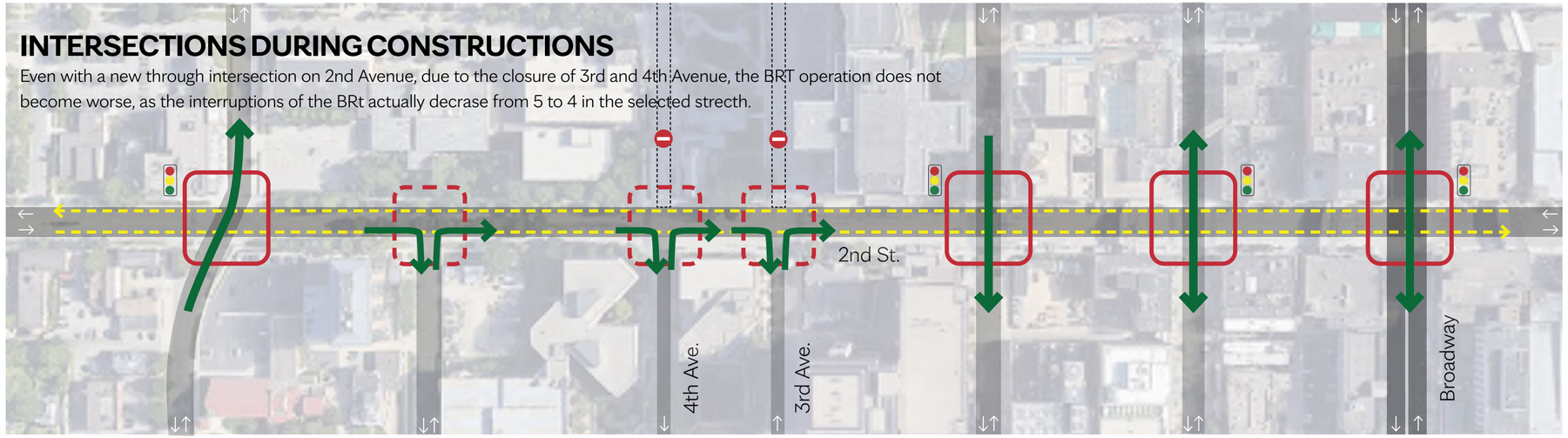


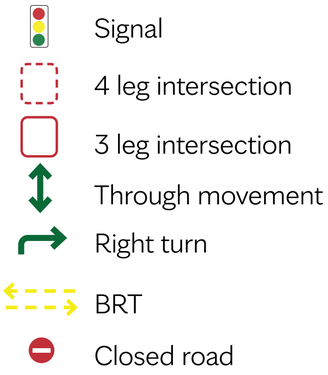




The BRT Operation during construction





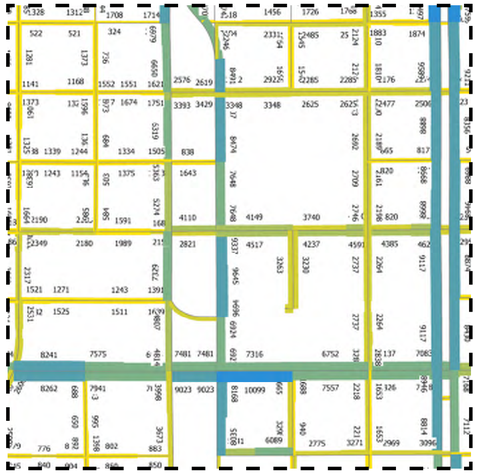


Even with the addition of a new intersection to the BRT operation area, given the fact that 3rd and 4th Ave will be closed during the construction, and the possibility of giving back Ananberg Plaza to its previous function after the project is completed, the overall impact on BRT operation will be minor.

Macro Simulations - Cube

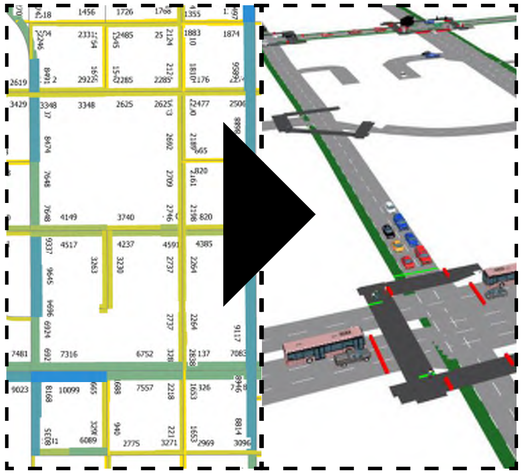
Methodology Introduction

The next pages illustrate the traffic simulations conducted on the three layout options for the interim scenarios. Two traffic models were developed to provide traffic assessments both at the urban scale and at the campus scale. The macro-scale simulations are based on the ROCOG traffic model (Cube Voyager), while the micro-scale simulations are performed with a model specifically created for the Unbound project and based on the traffic survey campaign carried out in 2022 (PTV Vissim).
The results of the macro-scale model are used to determine the redistribution of traffic flows determined by the changes in the road network foreseen by the project. The micro-scale traffic patterns are consequently re-distributed based on the outcomes of the Cube-model scenarios.



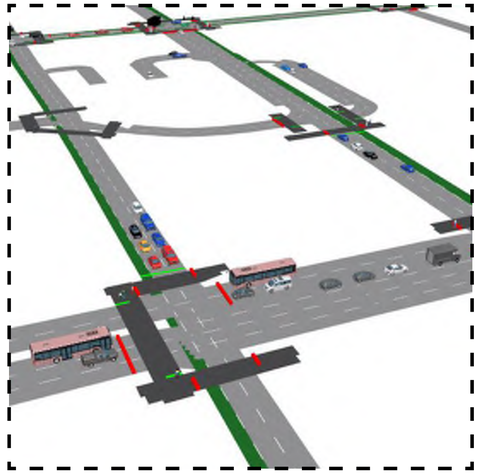
MACRO MODELLING

Creation of macro-scale scenarios to be used as inputs for micro-simulations, and also to test different configurations of the East drop-off and its impact on the city scale.



MACRO-TO-MICRO PROCESS

Export of macro-model matrices to be implemented into the micro-model

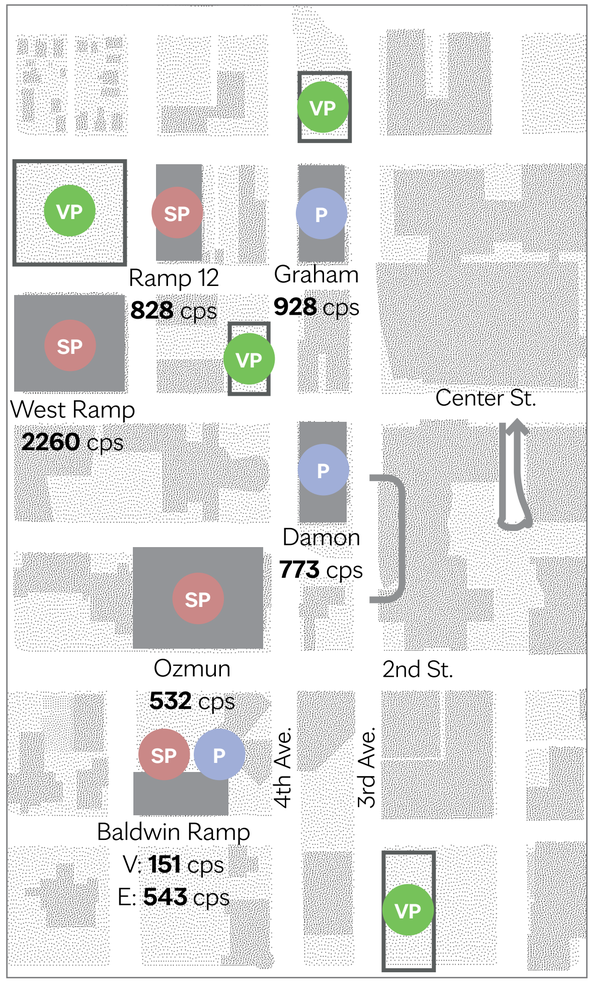


MICRO MODELLING (VISSIM)

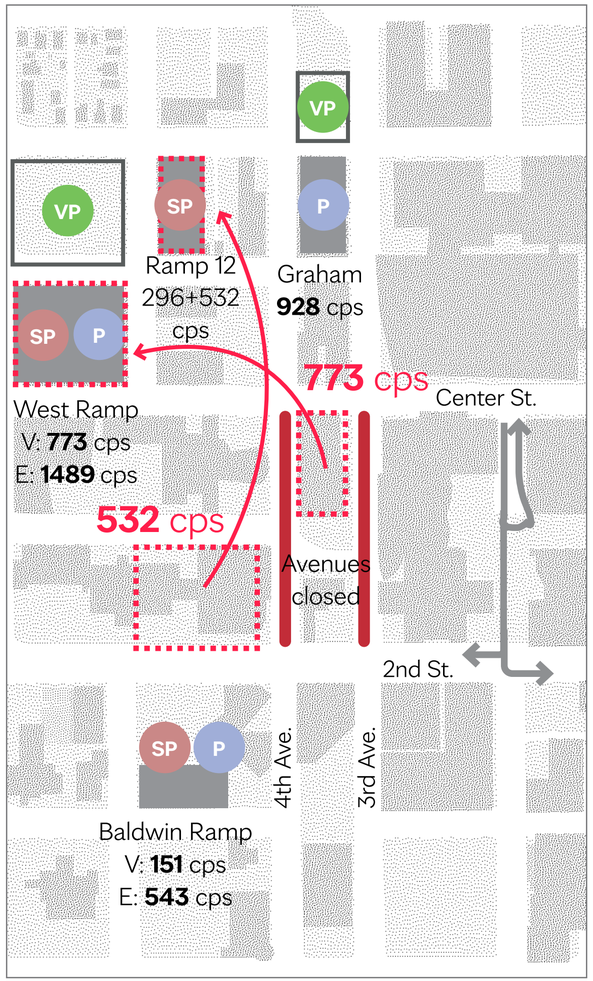
Development of micro-scale scenarios to verify drop-off layout and intersection performances.

Macro Simulations Assumptions

EXISTING



INTERIM MACRO SIMULATION



VP - Valet Parking
SP - Staff Parking
P - Visitor Parking

As far as the city macro model accounts for the downtown parking simulation, the changes of the parking usage during the interim phase were implemented into the tool for the present scenarios.

According to the foreseen network reorganization with the avenues' closure, Damon and Ozmun parking structures will no longer be available. It has been indicated initially, that their users are going to use existing parking places that belong to the Mayo Hospital. As it is presented on the scheme on left, in order to simulate it with the help of available modeling tool, the amount of parking spaces associated with Damon parking (773 cps) were assigned to Clinic users within the West Ramp with total of 2260 cps; 532 cps of Ozmun were moved to the Ramp 12 with the total 828 cps. The remaining amount of the parking spaces of the ramps that are used for the temporary accommodation of Mayo users is proportionally distributed between the original zones associated with this parking nodes.

For the Graham and Baldwin parking structures original values of the parking capacity are retained as per 2018 base city model scenario.

This model structure accounts for the original assumption where the visitors are displaced to the West ramp and the employees from Ozmun parking are going to use Ramp 12. An update according to the recent alternative considerations on the reversal temporary usage of the existing parking ramps is not performed. This is due to the fact that the main part of the modelling exercises (macro and micro) has been already finalized at the moment of the proposed changes.

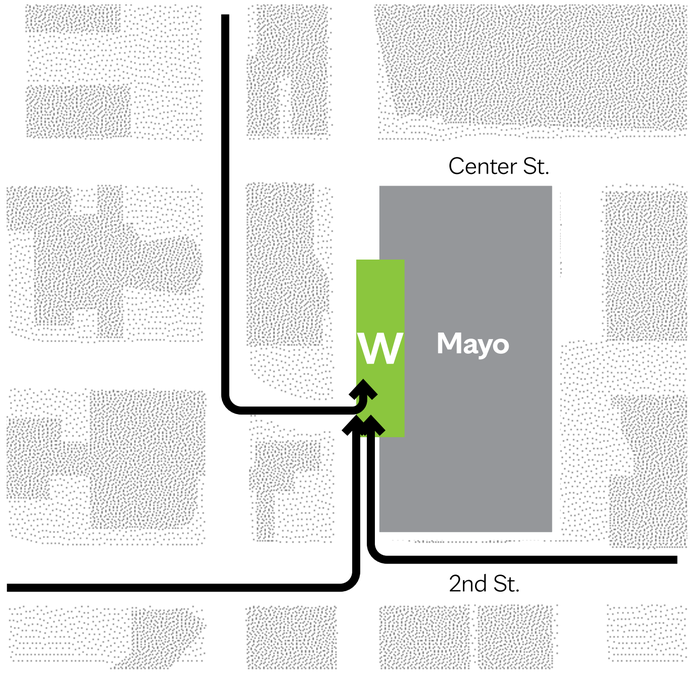
We believe that it would not impact the modelling outcomes drastically as the final destination flows are very similar. Therefore, the latest update was considered to be not significant for the layout definition and general resulting parameters.

Daily Traffic Volumes Overview

During the construction phases and when the Unbound project is completed, the traffic flows generated and attracted by the Mayo/Gonda complex will change significantly.

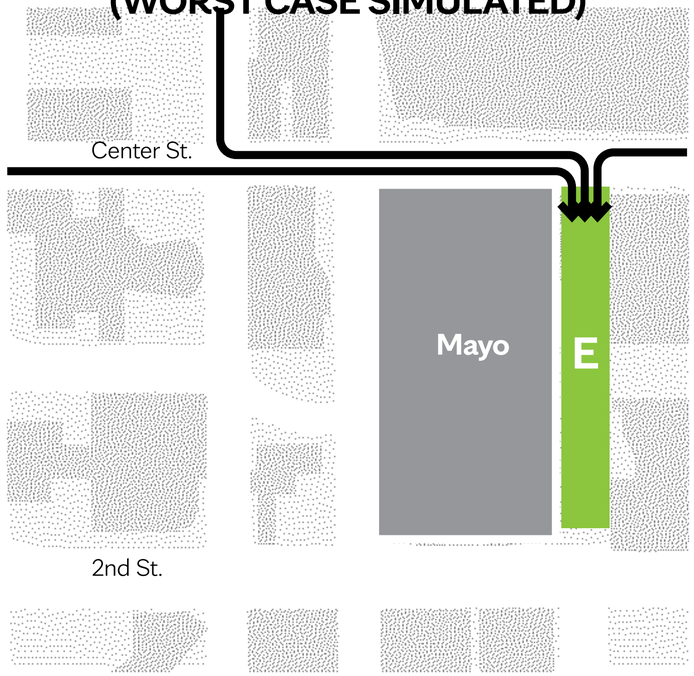
The three diagrams on the side summarize in a simplified way the trajectories of the Mayo arrival flows in different phases. These are important to visualize as these changes of routes will put under pressure some portions of Center Street ensuring the Interim phase.

EXISTING



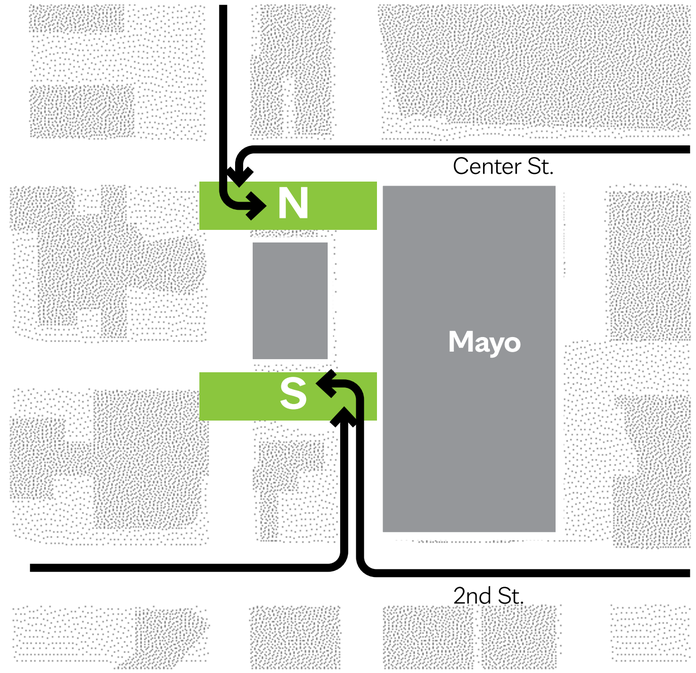
Today the access to the drop-off is conveniently located along 3rd Avenue, a one-way street with high capacity and no significant traffic conflicts or congestion. The left turn of flows coming from the north is regulated by the signal on 1st Street, which provides abundant queuing capacity.

2024-2029 INTERIM PHASE (WORST CASE SIMULATED)



All flows are redirected to the East entrance, this means that all arrivals must rely on Center Street: a two-way street with one lane per direction, with no turn lanes. As we'll see in the simulations, this condition can create some congestion.

2030 PROJECT



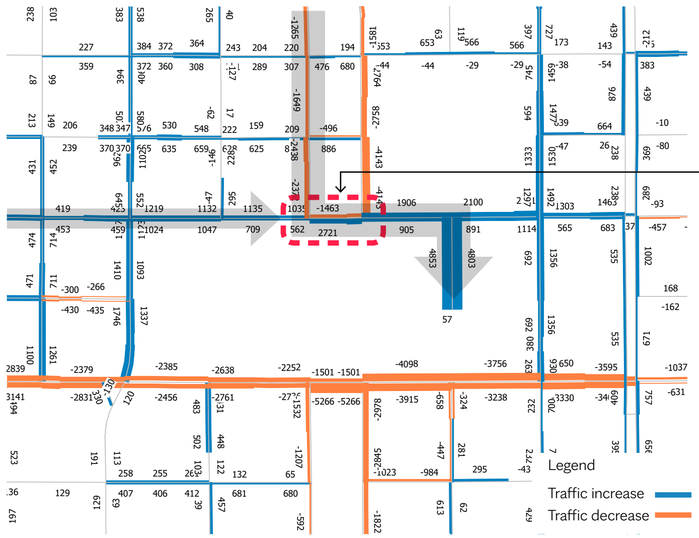
The campus will be served by 4 drop-offs, two main at north and south and two secondary at east and west. This will help to dissipate flows providing entrances from all directions. The north and south are symmetrical and provide equal access to all new buildings guaranteeing maximum flexibility.

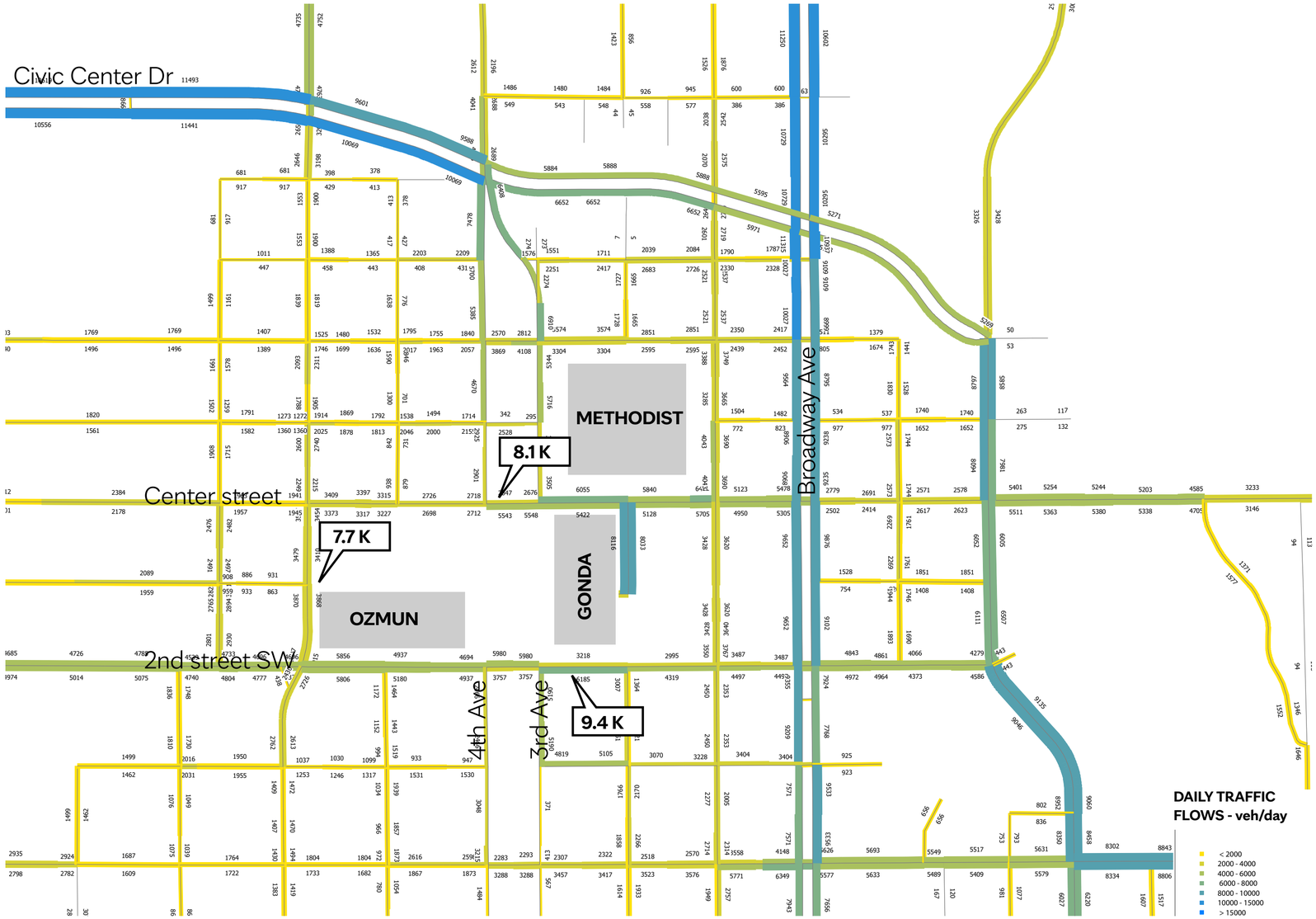
Daily Traffic Volumes - Interim Scenario Option 1

All three options of the Interim scenario show a traffic decrease due to the BRT lanes.
Traffic decrease in the Avenues is caused by the Avenues closure, which also leads to the spread increase on the Avenues from 7th Ave to Broadway Ave. In particular, the most loaded stretch is on 6th Avenue between 2nd and Center Street, while in the northern residential part, the traffic remains almost unvaried.

The part between 3rd and 4th avenues shows a high increase in traffic due to Mayo's flows re-routing. and it will be further analyzed at the micro-scale in more detail.

Difference - Interim Option 1 and Existing Scenarios



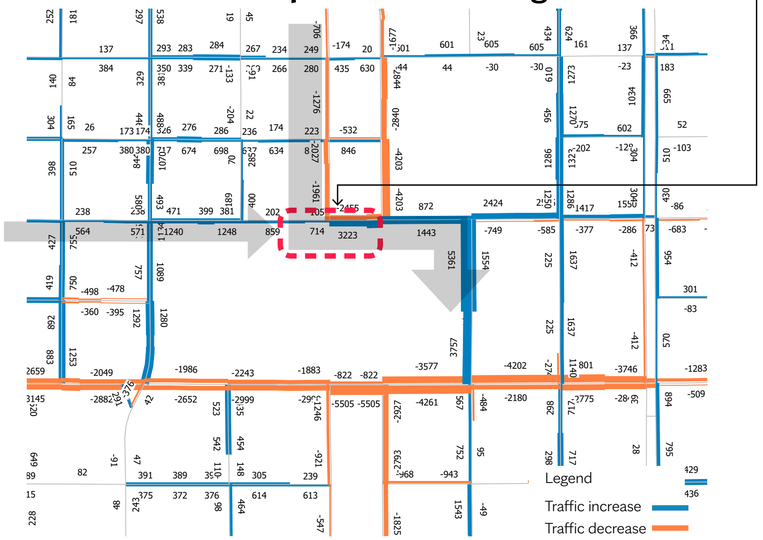


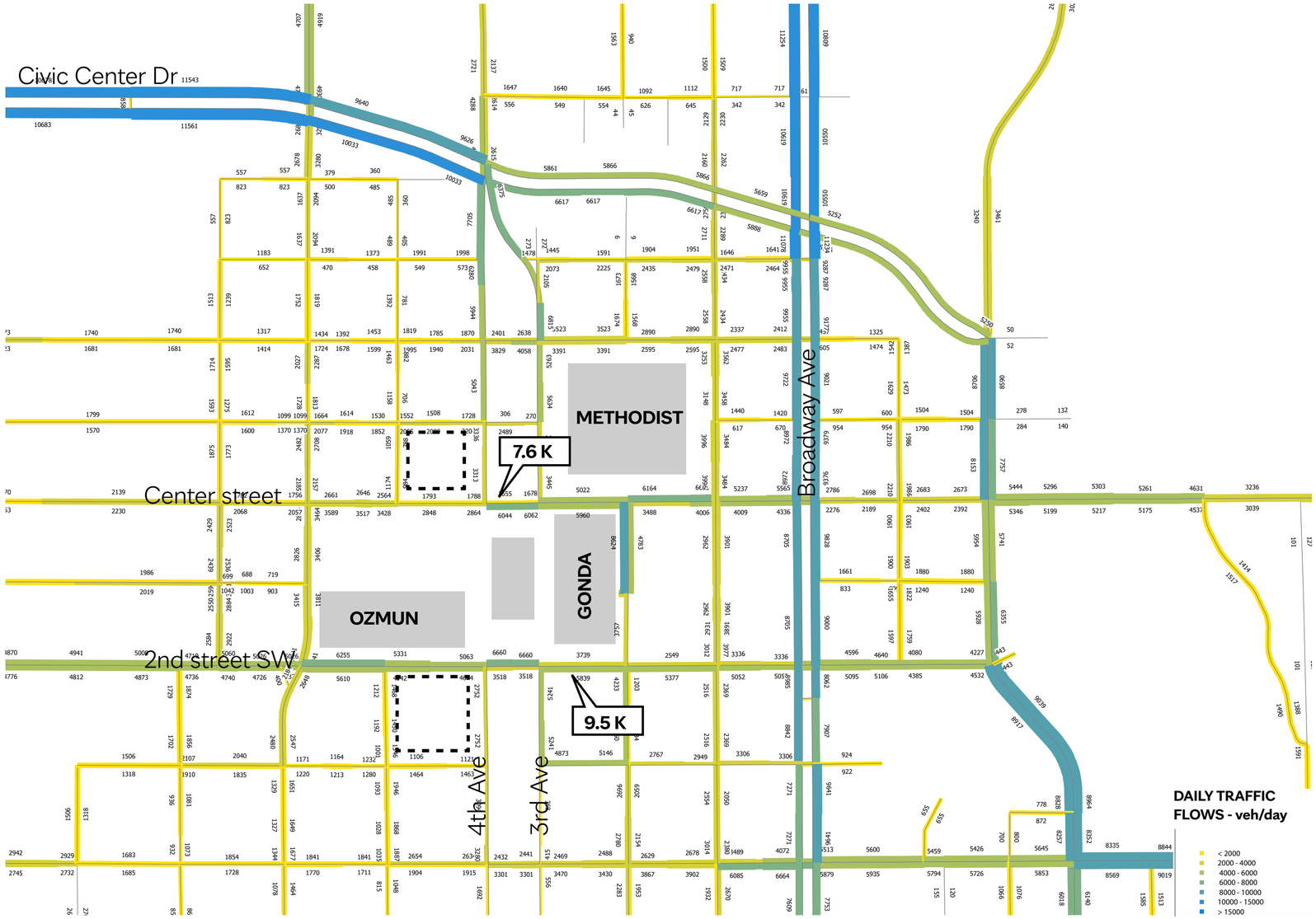
Daily Traffic Volumes - Interim Scenario Option 2

Option 2 shows a smaller decrease in traffic on the 2nd street in comparison to the previous option 1, due to the new intersection connecting East drop-off with 2nd street. This option has a more balanced drop-off traffic distribution toward the north and south.

The part between 3rd and 4th avenues shows a high increase in traffic due to Mayo's flows re-routing, and it will be further analyzed at the micro-scale in more detail.

Difference - Interim Option 2 and Existing Scenarios





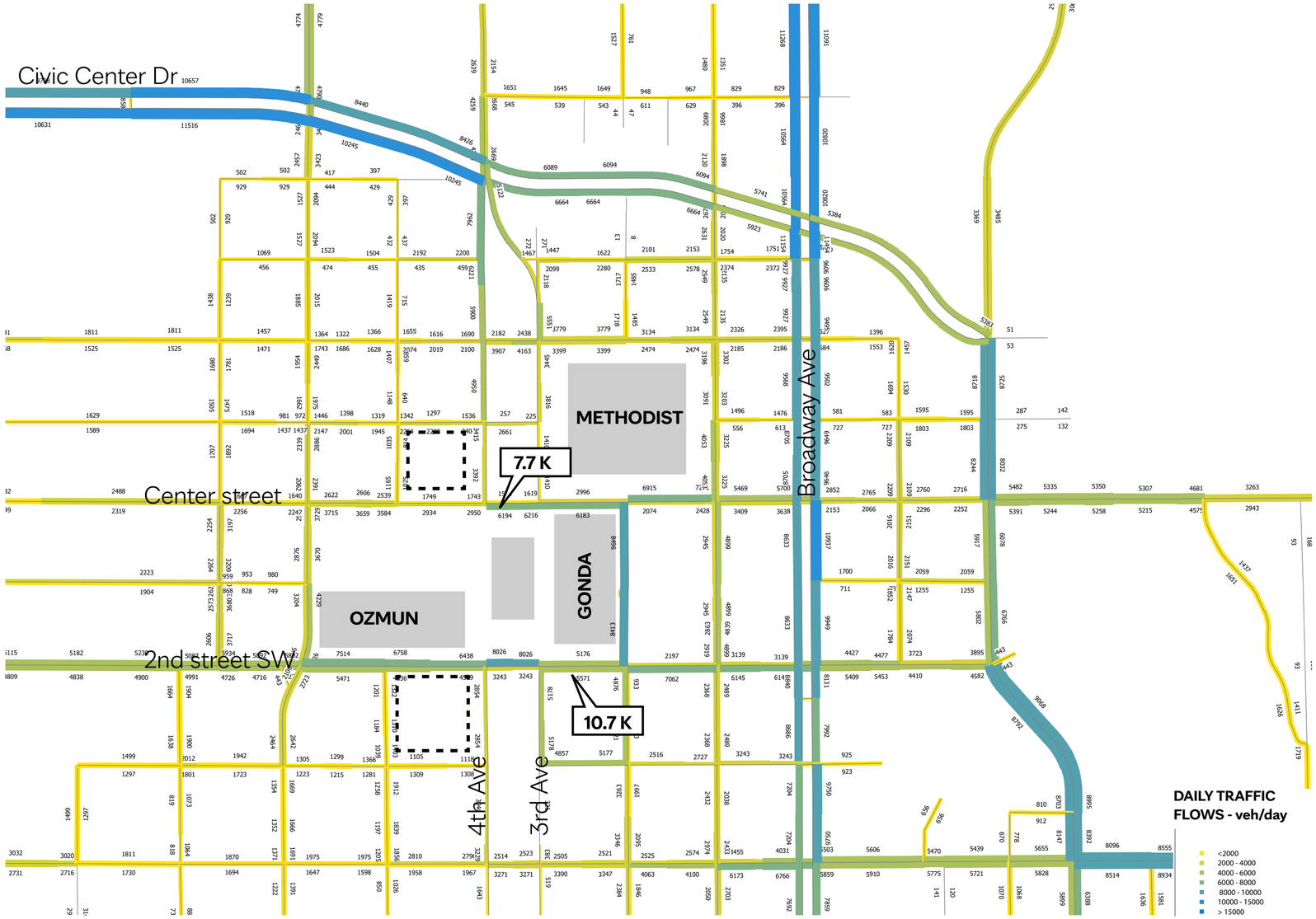
Daily Traffic Volumes - Interim Scenario Option 3

Option 3 shows a traffic increase on both, 2nd Street and Discovery Walk, due to the one-way East drop-off configuration. On the contrary, there is less traffic on Center Street compared to the two previous options. However, the drop-off flows exiting on 2nd street may create more conflicts with the BRT.

The part between 3rd and 4th avenues shows a high increase in traffic due to Mayo's flows re-routing. and it will be further analyzed at the micro-scale in more detail.

Difference - Interim Option 3 and Existing Scenarios



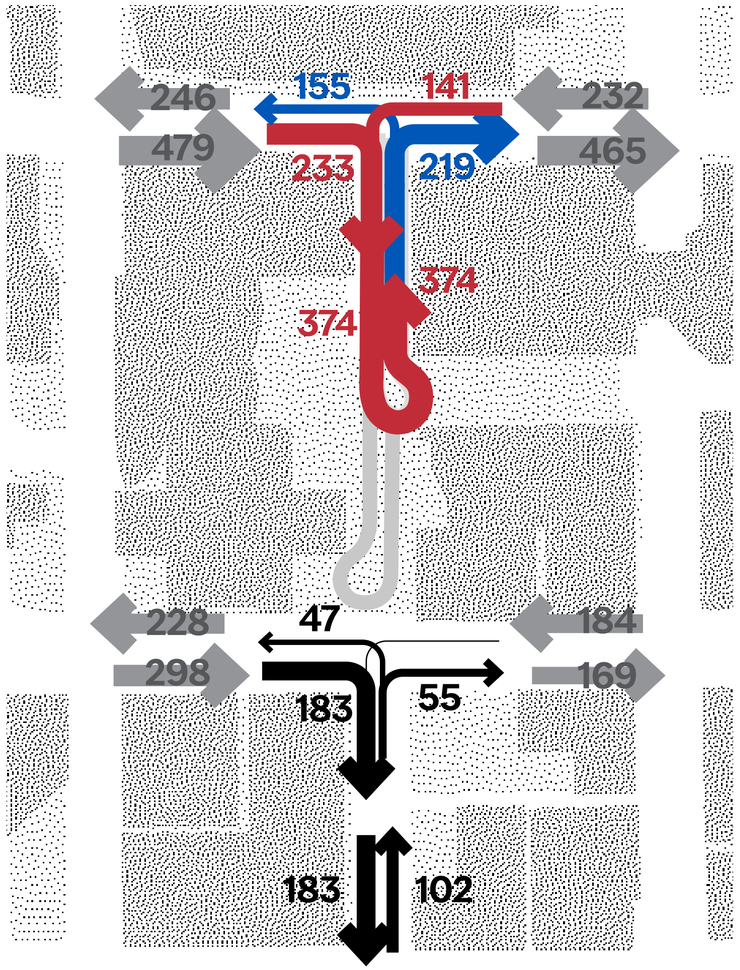


Flows Distribution - Interim Scenarios - PM peak hour

OPTION 1

IN FLOWS
100% NORTH
0% SOUTH

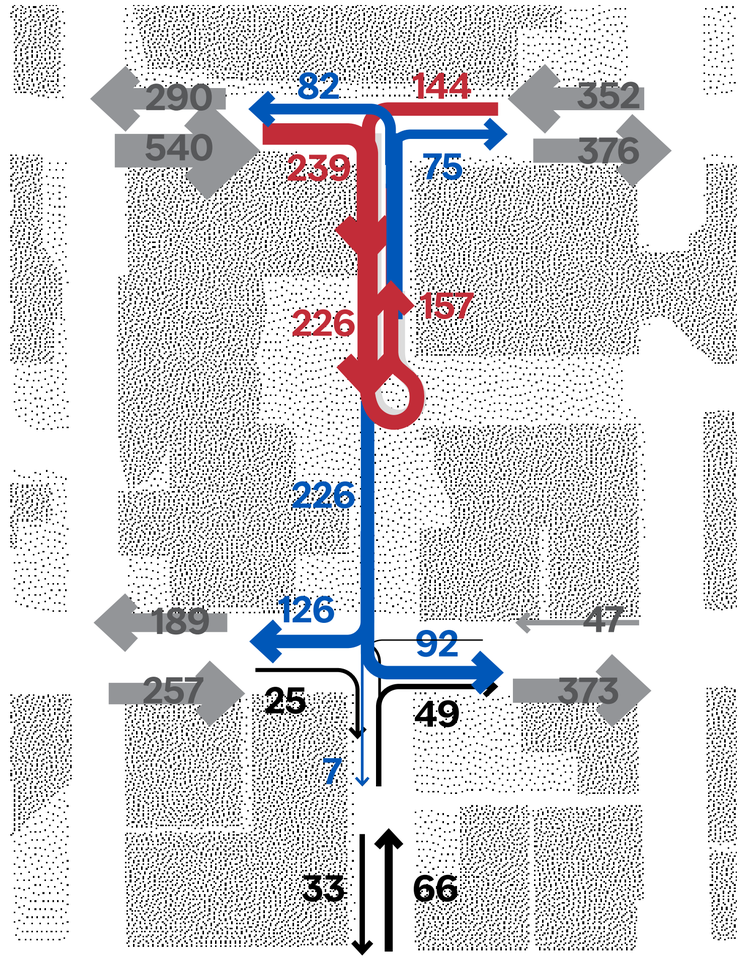
OUT FLOWS
100% NORTH
0% SOUTH



OPTION 2

IN FLOWS
100% NORTH
0% SOUTH

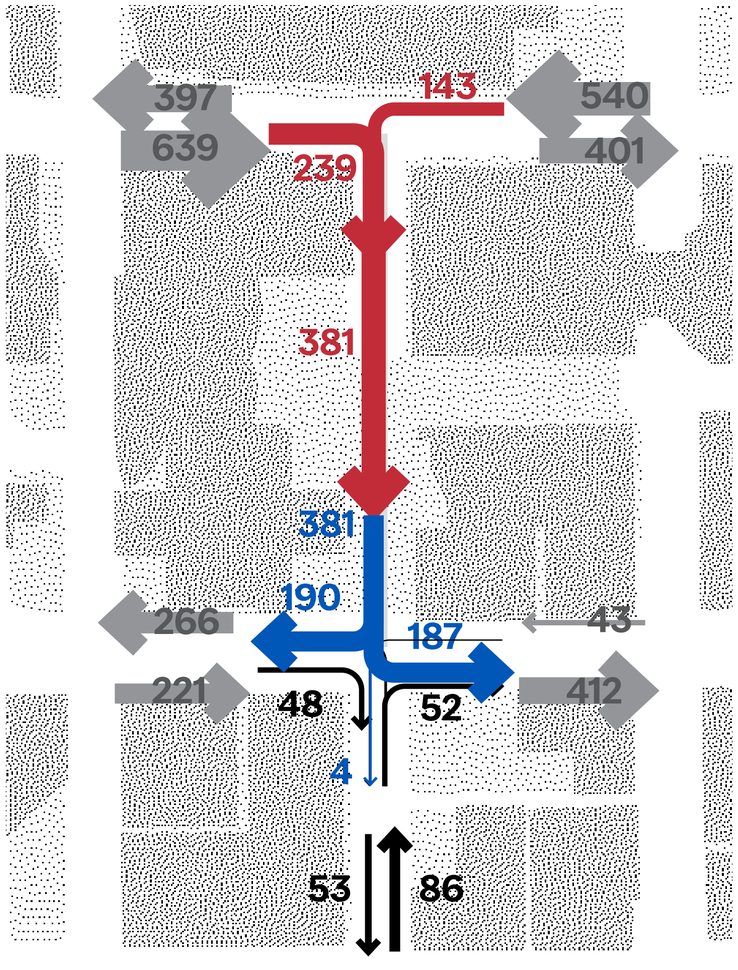
OUT FLOWS
40% NORTH
60% SOUTH



OPTION 3

IN FLOWS
100% NORTH
0% SOUTH

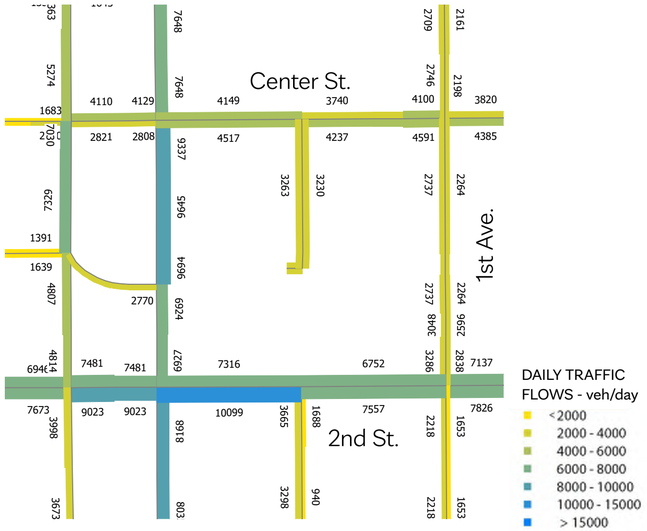
OUT FLOWS
0% NORTH
100% SOUTH



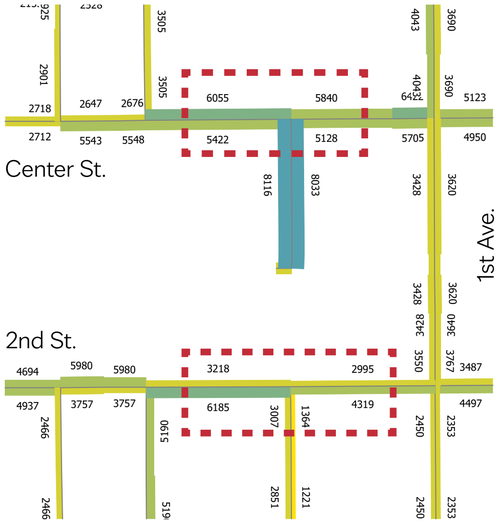
In all three OPTIONs, there is a great decrease on 2nd Street due to BRT introduction.

Daily Traffic Volumes Overview

2018 EXISTING

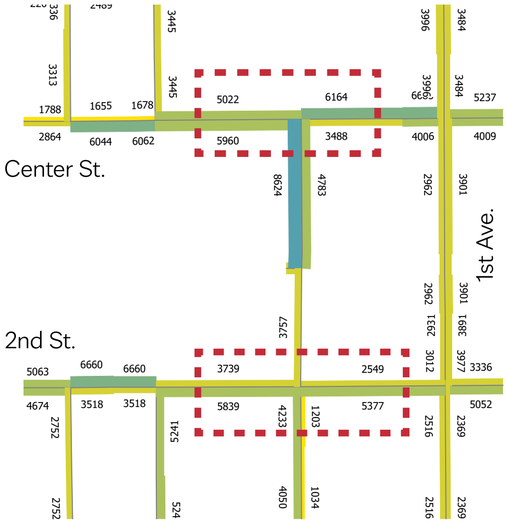


INTERIM OPTION 1



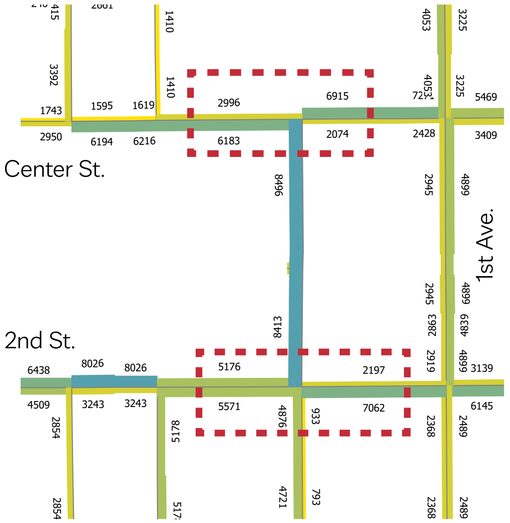
North: **100%** in & **100%** out
South: **0%** in & **0%** out

INTERIM OPTION 2



North **100%** in & **40%** out
South **0%** in & **60%** out

INTERIM OPTION 3



North **100%** in & **0%** out
South **0%** in & **100%** out

Impact of 2nd Street

The street is not impacted by new flows and also the BRT lane runs uninterrupted.

Some of the exiting flows use the new intersection to exit the drop-off (+4% traffic on 2nd)

The one-way circulation forces all flows to use 2nd Street, hence increasing traffic here by 20% compared to option 1

Impact on Center Street

This option has the heaviest impact on center street as 100% of flows entering and exiting rely on the north intersection (+34% traffic on Center)

This option has slightly less impact compared to option 1, since only 40% of exiting flows use it to leave the drop-off

Impact on Center This option has the least impact on the Center since no outgoing flows interest the north intersection.

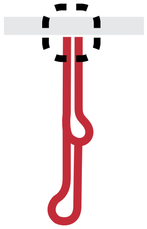
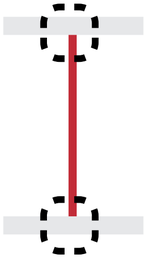
Impact on Discovery Walk

No specific impact as there is no new intersection between 2nd Avenue and 2nd Street.

Due to the new intersection, the traffic on Discovery Walk slightly increases, but in a limited way compared to option 3

Due to the new intersection the traffic on Discovery Walk increases, by more 35% compared to Option 1 and 8% compared to Option 2

Options Comparison

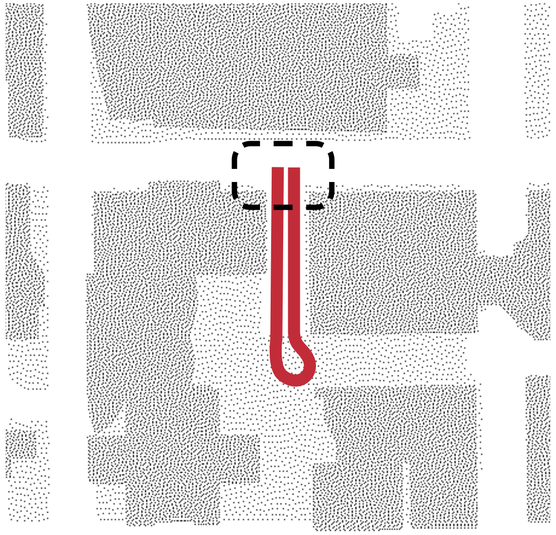
	OPTION 1	OPTION 2	OPTION 3
			
	Provides good users experience and clear way finding, puts more pressure on Center Street and has low capacity (further analyzed in micro)	**Preferred Option: it provides the best user experience, good traffic dissipation, and operations flexibility** (further analyzed in micro)	**Access to north parking facilities is too difficult after drop-off. A one-way system creates less congestion on Center Street but limits flexibility**
CIRCULATION	A direct path through Center Street to reach the patients' parking after the drop-off	Direct path through Center Street to reach the patients parking after the drop-off	Patients are forced to make a detour around the block after drop-off in order to reach the parking Kahler drop-off is on the wrong side due to the absence of the u-turn
TRAFFIC	2nd street is not affected by the new East Gonda drop-off No additional traffic on the Discovery Walk Increase in traffic on Center Street	Flexibility in the drop-off flows distribution to all directions for different users, including Kahler Traffic is divided between Center and 2nd street without causing congestions Slight increase of traffic on the Discovery Walk	Reduction of traffic on Center Street due to the closure of the possibility of u-turn All drop-off traffic needs to be distributed through the 2nd street Discovery Walk will have more traffic Potential through traffic issue
CAPACITY	Capacity is not compliant with the demand in Interim phase 1 where the North pavilion is not yet built.	Capacity is compliant with the demand in Interim phases 1 and 2.	Capacity meets the demand in Interim phases 1 and 2.

Micro Simulations - Vissim

Micro Simulations Scenarios

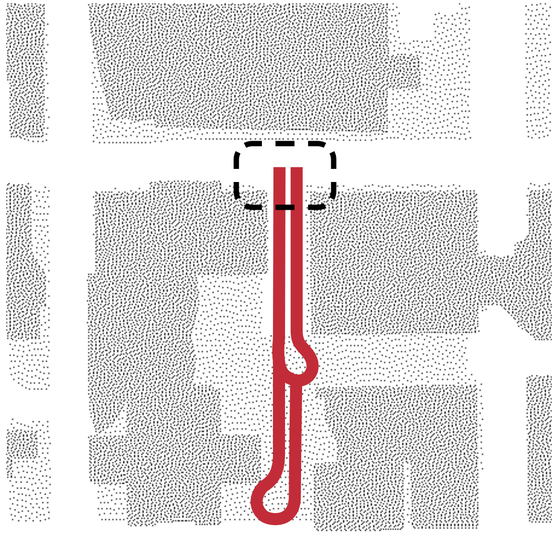
In the following slides, we'll analyze and compare the following scenarios: existing condition, option 1, and option 2. The focus of this comparison is to understand the differences in traffic conditions on Center Street and the impact of a new intersection on 2nd Street.

EXISTING



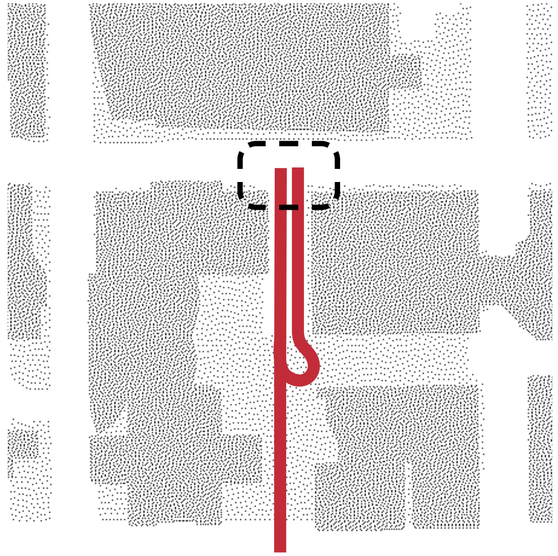
Existing scenarios are used as a comparison: Avenues opened and BRT not yet implemented.

INTERIM PHASE - OPTION 1



Option 1 is not sufficient in terms of capacity, but being the worst case for Center Street, it was still simulated as a Plan B, in case the opening of the new intersection on 2nd Street is not possible.

INTERIM PHASE - OPTION 2



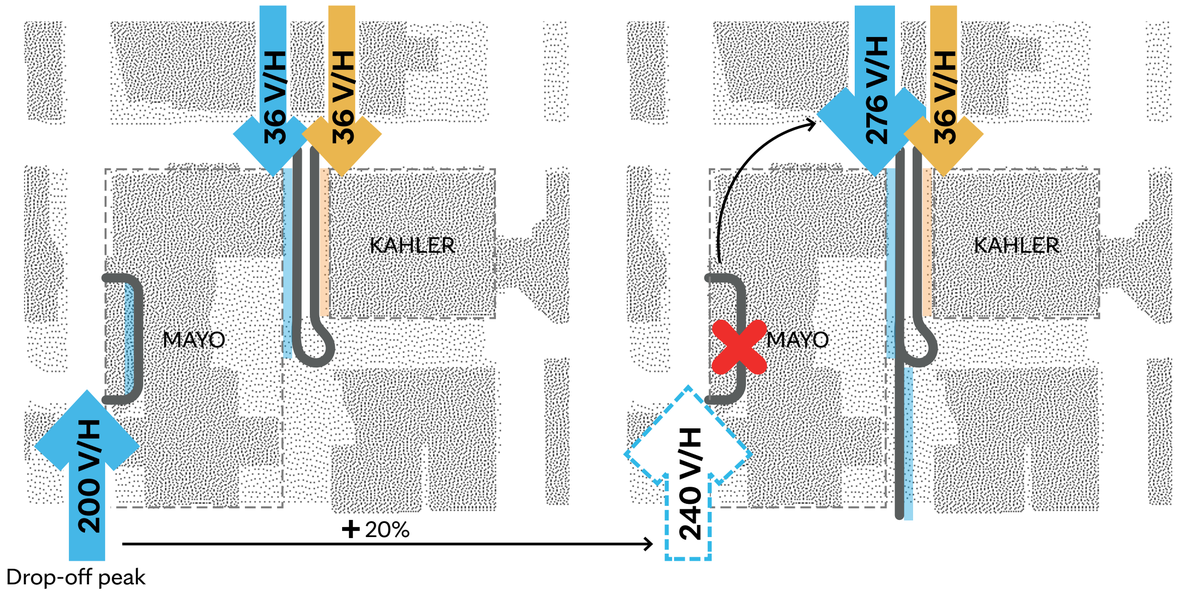
As previously analyzed, option 2 is the preferred option both for traffic distribution and for user experience.

Micro Simulations Assumptions

Mayo
Kahler

AM

EXISTING



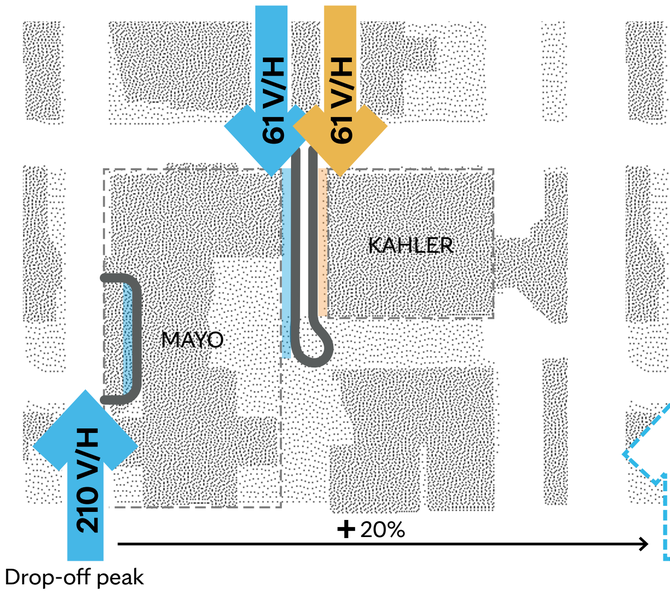
The Gonda dropoff am peak flow (7-8am) surveyed is 120 v/h, but for a more conservative simulation we have used the highest drop-off peak flow of 200 veh/h (8-9 am)

SIMULATED

To simulate a worst-case scenario, a 20% safety buffer is added on top of west Gonda drop-off flows, to anticipate a possible higher valet demand due to the temporary absence of an immediately adjacent parking (Damon)

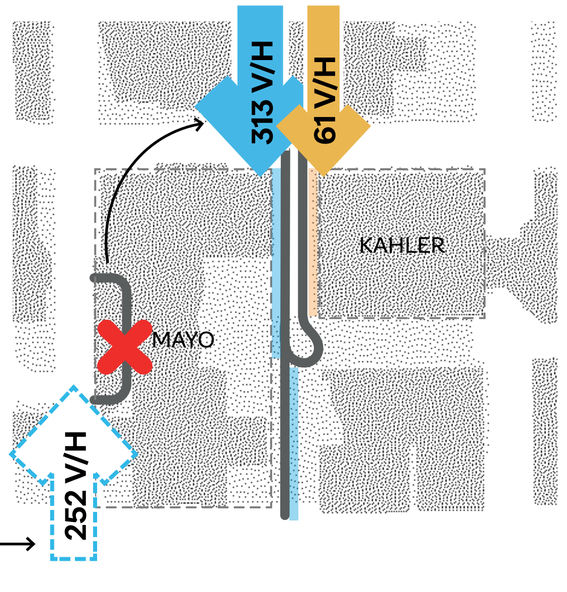
PM

EXISTING



The Gonda dropoff pm peak flow (5-6pm) surveyed is 109 v/h, but for a more conservative simulation we have used the highest drop-off peak flow of 210 veh/h (2-3 pm)

SIMULATED



To simulate a worst-case scenario, a 20% safety buffer is added on top of west Gonda drop-off flows, to anticipate a possible higher valet demand due to the temporary absence of an immediately adjacent parking (Damon)

Micro Simulations Assumptions

DWELL TIME

From when cars slow down to park to when they start moving to drive away

AT GENERAL DROP-OFF

AVG

50 SEC

AT VALET SERVICE (SHORT)

AVG

130 SEC

AT VALET SERVICE (LONG)

AVG

1500SEC

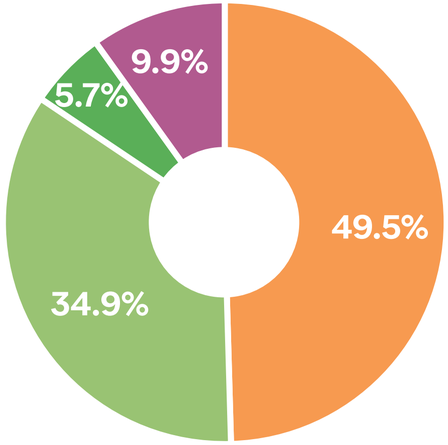
AT SHUTTLE DROP-OFF

AVG

240SEC

OPERATION TYPOLOGY

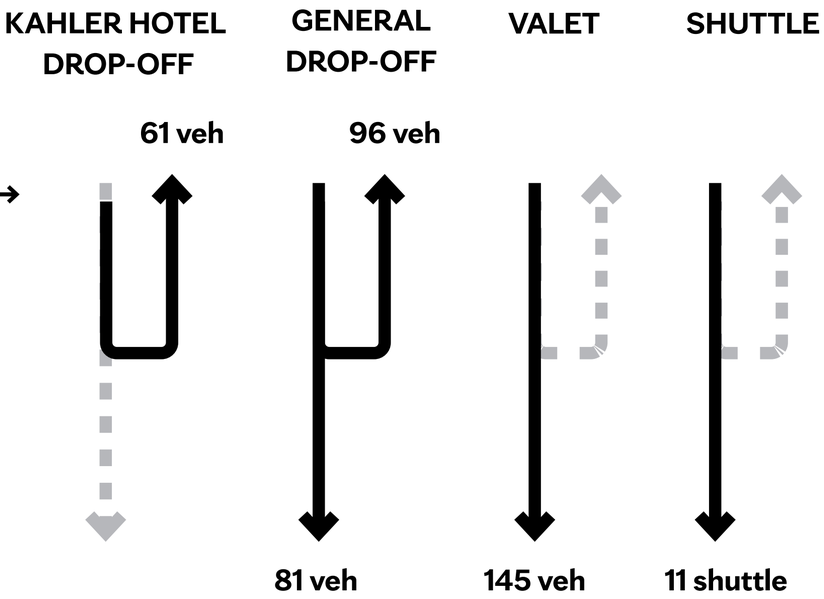
Drop-off traffic consists of the following components: 55% general drop-off and 45% valet. A small component of valet flows (15%) are assumed to stay parked for a longer time (1500 sec), simulating the peak condition in which the valet staff can't process all cars in real time and therefore needs to leave a few parked at the drop-off.



GENERAL DROP-OFF AND VALET FLOWS

TOTAL SIMULATED CARS: 383 CARS/HOUR

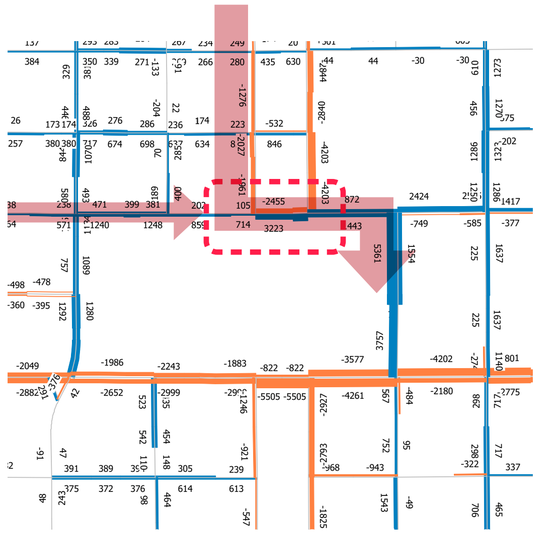
		Interim Option 1		Interim Option 2	
Name		AM	PM	AM	PM
Kahler Hotel Dropoff		36	61	36	61
Dropoff	North Exit	Doesn't Exist	Doesn't exist	95	96
	South exit	152	172	63	81
	Total Drop-off	**152**	**172**	**158**	**177**
Valet	Short Valet	107	121	111	125
	Long Valet	17	20	18	20
	Total Valet	**124**	**141**	**129**	**145**



Mitigation Measures

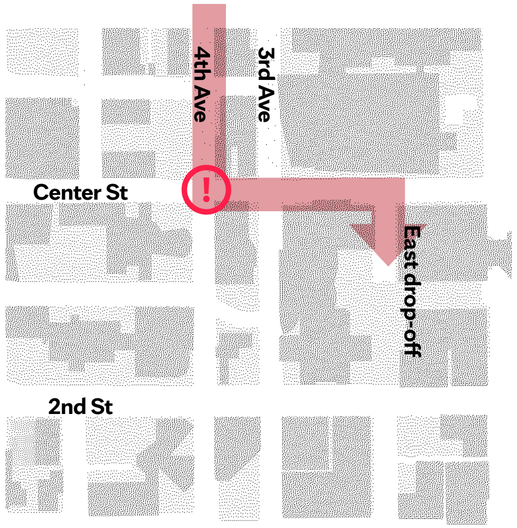
MACRO ANALYSIS

Macro simulations clearly showed that one of the most critical points of the network in the interim scenarios was the portion of Center Street from 2nd to 4th Avenue



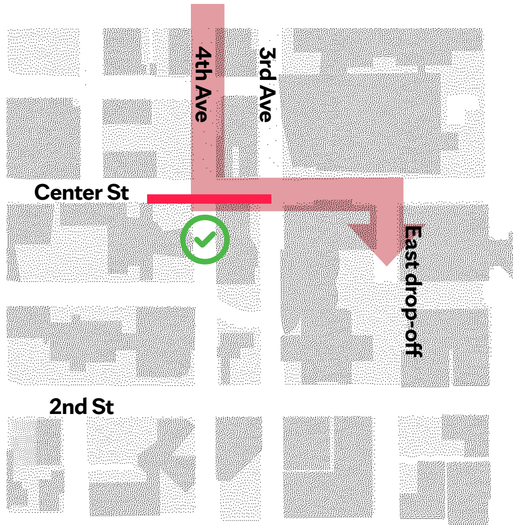
CONGESTION

From the first Vissim runs we observed a Level of service of “E” at the Centre St & 4th Ave intersection, with queues on Center street and 4th Avenue.



MITIGATION MEASURES

Mitigation measures were applied to improve the network performance: An additional lane was provided on the stretch of Centre Street between 4th and 3rd Avenues, together with a 120 feet lane on the eastbound (see detail in next page)



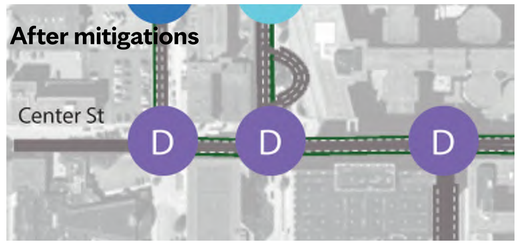
BETTER LEVEL OF SERVICE

A good level of service and network performance reached thanks to additional queuing space and turning space

LEVELS OF SERVICE

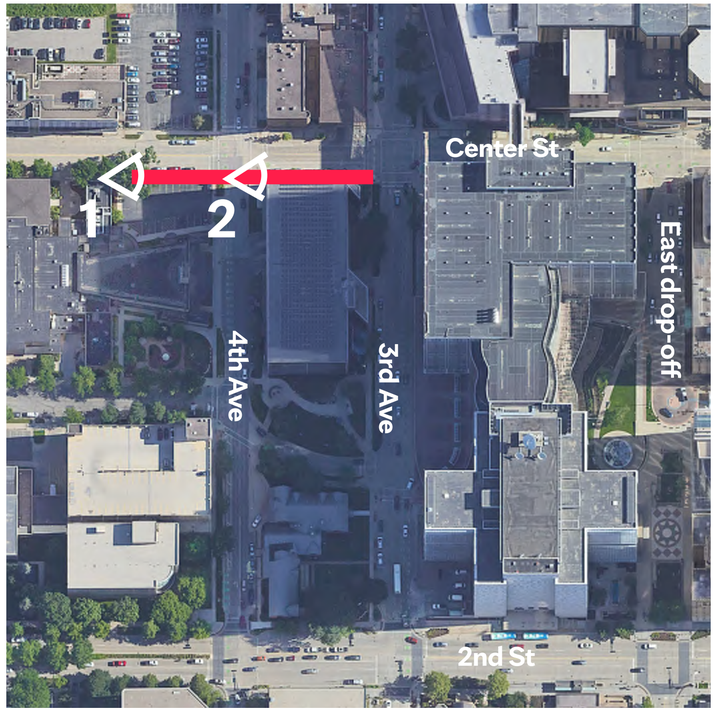
A B C D E F

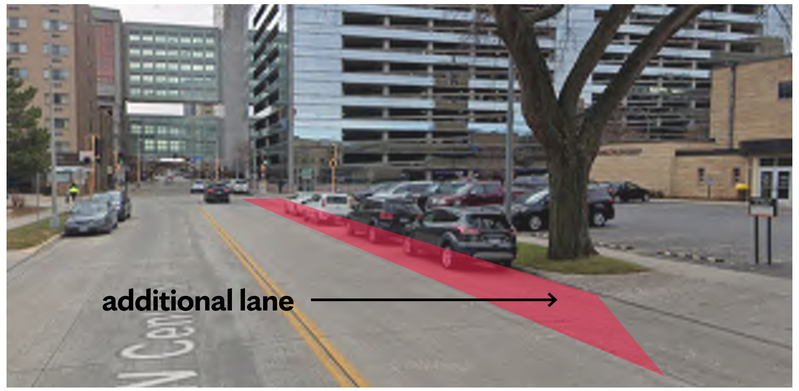




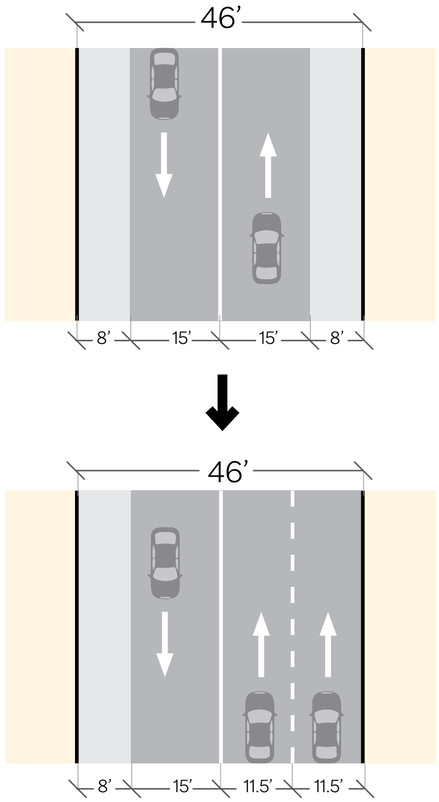
Mitigation Measures on Center Street

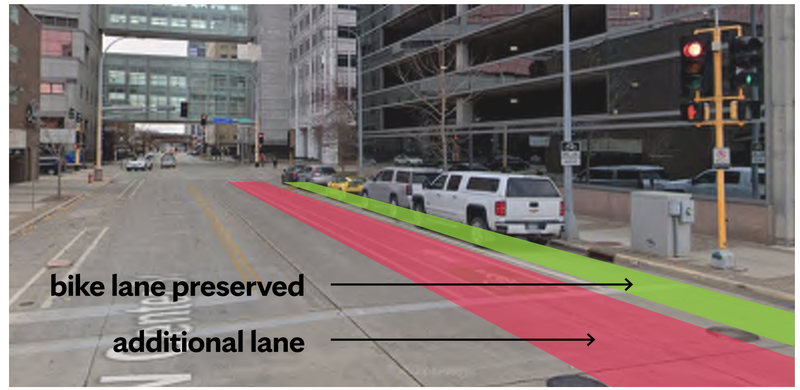
An additional lane was provided on the stretch of Center Street between 4th and 3rd Avenue, together with a 120 feet pocket on the eastbound approach to the intersection. Existing road curb lines remain as per existing condition, additional lanes can be provided by removing on-street parking. Also, the bike lane is kept but moved.



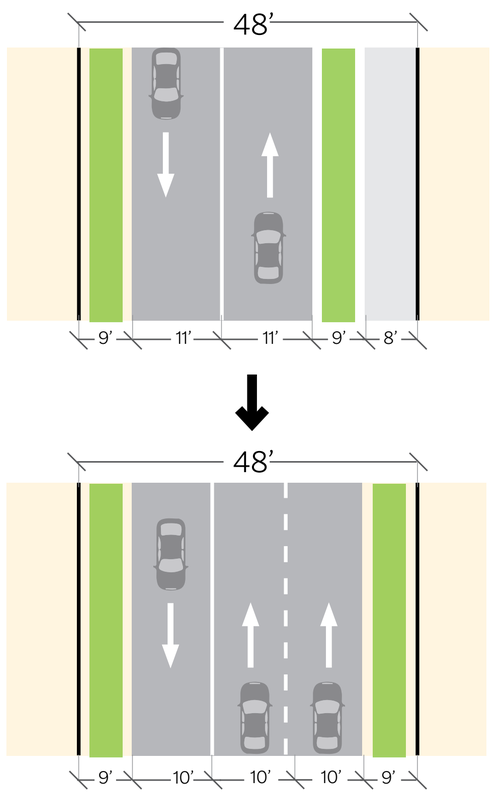


1.



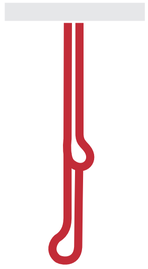


2.



Traffic Volume Comparison - AM (7:00 - 8:00 AM)

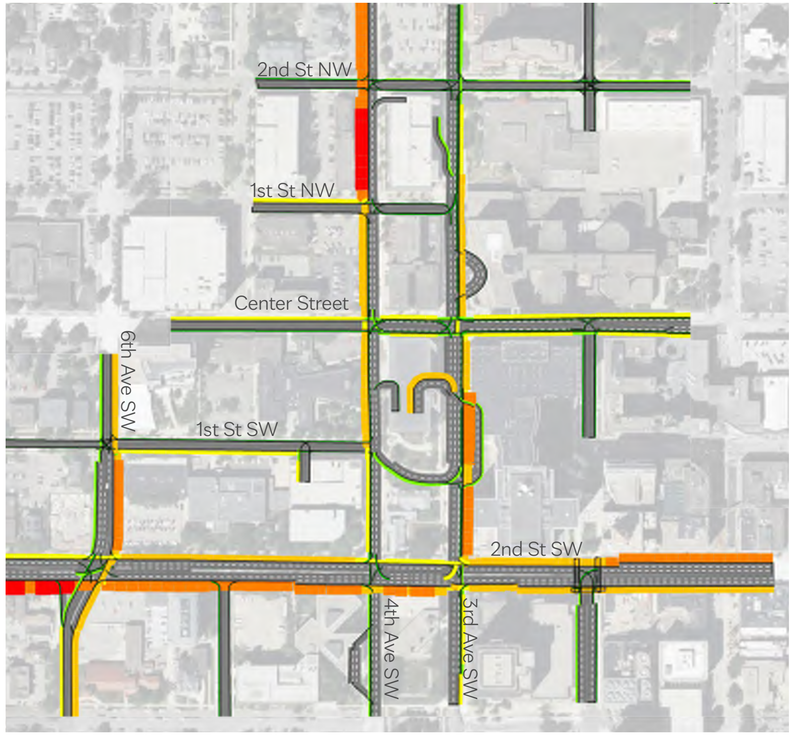
The flow-charts below compare the traffic flows on the network in the three scenarios (AM peak hour). The most relevant differences between the existing and the two East-Entrance options are the strong decrease in flows on 2nd street due to BRT implementation and the increase of flows on 6th Avenue due to the closure of 3rd and 4th.



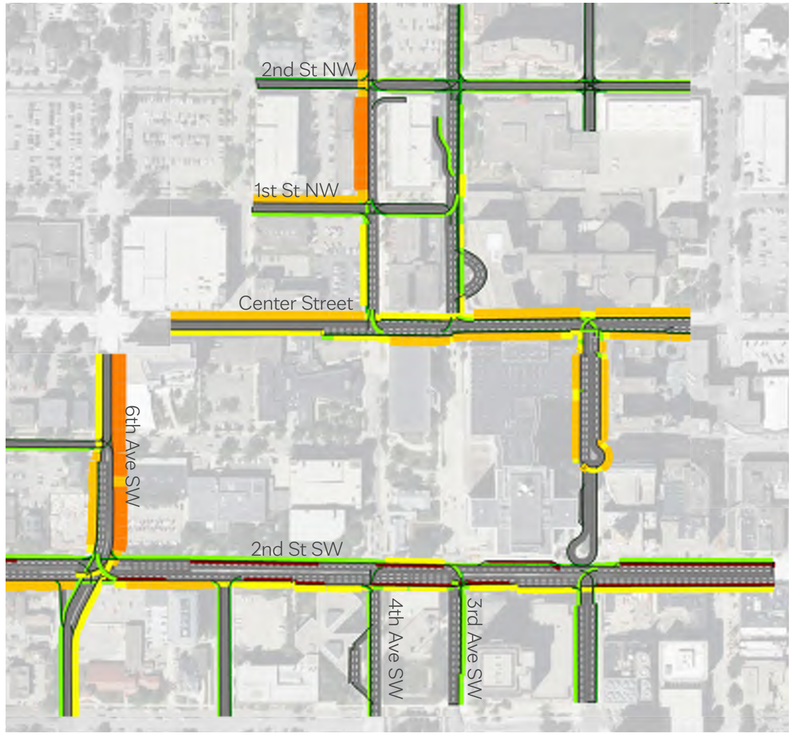


Traffic volume
Average vehicle/hour
< 100
< 200
< 300
< 500
< 700
< 900
> 900

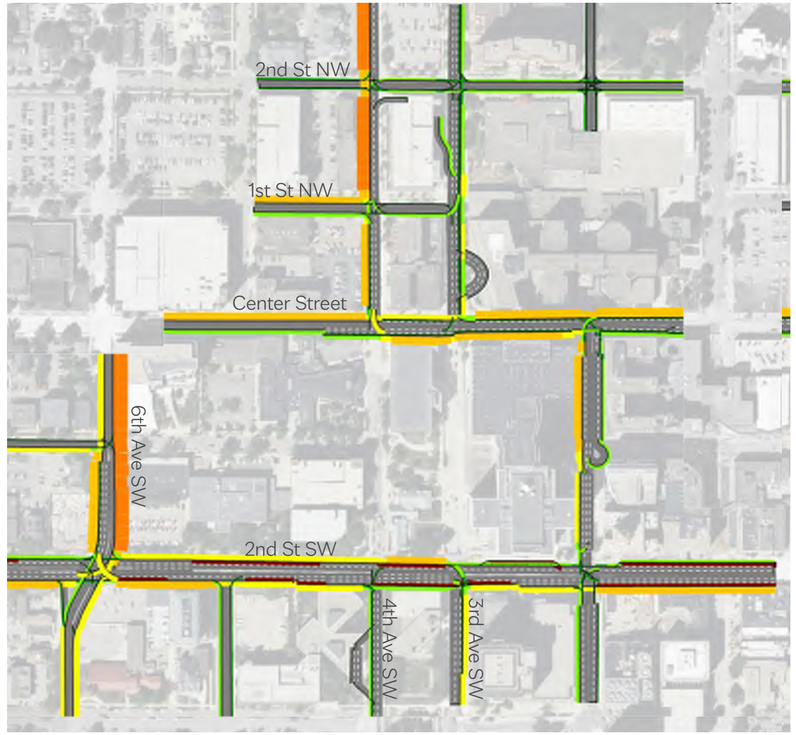
EXISTING CONDITION - AM



Option 1

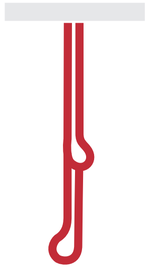


OPTION 2



Traffic Volume Comparison - PM (4:30 - 5:30 PM)

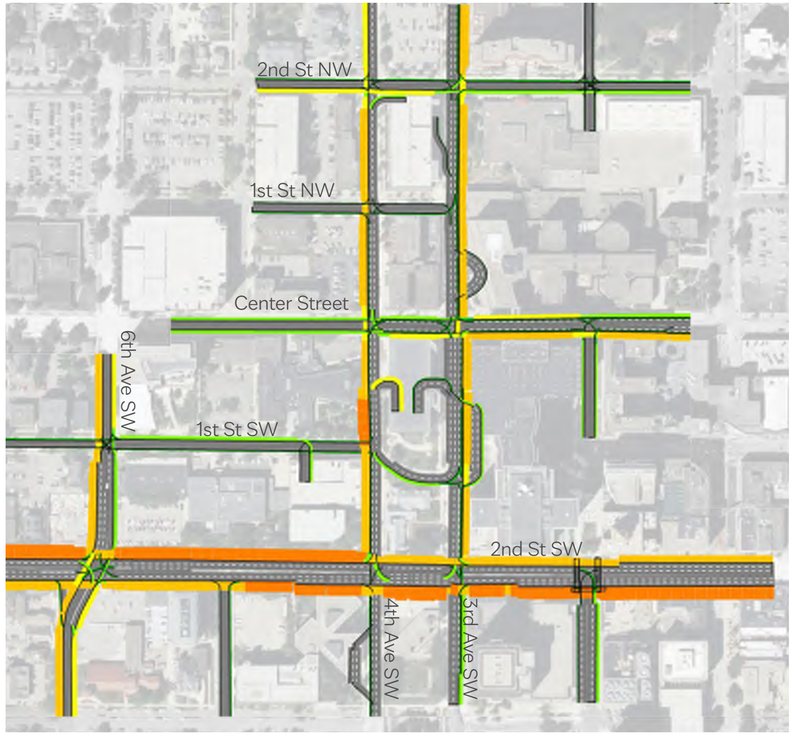
The flow charts below compare the traffic flows on the network in the three scenarios (PM peak hour). Differences with the existing condition are very similar to the AM scenarios on the previous page. Traffic on 6th Avenue is still increasing but in the southbound direction. The Center Street traffic in proximity to the East Entrance drop-off is significantly higher.



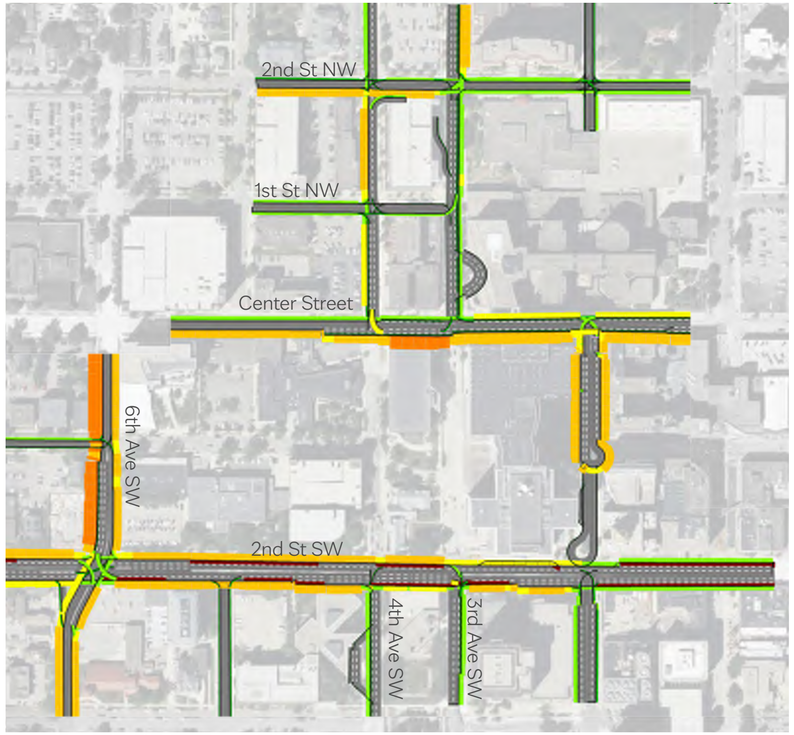




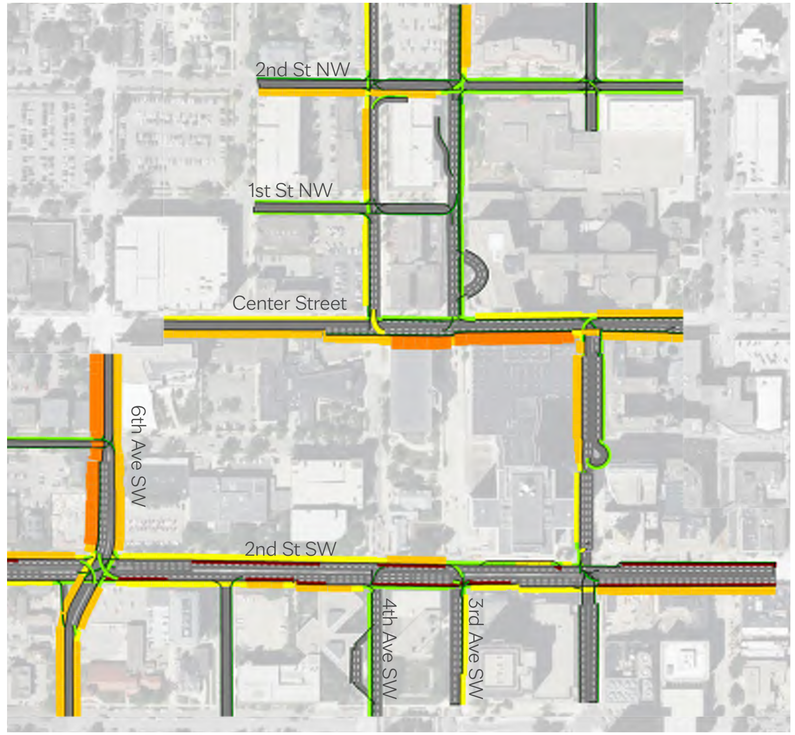
EXISTING CONDITION - PM



OPTION 1



OPTION 2



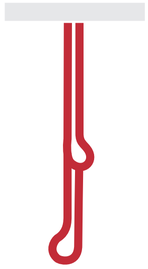
Level of Service Comparison - AM (7:00 - 8:00 AM)

The scenarios are all satisfactory as Level of Service C is never exceeded except for two cases: Option 1 and 2 - 2nd St SW and 6th Ave, which sees a traffic increase due to the closure of Avenues and temporary lack of south arrival point to the clinic. All flows from the West turning on 6° Avenue to reach parking areas and drop-off points.

Option1 - Center St and 2nd Ave due to the concentration of East entrance traffic.

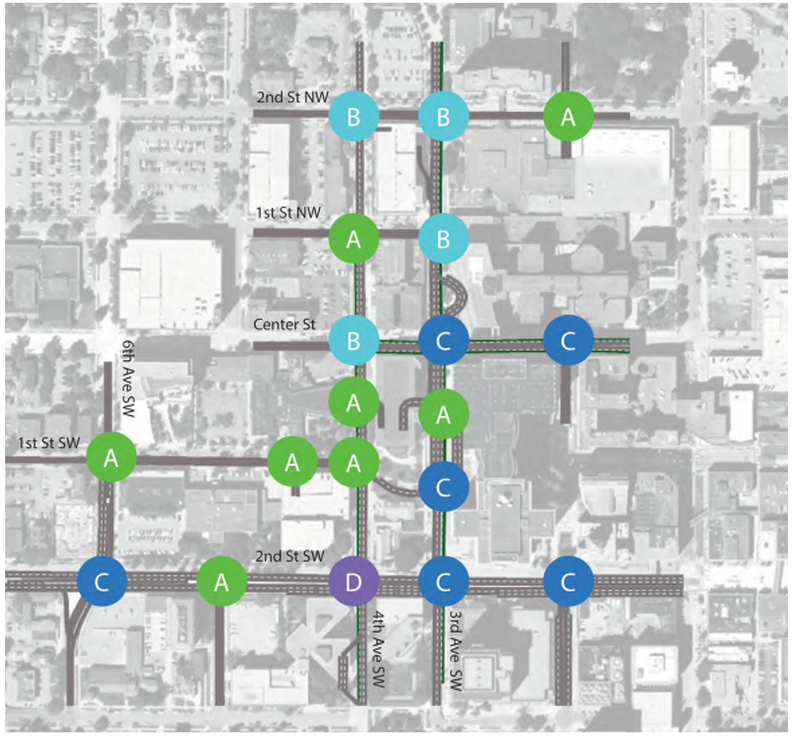
LEVELS OF SERVICE

A B C D E F

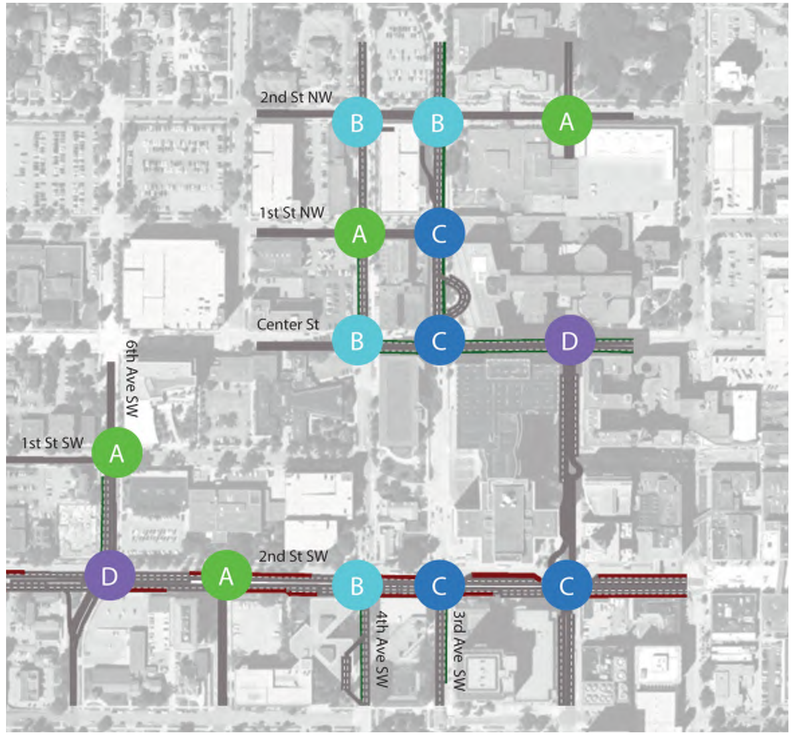




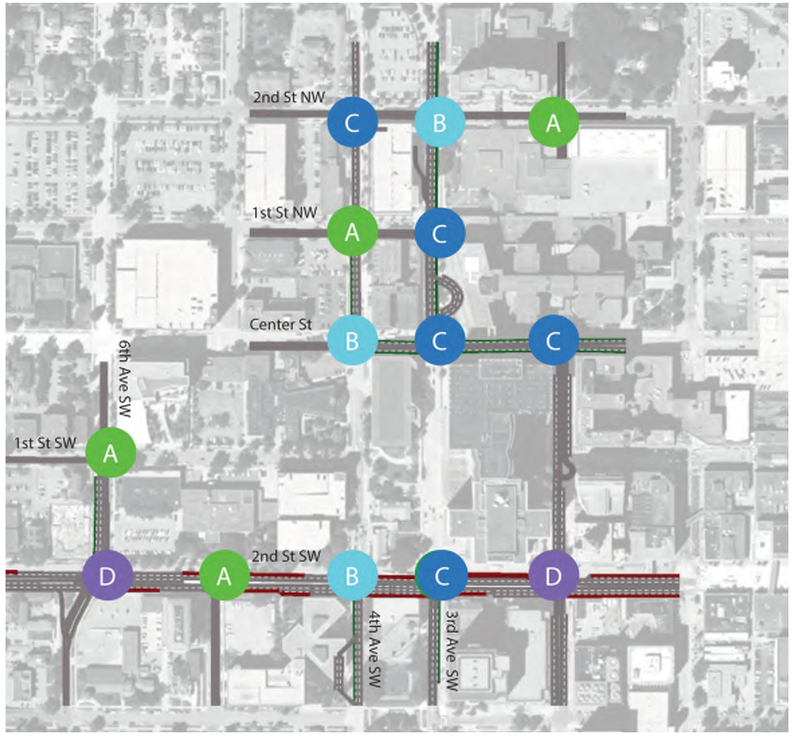
EXISTING CONDITION - AM



OPTION 1



OPTION 2

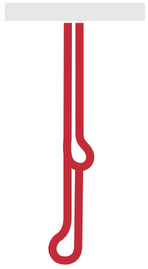


Level of Service Comparison - PM (4:30 - 5:30 PM)

LEVELS OF SERVICE

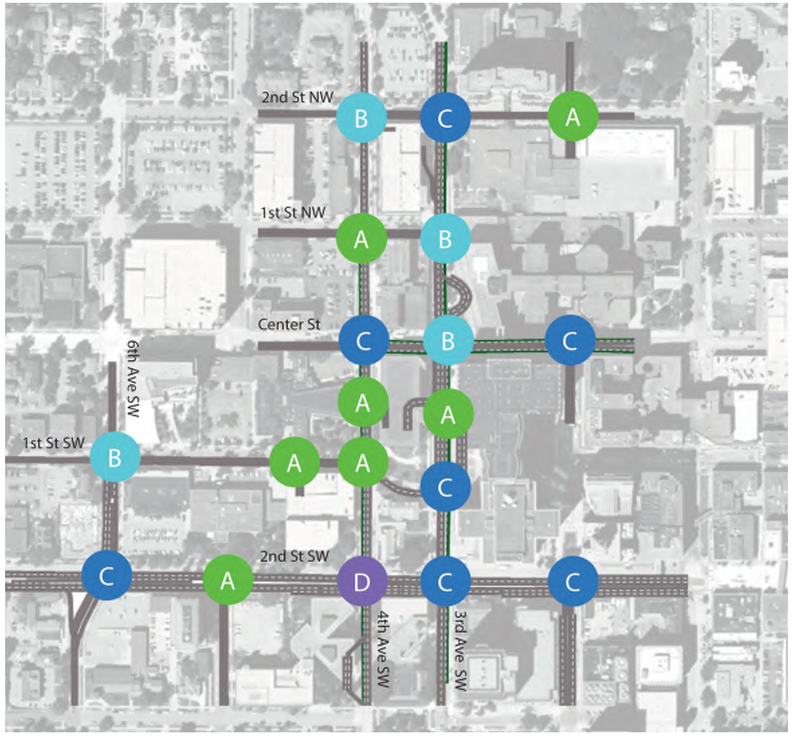
A B C D E F

In general PM scenario presents fewer criticalities compared to the AM even if the Mayo-related flows are higher. Option 1 shows only one slightly critical point always related, like in the AM, at the East entrance traffic. Option 2 is always below LOS C, which keeps the existing condition unvaried.

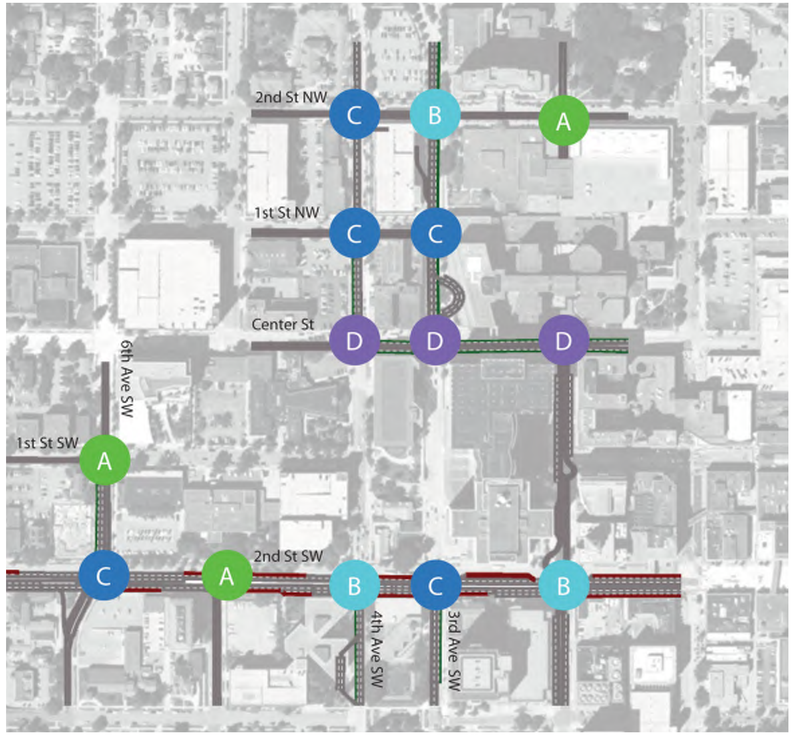




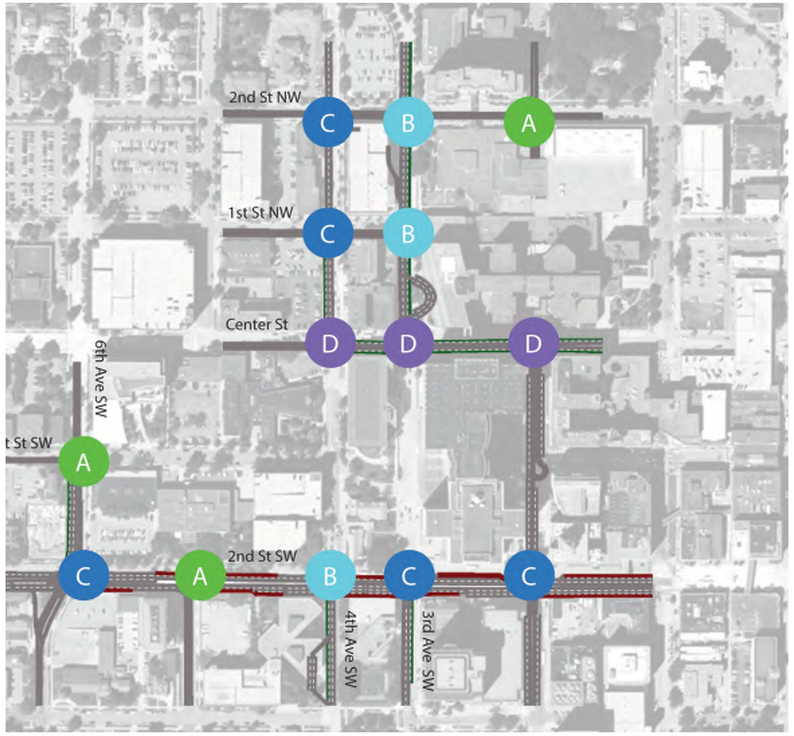
EXISTING CONDITION - PM



OPTION 1

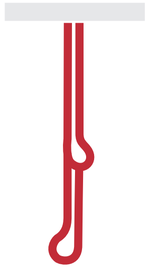


OPTION 2



Average Queuing Comparison - AM (7:00 - 8:00 AM)

In Option 1 the model shows some queuing at Center and 2nd Ave: this may suggest that such queuing may interest also Center and 1st Ave in the AM peak. In option 2 the queuing in this area is not worrying therefore it is expected that also Center and 1st St will have an acceptable LOS.





Queue
BRT
Bike lane

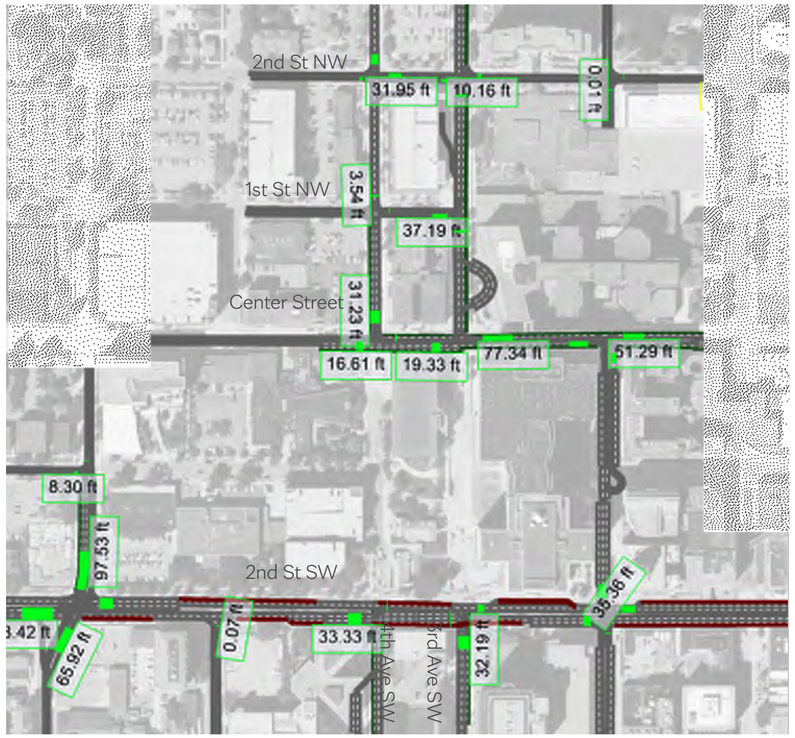
EXISTING CONDITION - AM



OPTION 1



OPTION 2



95th Percentile Queuing Comparison - AM (7:00 - 8:00 AM)

The simulation shows that the longest maximum queues are mostly concentrated ion Center Street where the concentration of flows is higher. In some cases the queue spills back into adjacent intersections. As expected, queues are worse in option 1 compared to option 2.

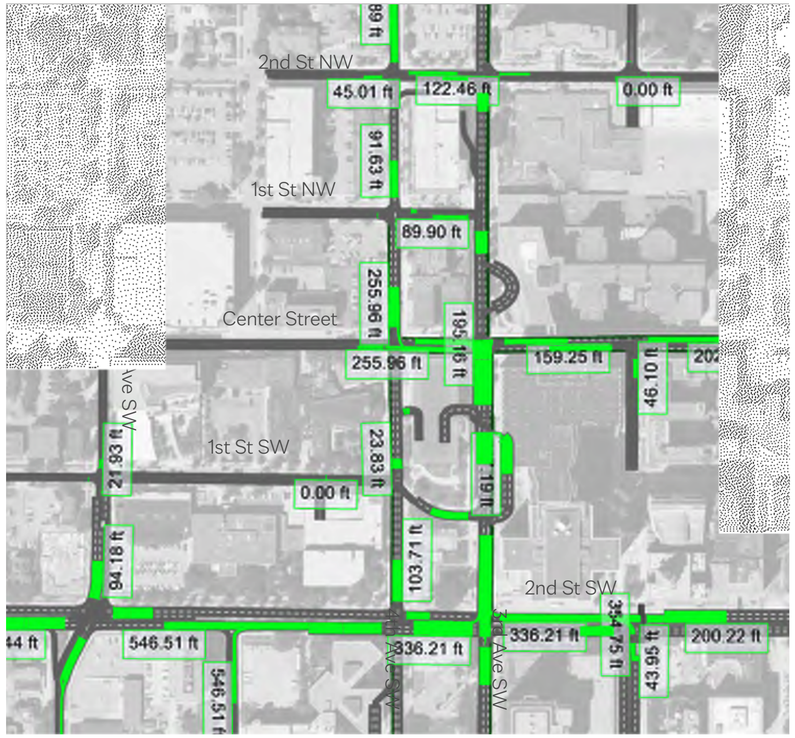
It should be noted that this condition reflects a worst case condition that might have occurred only once in all the simulations, the average delay and level of service provide a more accurate and comprehensive parameter.

Queue

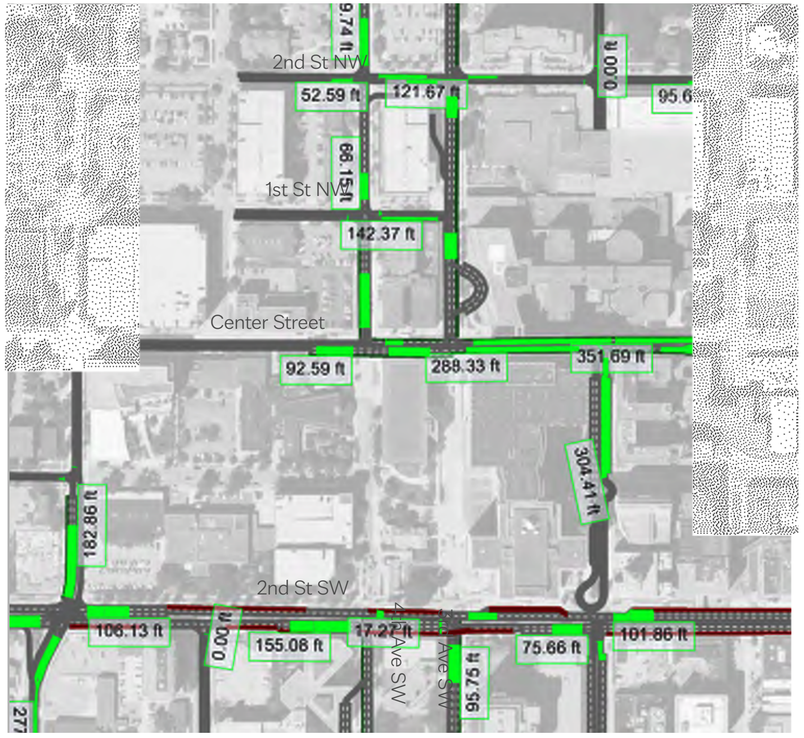
BRT

Bike lane

EXISTING CONDITION - AM



OPTION 1



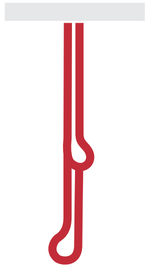
OPTION 2



Average Queuing Comparison - PM (4:30 - 5:30 PM)

Similarly to the AM peak, Option1 shows some queuing at Center and 2nd Ave in the PM peak, but slightly less significant.

Intersection of 2nd Street and 6th Ave also shows less traffic compared to the AM peak in both options.



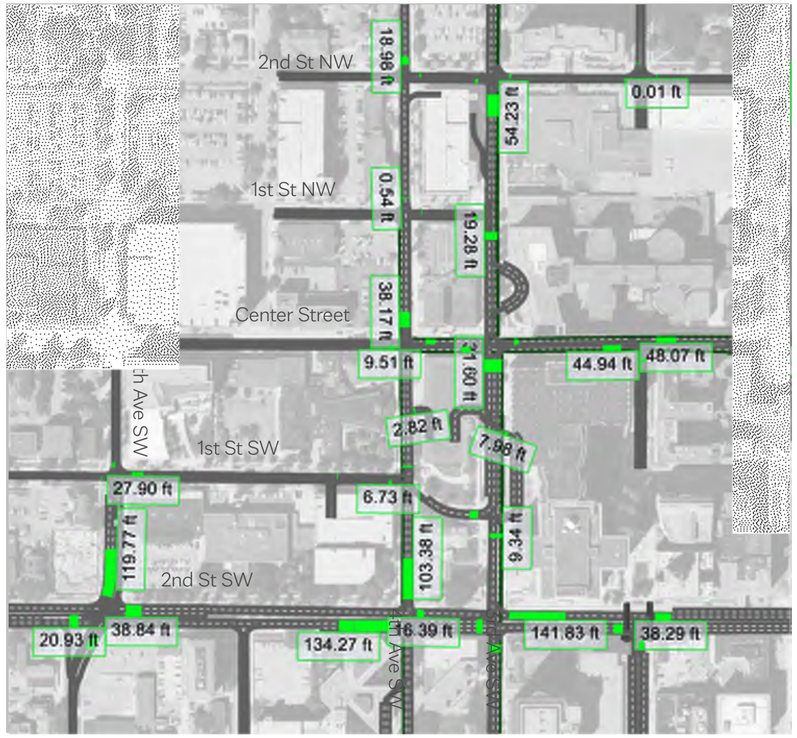


Queue

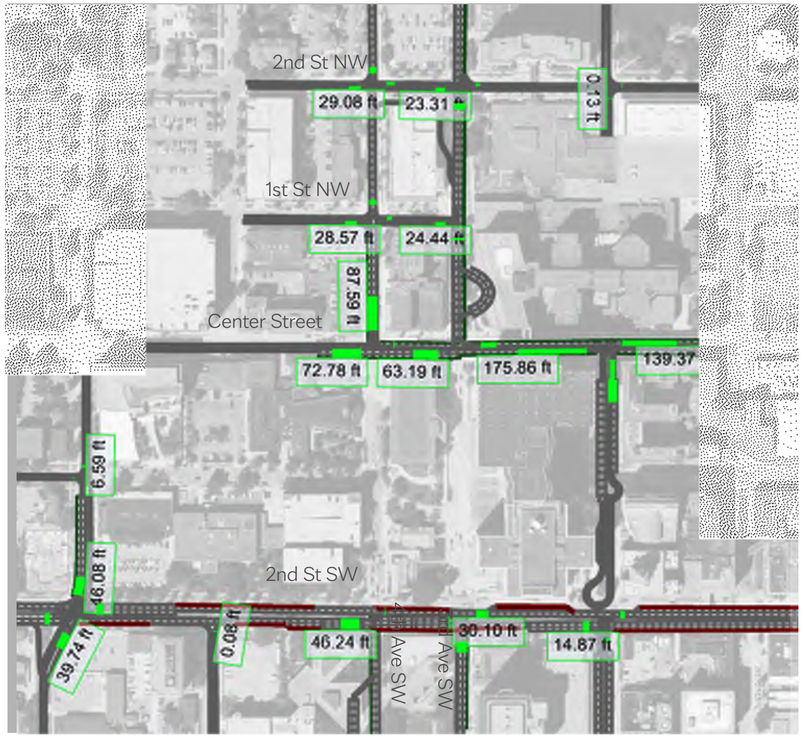
BRT

Bike lane

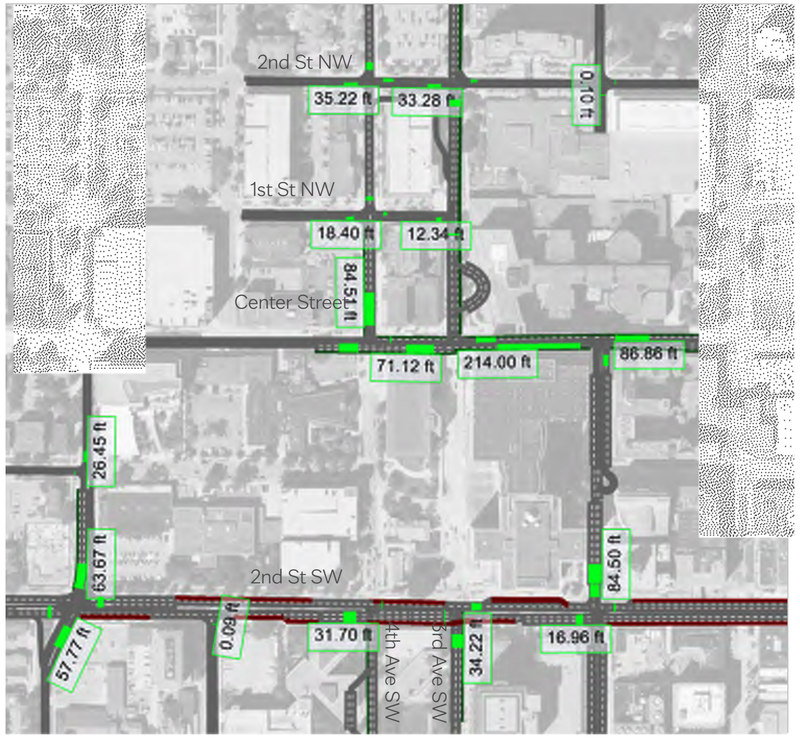
EXISTING CONDITION - PM



OPTION 1



OPTION 2



95th Percentile Queuing Comparison - PM (4:30 - 5:30 PM)

The simulation shows that the longest maximum queues are mostly concentrated ion Center Street where the concentration of flows is higher. In some cases the queue spills back into adjacent intersections. As expected, queues are worse in option 1 compared to option 2.

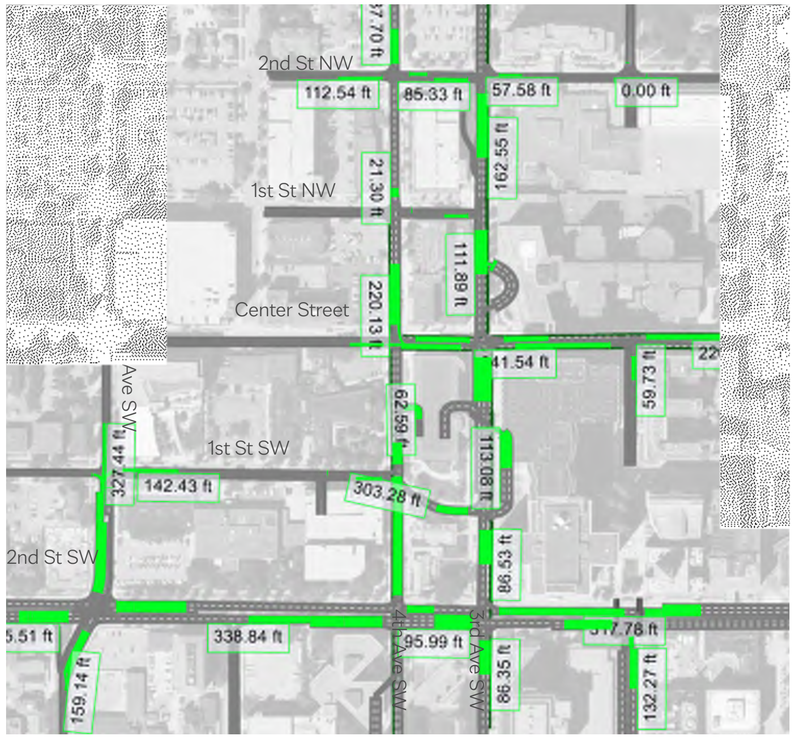
It should be noted that this condition reflects a worst case condition that might have occurred only once in all the simulations, the average delay and level of service provide a more accurate and comprehensive parameter.

Queue

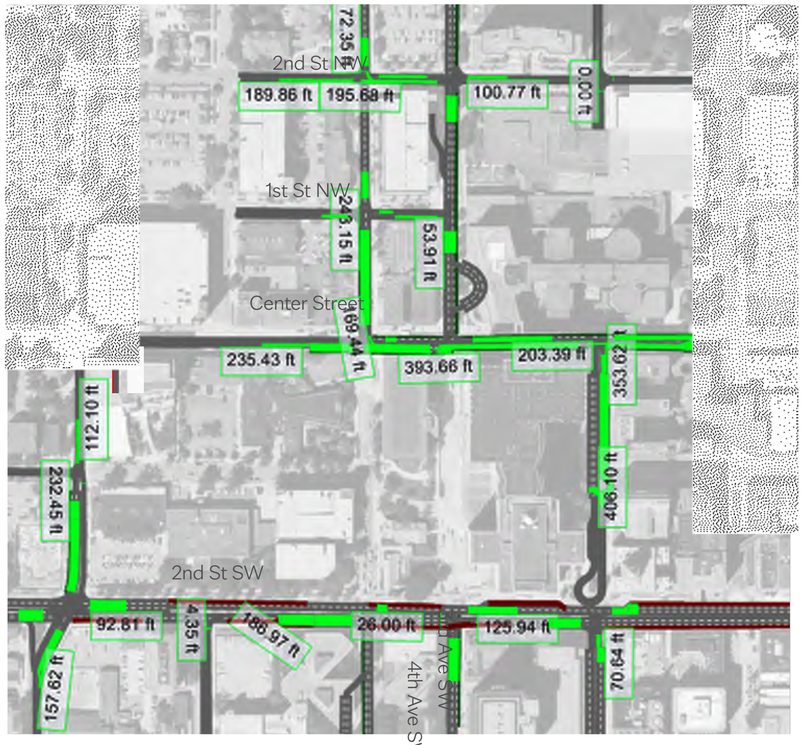
BRT

Bike lane

EXISTING CONDITION - AM



OPTION 1



OPTION 2



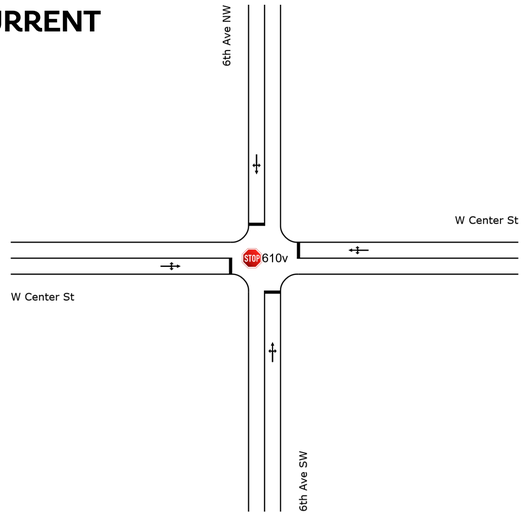
Intersection Location | W Center St - 6th Ave

There will be a change of flows on Center Street and 6th Avenue during the interim phases. For this reason the City asked to develop a detailed study of this intersection to determine whether the mitigation measures foreseen for the project scenario are needed before the project opens.

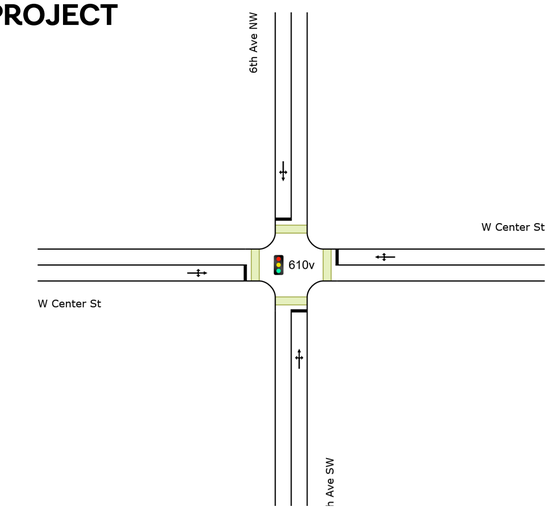
In the schemes below the mitigations proposed for the project scenario:

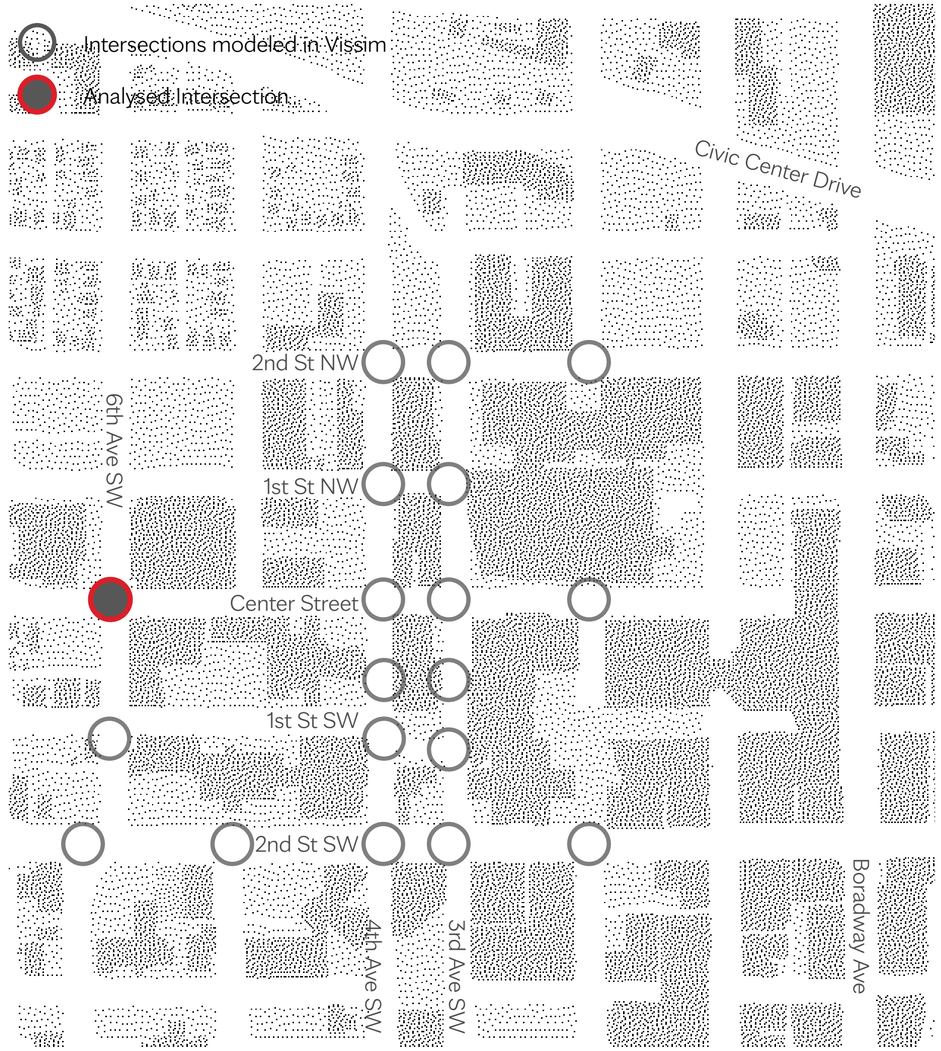
- addition of signal
- addition of left turn lanes on Center Street (of about 195 feet on each side)

CURRENT



PROJECT

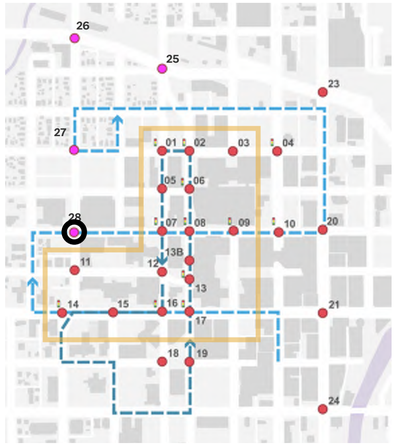


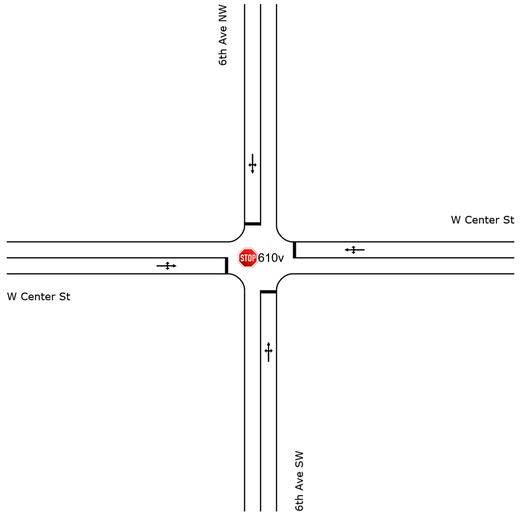


W Center St - 6th Ave | Existing Condition

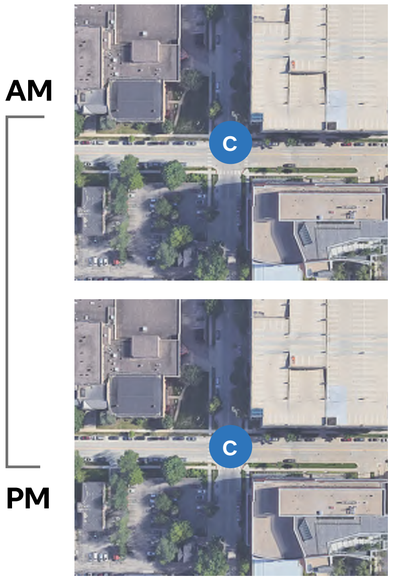
This intersection is currently all-way stop controlled with one lane per direction in all legs.

The intersection is currently characterized by an average delay of 21 seconds in the AM peak (LoS C) and 19 in the PM (LoS C).

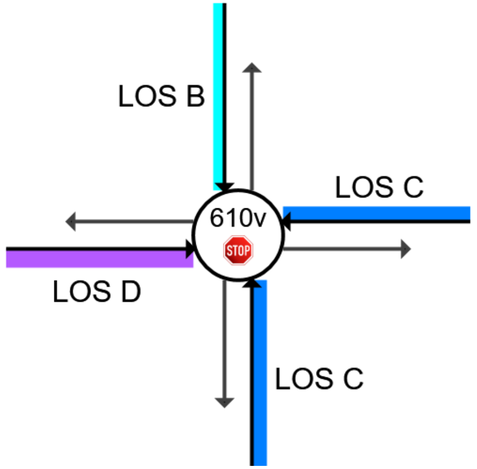




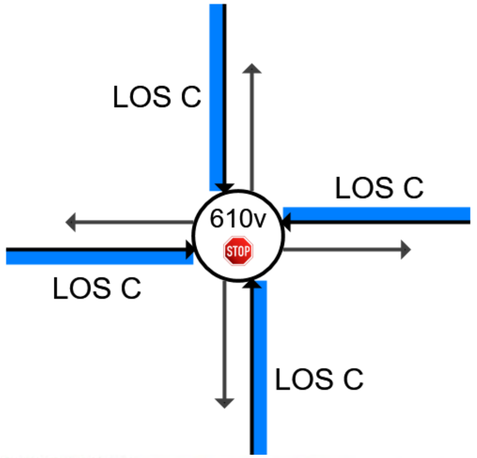
LOS and Saturation Degree is shown within the maximum range

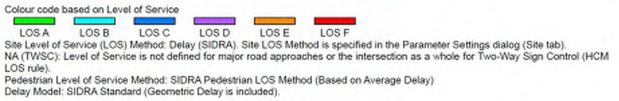


LOS - AM

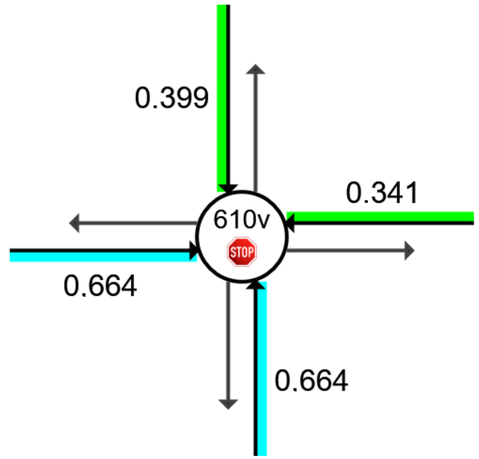


LOS - PM

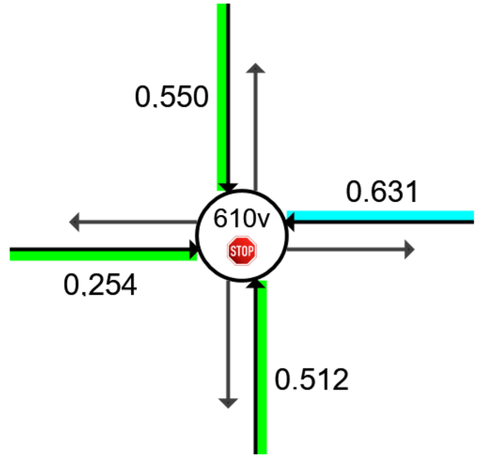




Degree of Saturation - AM



Degree of Saturation - PM

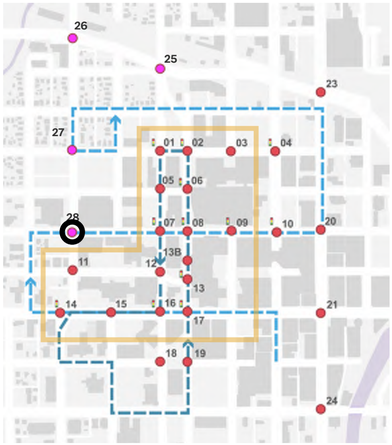


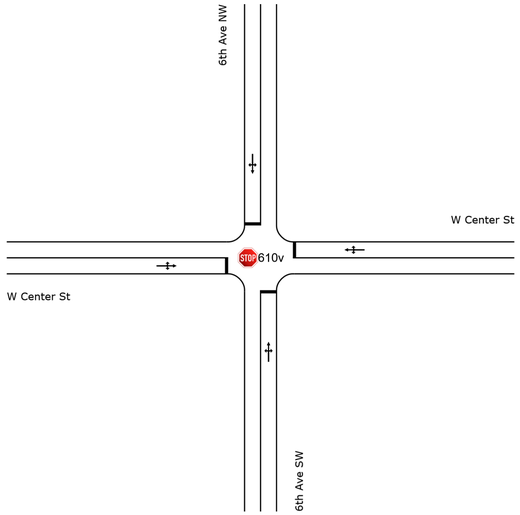


W Center St - 6th Ave | Interim Scenario - Unmitigated

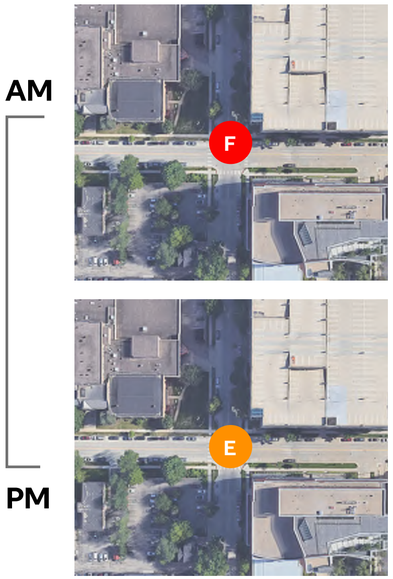
In this page we visualize the intersection, with the interim scenario traffic flows and an unmitigated layout.

As visible the delays and saturation on both Center Street and 6th Avenue don't meet the City engineering standards. In the next slide we present the possible mitigation measure to cope with this traffic growth.

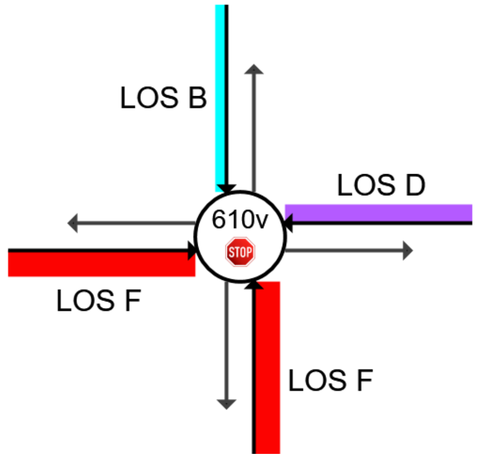




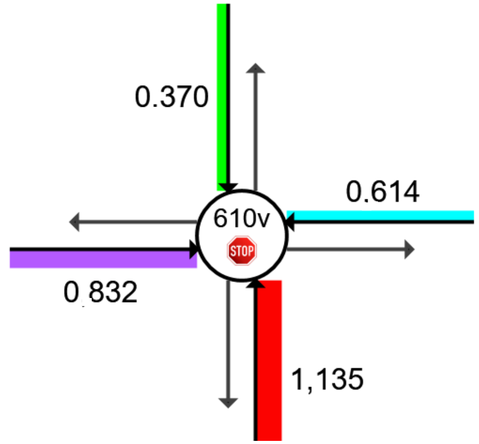
LOS and Saturation Degree is shown within the maximum range



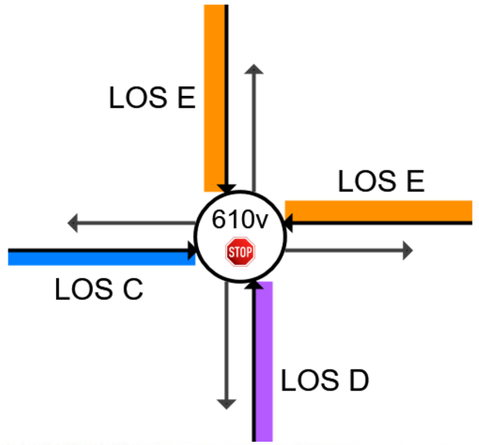
LOS - AM

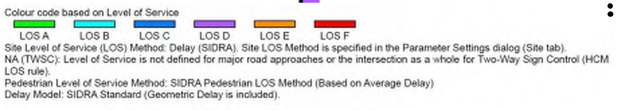


Degree of Saturation - AM

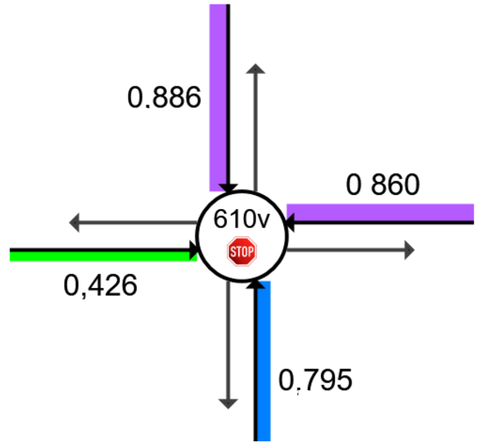


LOS - PM





Degree of Saturation - PM



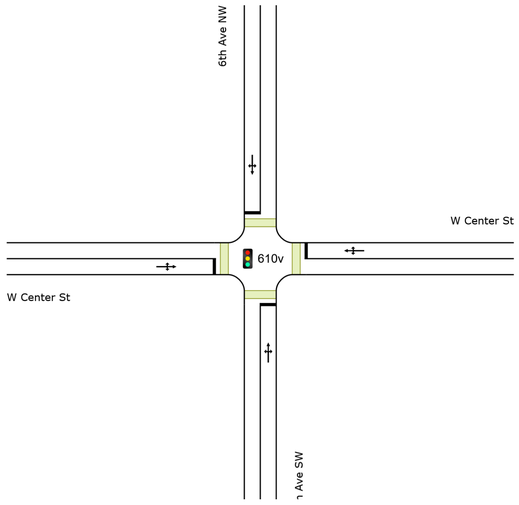


W Center St - 6th Ave | Interim Scenario - Mitigated (New signal)

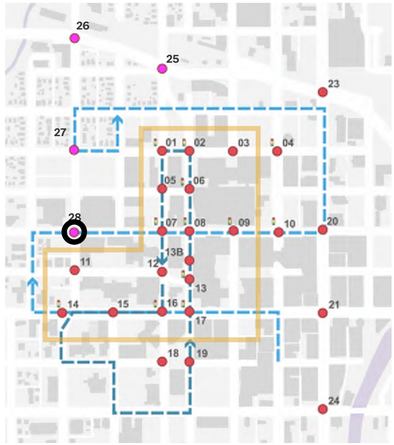
The mitigation proposed for the intersection is to turn it from all-way stop to signalized, as already foreseen in the 2045 project scenario.

The model suggests, that this mitigation is already required during the interim scenario in order to match the City engineering traffic standards.





LOS and Saturation Degree is shown within the maximum range

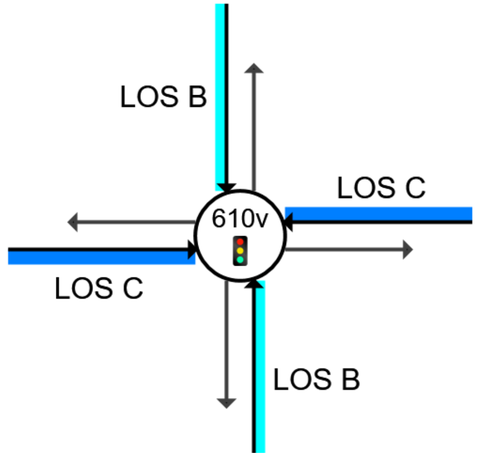


AM

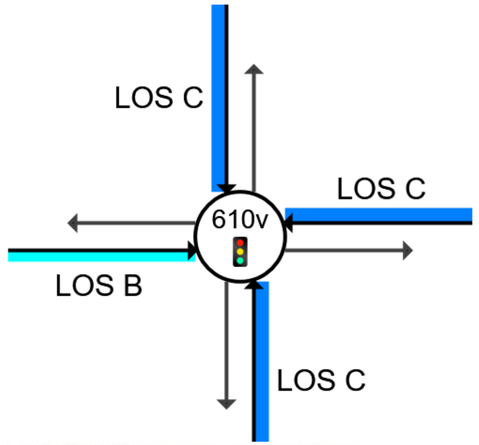
PM

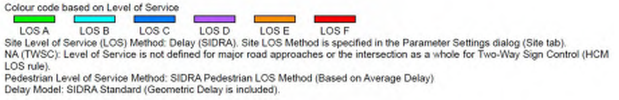


LOS - AM

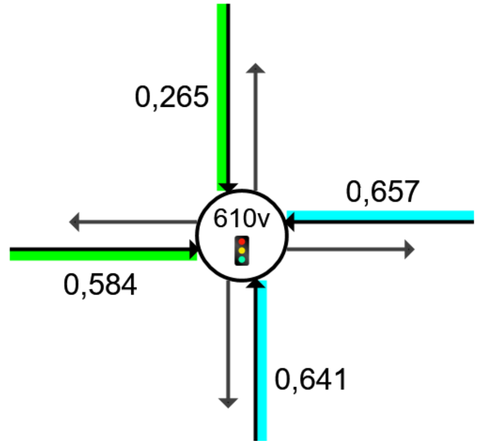


LOS - PM

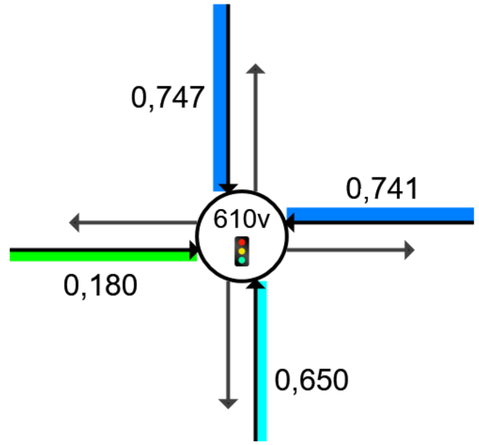




Degree of Saturation - AM



Degree of Saturation - PM





Mitigation Measures

The mitigation measures required in the simulated scenario are the following:

UNMITIGATED

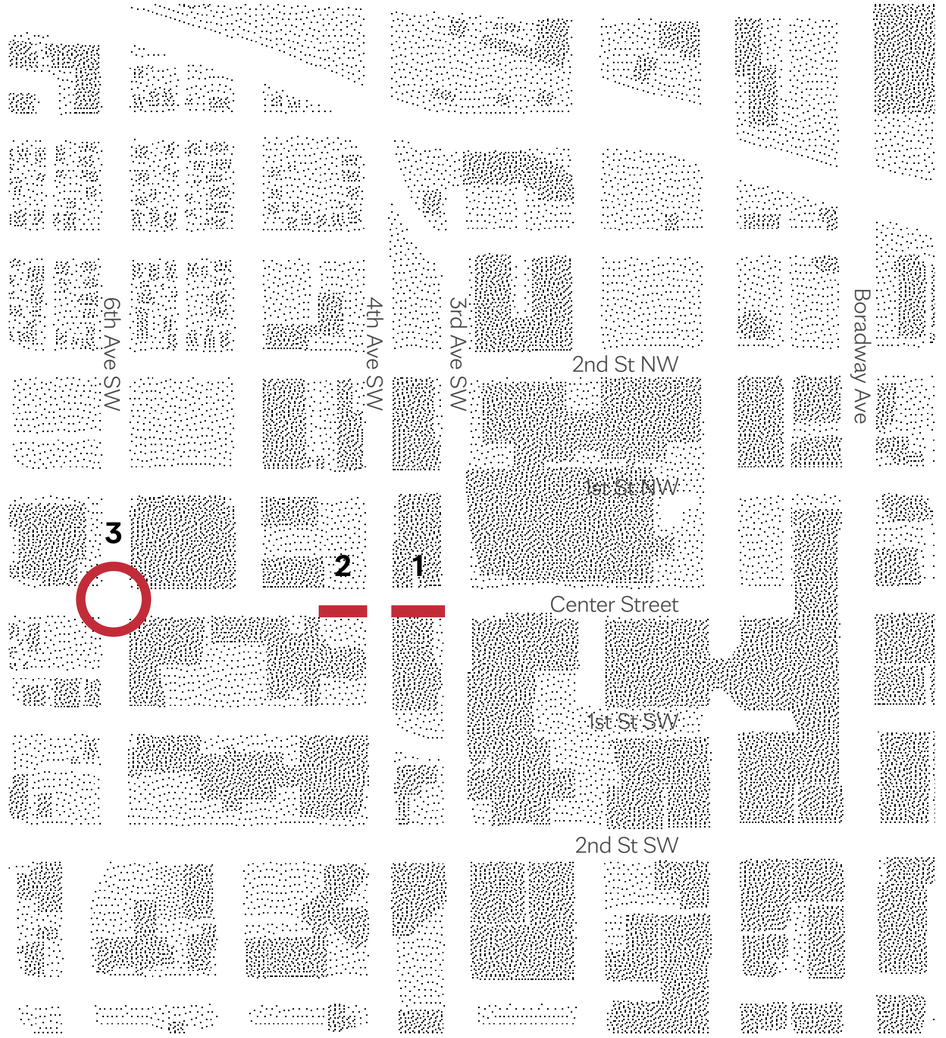
MITIGATED

1. Removal of on street parking and accommodation of new EB lane on W Center Street between 3rd and 4th Avenue SW

2. Removal of on street parking and accommodation of new EB lane on W Center Street, west of 4th Avenue SW (120 feet)

all way stop

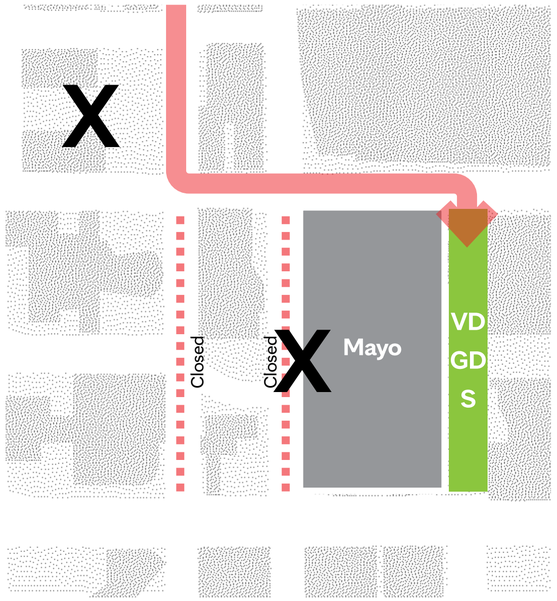
3. New traffic light on 6th ave and Center Street intersection



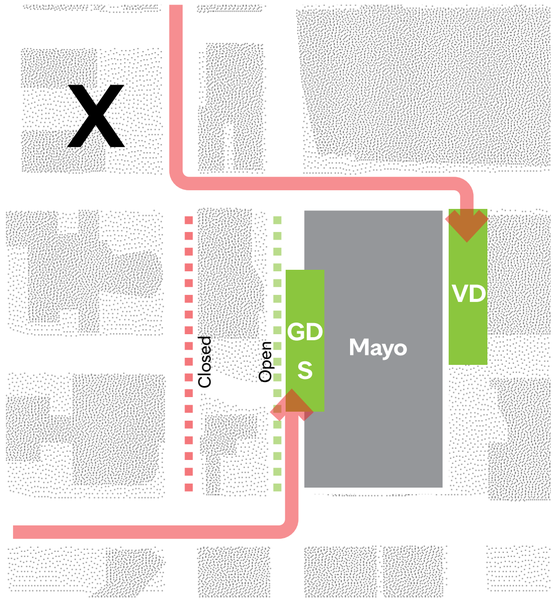
Conclusions

It is very important to note that the micro-simulations are run on the very worst-case scenario, which is not planned to occurr because the Interim phases will be split iin two. In this worst case scenario all Mayo drop-off flows will go to East Entrance and will therefore rely on Center Street. In reality Interim phase1 will keep a lot of traffic away from Center Street as it will still rely on West Gonda dropoff, while in Phase2 the new North Parking facility and drop-off pavilion will be operational and thanks to its entrance on 4th Avenue it will remove a significant portion of traffic from Center Street, decreasing congestion further.

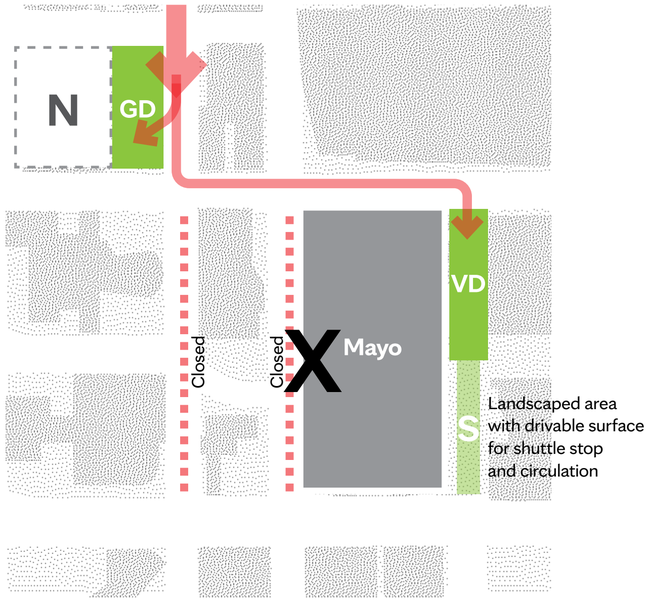
WORST CASE (SIMULATED SCENARIO)



INTERIM PHASE 1



INTERIM PHASE 2



* Depending on the valet usage scenario North Parking can be flexible in order to accommodate most needed use. (Valet or Self-parking)

VD - Valet Drop-off
S - Shuttle
GD - General Dropoff

Appendix

Node Evaluation Summary

Node Evaluation Summary

The City engineering standards require that the maximum LOS of the intersection is D and each single movement should not be worse than E. Highlighted in red and yellow the movements with LOS F or E.

Interim Option 1 AM

Node	Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
203	UNS	2nd St NW - 2nd Ave NW	2nd St Ave NW North to 2nd St NW West	N-W	SBR	0	0	A
			2nd St Ave NW North to Mayo Clinic Jacobson Building	N-S	SBT	35	1.38	A
			2nd St Ave NW North to 2nd St NW East	N-E	SBL	4	1.87	A
			2nd St NW East to 2nd St Ave NW North	E-N	WBR	20	0.84	A
			2nd St NW East to 2nd St NW West	E-W	WBT	93	0.55	A
			2nd St NW East to Mayo Clinic Jacobson Building	E-S	WBL	1	1.11	A
			Mayo Clinic Jacobson Building to 2nd St NW West	S-W	NBL	25	1.67	A
			Mayo Clinic Jacobson Building to 2nd St Ave NW North	S-N	NBT	8	2.12	A
			Mayo Clinic Jacobson Building to 2nd St NW East	S-E	NBR	7	1.3	A
			2nd St NW West to 2nd St Ave NW North	W-N	EBL	6	1.08	A
			2nd St NW West to 2nd St NW East	W-E	EBT	93	0.58	A
			2nd St NW West to Mayo Clinic Jacobson Building	W-S	EBR	31	0.77	A
			--	**Total**		**323**	**0.86**	**A**
209	SIG	W Center St - 2nd Ave SW	W Center East to W Center West	E-W	WBT	275	65.78	E
			W Center East to 2nd Ave SW South	E-S	WBL	122	73.01	E
			2nd Ave SW South to W Center West	S-W	NBL	148	50.92	D
			2nd Ave SW South to W Center East	S-E	NBR	171	27.6	C
			W Center West to W Center East	W-E	EBT	133	33.81	C
			W Center West to 2nd Ave SW South	W-S	EBR	202	32.86	C
			--	**Total**		**1052**	**47.97**	**D**
220	SIG	2nd St SW - 2nd Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	60	15.73	B
			2nd St SW East to 2nd Ave SW South	E-S	WBL	126	38.09	D
			2nd Ave SW South to 2nd St SW East	S-E	NBR	35	10.17	B
			2nd Ave SW South to 2nd St SW West	S-W	NBL	34	34.16	C
			2nd St SW West to 2nd Ave SW South	W-S	EBR	52	9.35	A
			2nd St SW West to 2nd St SW East	W-E	EBT	211	16.95	B
			--	**Total**		**518**	**21.87**	**C**
302	SIG	2nd St NW - 3rd Ave NW	2nd St NW East to 3rd Ave NW North	E-N	WBR	36	16.99	B
			2nd St NW East to 2nd St NW West	E-W	WBT	81	17.95	B
			3rd Ave NW South to 2nd St NW West	S-W	NBL	35	10.81	B
			3rd Ave NW South to 3rd Ave NW North	S-N	NBT	97	10.06	B
			3rd Ave NW South to 2nd St NW East	S-E	NBR	34	11.87	B
			2nd St NW West to 3rd Ave NW North	W-N	EBL	16	25.08	C
			2nd St NW West to 2nd St NW East	W-E	EBT	96	21.4	C
			--	**Total**		**396**	**15.86**	**B**
306	SIG	1 st St NW - 3rd Ave NW	3rd Ave NW South to 1st St NW West	S-W	NBL	35	11.03	B
			3rd Ave NW South to 3rd Ave NW North	S-N	NBT	175	8.67	A
			1st St NW West to 3rd Ave NW North	W-N	EBL	153	48.87	D
			--	**Total**		**363**	**25.93**	**C**
308	SIG	W Center St - 3rd Ave NW	W Center East to 3rd Ave NW North	E-N	WBR	145	28.91	C
			W Center East to W Center West	E-W	WBT	277	33.39	C
			W Center West to 3rd Ave NW North	W-N	EBL	66	18.38	B
			W Center West to W Center East	W-E	EBT	335	16.06	B
			--	**Total**		**823**	**24.47**	**C**
319	SIG	2nd St SW - 3rd Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	102	29.72	C
			3rd Ave SW South to 2nd St SW West	S-W	NBL	137	38.05	D
			3rd Ave SW South to 2nd St SW East	S-E	NBR	62	28.6	C
			2nd St SW West to 2nd St SW East	W-E	EBT	202	0.74	A
			--	**Total**		**504**	**20.19**	**C**
401	SIG	2nd St NW - 4th Ave NW	4th Ave NW North to 2nd St NW East	N-W	SBR	59	14.57	B
			4th Ave NW North to 4th Ave NW South	N-S	SBT	406	13.1	B
			4th Ave NW North to 2nd St NW East	N-E	SBL	75	13.51	B
			2nd St NW East to 2nd St NW East	E-W	WBT	14	47.45	D
			2nd St NW East to 4th Ave NW South	E-S	WBL	102	48.33	D
			2nd St NW East to 2nd St NW East	W-E	EBT	38	24.3	C
			2nd St NW East to 4th Ave NW South	W-S	EBR	21	24.39	C
			--	**Total**		**714**	**19.9**	**B**
405	UNS	1 st St NW - 4th Ave NW	4th Ave NW North to 1st St NW West	N-W	SBR	303	4.17	A
			4th Ave NW North to 4th Ave NW South	N-S	SBT	151	2.64	A
			4th Ave NW North to 1st St NW East	N-E	SBL	99	3.24	A
			1st St NW East to 1st St NW West	E-W	WBT	20	2.82	A
			1st St NW East to 4th Ave NW South	E-S	WBL	16	2.88	A
			1st St NW West to 1st St NW East	W-E	EBT	54	4.44	A
			1st St NW West to 4th Ave NW South	W-S	EBR	117	1.99	A
			--	**Total**		**760**	**3.37**	**A**
407	SIG	W Center St - 4th Ave NW	4th Ave NW North to W Center West	N-W	SBR	103	8.31	A
			4th Ave NW North to W Center East	N-E	SBL	181	26.48	C
			W Center East to W Center West	E-W	WBT	278	5.04	A
			W Center West to W Center East	W-E	EBT	220	25.51	C
			--	**Total**		**781**	**16.28**	**B**
418	SIG	2nd St SW - 4th Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	189	2.17	A
			2nd St SW East to 4th Ave SW South	E-S	WBL	50	2.49	A
			2nd St SW West to 2nd St SW East	W-E	EBT	202	28.91	C
			2nd St SW West to 4th Ave SW South	W-S	EBR	89	7.14	A
			--	**Total**		**531**	**13.27**	**B**
517	UNS	2nd St SW - 5th Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	190	0.98	A
			5th Ave SW South to 2nd St SW East	S-E	NBR	63	1.07	A
			2nd St SW West to 2nd St SW East	W-E	EBT	229	0.33	A
			2nd St SW West to 5th Ave SW South	W-S	EBR	109	1.22	A
			--	**Total**		**591**	**0.78**	**A**
613	UNS	1st St SW - 6th Ave SW	6th Ave SW North to 1st St SW West	N-W	SBR	17	0.8	A
			6th Ave SW North to 6th Ave SW South	N-S	SBT	282	0.53	A
			6th Ave SW South to 1st St SW West	S-W	NBL	9	2.18	A
			6th Ave SW South to 6th Ave SW North	S-N	NBT	540	0.5	A
			1st St SW West to 6th Ave SW North	W-N	EBL	36	6.71	A
			1st St SW West to 6th Ave SW South	W-S	EBR	89	3.07	A
			--	**Total**		**975**	**1**	**A**
616	SIG	2nd St SW - 6th Ave SW	6th Ave SW North to 2nd St SW West	N-W	SBR	73	16.96	B
			6th Ave SW North to 6th Ave SW South	N-SW	SBT	110	27.01	C
			6th Ave SW North to 2nd St SW East	N-E	SBL	186	35.62	D
			2nd St SW East to 6th Ave SW North	E-N	WBR	85	15.58	B
			2nd St SW East to 2nd St SW West	E-W	WBT	88	39.77	D
			2nd St SW East to 6th Ave SW South	E-SW	WBL	18	39.05	D
			6th Ave SW South to 2nd St SW West	SW-W	NBL	27	37.1	D
			6th Ave SW South to 6th Ave SW North	SW-N	NBT	240	47.18	D
			6th Ave SW South to 2nd St SW East	SW-E	NBR	22	40.33	D
			2nd St SW West to 6th Ave SW North	W-N	EBL	225	73.27	E
			2nd St SW West to 2nd St SW East	W-E	EBT	130	25.19	C
			2nd St SW West to 6th Ave SW South Bypass	W-S	EBR	65	8.77	A
			--	**Total**		**1268**	**39.5**	**D**
701	UNS	Dropoff East	East Dropoff North to East Dropoff South	N-S	SBT	20	3.01	A
			East Dropoff North to East Dropoff North	N-N	SBU	302	24.77	C
			--	**Total**		**342**	**23.89**	**C**
0		**NETWORK TOTALS**				**11330**	**24.39866**	

Interim Option 1 PM

Node	Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
203	UNS	2nd St NW - 2nd Ave NW	2nd St Ave NW North to 2nd St NW West	N-W	SBR	4	1.24	A
			2nd St Ave NW North to Mayo Clinic Jacobson Building	N-S	SBT	16	1.75	A
			2nd St Ave NW North to 2nd St NW East	N-E	SBL	0	0	A
			2nd St NW East to 2nd St Ave NW North	E-N	WBR	37	0.76	A
			2nd St NW East to 2nd St NW West	E-W	WBT	86	0.61	A
			2nd St NW East to Mayo Clinic Jacobson Building	E-S	WBL	5	1.41	A
			Mayo Clinic Jacobson Building to 2nd St NW West	S-W	NBL	95	2.2	A
			Mayo Clinic Jacobson Building to 2nd St Ave NW North	S-N	NBT	19	2.82	A
			Mayo Clinic Jacobson Building to 2nd St NW East	S-E	NBR	18	1.59	A
			2nd St NW West to 2nd St Ave NW North	W-N	EBL	4	1.39	A
			2nd St NW West to 2nd St NW East	W-E	EBT	154	0.37	A
			2nd St NW West to Mayo Clinic Jacobson Building	W-S	EBR	11	0.53	A
			--	**Total**		**449**	**1.07**	**A**
209	SIG	W Center St - 2nd Ave SW	W Center East to W Center West	E-W	WBT	91	84.05	F
			W Center East to 2nd Ave SW South	E-S	WBL	145	100.29	F
			2nd Ave SW South to W Center West	S-W	NBL	156	51.27	D
			2nd Ave SW South to W Center East	S-E	NBR	223	33.96	C
			W Center West to W Center East	W-E	EBT	250	37.73	D
			W Center West to 2nd Ave SW South	W-S	EBR	241	45.33	D
			--	**Total**		**1105**	**52.64**	**D**
220	SIG	2nd St SW - 2nd Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	181	16.39	B
			2nd St SW East to 2nd Ave SW South	E-S	WBL	3	29.63	C
			2nd Ave SW South to 2nd St SW East	S-E	NBR	54	12.77	B
			2nd Ave SW South to 2nd St SW West	S-W	NBL	46	35.69	D
			2nd St SW West to 2nd Ave SW South	W-S	EBR	182	12.82	B
			2nd St SW West to 2nd St SW East	W-E	EBT	123	16.93	B
			--	**Total**		**589**	**16.72**	**B**
302	SIG	2nd St NW - 3rd Ave NW	2nd St NW East to 3rd Ave NW North	E-N	WBR	75	11.72	B
			2nd St NW East to 2nd St NW West	E-W	WBT	108	14.11	B
			3rd Ave NW South to 2nd St NW West	S-W	NBL	8	30.39	C
			3rd Ave NW South to 3rd Ave NW North	S-N	NBT	176	24.12	C
			3rd Ave NW South to 2nd St NW East	S-E	NBR	12	25.43	C
			2nd St NW West to 3rd Ave NW North	W-N	EBL	196	12.03	B
			2nd St NW West to 2nd St NW East	W-E	EBT	157	10.93	B
			--	**Total**		**732**	**15.34**	**B**
306	SIG	1 st St NW - 3rd Ave NW	3rd Ave NW South to 1st St NW West	S-W	NBL	25	34.12	C
			3rd Ave NW South to 3rd Ave NW North	S-N	NBT	119	8.08	A
			1st St NW West to 3rd Ave NW North	W-N	EBL	111	38.67	D
			--	**Total**		**254**	**23.82**	**C**
308	SIG	W Center St - 3rd Ave NW	W Center East to 3rd Ave NW North	E-N	WBR	83	21.49	C
			W Center East to W Center West	E-W	WBT	164	28.94	C
			W Center West to 3rd Ave NW North	W-N	EBL	61	27.88	C
			W Center West to W Center East	W-E	EBT	489	40.59	D
			--	**Total**		**797**	**35.28**	**D**
319	SIG	2nd St SW - 3rd Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	237	35.85	D
			3rd Ave SW South to 2nd St SW West	S-W	NBL	105	40.75	D
			3rd Ave SW South to 2nd St SW East	S-E	NBR	94	31.18	C
			2nd St SW West to 2nd St SW East	W-E	EBT	212	0.68	A
			--	**Total**		**648**	**24.47**	**C**
401	SIG	2nd St NW - 4th Ave NW	4th Ave NW North to 2nd St NW East	N-W	SBR	30	24.03	C
			4th Ave NW North to 4th Ave NW South	N-S	SBT	126	22.05	C
			4th Ave NW North to 2nd St NW East	N-E	SBL	37	24.54	C
			2nd St NW East to 2nd St NW East	E-W	WBT	57	25.29	C
			2nd St NW East to 4th Ave NW South	E-S	WBL	59	36.07	D
			2nd St NW East to 2nd St NW East	W-E	EBT	316	16.07	B
			2nd St NW East to 4th Ave NW South	W-S	EBR	39	15.76	B
			--	**Total**		**664**	**20.58**	**C**

Node Evaluation Summary

The City engineering standards require that the maximum LOS of the intersection is D and each single movement should not be worse than E. Highlighted in red and yellow the movements with LOS F or E.

Interim Option 1 PM

Node	Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
203	UNS	2nd St NW - 2nd Ave NW	2nd St Ave NW North to 2nd St NW West	N-W	SBR	4	1.24	A
			2nd St Ave NW North to Mayo Clinic Jacobson Building	N-S	SBT	16	1.75	A
			2nd St Ave NW North to 2nd St NW East	N-E	SBL	0	0	A
			2nd St NW East to 2nd St Ave NW North	E-N	WBR	37	0.76	A
			2nd St NW East to 2nd St NW West	E-W	WBT	86	0.61	A
			2nd St NW East to Mayo Clinic Jacobson Building	E-S	WBL	5	1.41	A
			Mayo Clinic Jacobson Building to 2nd St NW West	S-W	NBL	95	2.2	A
			Mayo Clinic Jacobson Building to 2nd St Ave NW North	S-N	NBT	19	2.82	A
			Mayo Clinic Jacobson Building to 2nd St NW East	S-E	NBR	18	1.59	A
			2nd St NW West to 2nd St Ave NW North	W-N	EBL	4	1.39	A
			2nd St NW West to 2nd St NW East	W-E	EBT	154	0.37	A
			2nd St NW West to Mayo Clinic Jacobson Building	W-S	EBR	11	0.53	A
			--	**Total**		**449**	**1.07**	**A**
209	SIG	W Center St - 2nd Ave SW	W Center East to W Center West	E-W	WBT	91	84.05	F
			W Center East to 2nd Ave SW South	E-S	WBL	145	100.29	F
			2nd Ave SW South to W Center West	S-W	NBL	156	51.27	D
			2nd Ave SW South to W Center East	S-E	NBR	223	33.96	C
			W Center West to W Center East	W-E	EBT	250	37.73	D
			W Center West to 2nd Ave SW South	W-S	EBR	241	45.33	D
			--	**Total**		**1105**	**52.64**	**D**
220	SIG	2nd St SW - 2nd Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	181	16.39	B
			2nd St SW East to 2nd Ave SW South	E-S	WBL	3	29.63	C
			2nd Ave SW South to 2nd St SW East	S-E	NBR	54	12.77	B
			2nd Ave SW South to 2nd St SW West	S-W	NBL	46	35.69	D
			2nd St SW West to 2nd Ave SW South	W-S	EBR	182	12.82	B
			2nd St SW West to 2nd St SW East	W-E	EBT	123	16.93	B
			--	**Total**		**589**	**16.72**	**B**
302	SIG	2nd St NW - 3rd Ave NW	2nd St NW East to 3rd Ave NW North	E-N	WBR	75	11.72	B
			2nd St NW East to 2nd St NW West	E-W	WBT	108	14.11	B
			3rd Ave NW South to 2nd St NW West	S-W	NBL	8	30.39	C
			3rd Ave NW South to 3rd Ave NW North	S-N	NBT	176	24.12	C
			3rd Ave NW South to 2nd St NW East	S-E	NBR	12	25.43	C
			2nd St NW West to 3rd Ave NW North	W-N	EBL	196	12.03	B
			2nd St NW West to 2nd St NW East	W-E	EBT	157	10.93	B
			--	**Total**		**732**	**15.34**	**B**
306	SIG	1 st St NW - 3rd Ave NW	3rd Ave NW South to 1st St NW West	S-W	NBL	25	34.12	C
			3rd Ave NW South to 3rd Ave NW North	S-N	NBT	119	8.08	A
			1st St NW West to 3rd Ave NW North	W-N	EBL	111	38.67	D
			--	**Total**		**254**	**23.82**	**C**
308	SIG	W Center St - 3rd Ave NW	W Center East to 3rd Ave NW North	E-N	WBR	83	21.49	C
			W Center East to W Center West	E-W	WBT	164	28.94	C
			W Center West to 3rd Ave NW North	W-N	EBL	61	27.88	C
			W Center West to W Center East	W-E	EBT	489	40.59	D
			--	**Total**		**797**	**35.28**	**D**
319	SIG	2nd St SW - 3rd Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	237	35.85	D
			3rd Ave SW South to 2nd St SW West	S-W	NBL	105	40.75	D
			3rd Ave SW South to 2nd St SW East	S-E	NBR	94	31.18	C
			2nd St SW West to 2nd St SW East	W-E	EBT	212	0.68	A
			--	**Total**		**648**	**24.47**	**C**
401	SIG	2nd St NW - 4th Ave NW	4th Ave NW North to 2nd St NW East	N-W	SBR	30	24.03	C
			4th Ave NW North to 4th Ave NW South	N-S	SBT	126	22.05	C
			4th Ave NW North to 2nd St NW East	N-E	SBL	37	24.54	C
			2nd St NW East to 2nd St NW East	E-W	WBT	57	25.29	C
			2nd St NW East to 4th Ave NW South	E-S	WBL	59	36.07	D
			2nd St NW East to 2nd St NW East	W-E	EBT	316	16.07	B
			2nd St NW East to 4th Ave NW South	W-S	EBR	39	15.76	B
			--	**Total**		**664**	**20.58**	**C**
405	UNS	1 st St NW - 4th Ave NW	4th Ave NW North to 1st St NW West	N-W	SBR	120	3.09	A
			4th Ave NW North to 4th Ave NW South	N-S	SBT	173	18.32	C
			4th Ave NW North to 1st St NW East	N-E	SBL	41	15.99	C
			1st St NW East to 1st St NW West	E-W	WBT	3	114.59	F
			1st St NW East to 4th Ave NW South	E-S	WBL	21	63.38	F
			1st St NW West to 1st St NW East	W-E	EBT	69	52.17	F
			1st St NW West to 4th Ave NW South	W-S	EBR	51	57.14	F
			--	**Total**		**477**	**23.23**	**C**
407	SIG	W Center St - 4th Ave NW	4th Ave NW North to W Center West	N-W	SBR	26	20.13	C
			4th Ave NW North to W Center East	N-E	SBL	215	62.39	E
			W Center East to W Center West	E-W	WBT	164	3.44	A
			W Center West to W Center East	W-E	EBT	335	51.43	D
			--	**Total**		**739**	**42.5**	**D**
418	SIG	2nd St SW - 4th Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	304	2.7	A
			2nd St SW East to 4th Ave SW South	E-S	WBL	38	3.83	A
			2nd St SW West to 2nd St SW East	W-E	EBT	212	35.65	D
			2nd St SW West to 4th Ave SW South	W-S	EBR	154	12.07	B
			--	**Total**		**708**	**14.73**	**B**
517	UNS	2nd St SW - 5th Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	305	0.75	A
			5th Ave SW South to 2nd St SW East	S-E	NBR	59	1.14	A
			2nd St SW West to 2nd St SW East	W-E	EBT	307	0.29	A
			2nd St SW West to 5th Ave SW South	W-S	EBR	44	1.1	A
			--	**Total**		**715**	**0.61**	**A**
613	UNS	1st St SW - 6th Ave SW	6th Ave SW North to 1st St SW West	N-W	SBR	69	2.37	A
			6th Ave SW North to 6th Ave SW South	N-S	SBT	531	3.36	A
			6th Ave SW South to 1st St SW West	S-W	NBL	47	5.33	A
			6th Ave SW South to 6th Ave SW North	S-N	NBT	289	0.83	A
			1st St SW West to 6th Ave SW North	W-N	EBL	23	6.34	A
			1st St SW West to 6th Ave SW South	W-S	EBR	16	4.83	A
			--	**Total**		**975**	**2.74**	**A**
616	SIG	2nd St SW - 6th Ave SW	6th Ave SW North to 2nd St SW West	N-W	SBR	140	15.6	B
			6th Ave SW North to 6th Ave SW South	N-SW	SBT	235	20.22	C
			6th Ave SW North to 2nd St SW East	N-E	SBL	173	17.6	B
			2nd St SW East to 6th Ave SW North	E-N	WBR	103	7.36	A
			2nd St SW East to 2nd St SW West	E-W	WBT	151	19.08	B
			2nd St SW East to 6th Ave SW South	E-SW	WBL	51	32.46	C
			6th Ave SW South to 2nd St SW West	SW-W	NBL	130	42.72	D
			6th Ave SW South to 6th Ave SW North	SW-N	NBT	165	25.92	C
			6th Ave SW South to 2nd St SW East	SW-E	NBR	18	17.6	B
			2nd St SW West to 6th Ave SW North	W-N	EBL	67	25.88	C
			2nd St SW West to 2nd St SW East	W-E	EBT	160	17.44	B
			2nd St SW West to 6th Ave SW South Bypass	W-S	EBR	63	1.42	A
			--	**Total**		**1456**	**20.68**	**C**
701	UNS	Dropoff East	East Dropoff North to East Dropoff South	N-S	SBT	20	7.47	A
			East Dropoff North to East Dropoff North	N-N	SBU	362	36.04	E
			--	**Total**		**402**	**36.22**	**E**
0		**NETWORK TOTALS**				**12238**	**23.0924**	

Interim Option 2 AM (recommended)

Node	Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
203	UNS	2nd St NW - 2nd Ave NW	2nd St Ave NW North to 2nd St NW West	N-W	SBR	0	0	A
			2nd St Ave NW North to Mayo Clinic Jacobson Building	N-S	SBT	39	1.51	A
			2nd St Ave NW North to 2nd St NW East	N-E	SBL	3	2.36	A
			2nd St NW East to 2nd St Ave NW North	E-N	WBR	17	0.8	A
			2nd St NW East to 2nd St NW West	E-W	WBT	84	0.58	A
			2nd St NW East to Mayo Clinic Jacobson Building	E-S	WBL	12	1.43	A
			Mayo Clinic Jacobson Building to 2nd St NW West	S-W	NBL	32	1.69	A
			Mayo Clinic Jacobson Building to 2nd St Ave NW North	S-N	NBT	6	2.09	A
			Mayo Clinic Jacobson Building to 2nd St NW East	S-E	NBR	7	1.54	A
			2nd St NW West to 2nd St Ave NW North	W-N	EBL	6	0.91	A
			2nd St NW West to 2nd St NW East	W-E	EBT	99	0.58	A
			2nd St NW West to Mayo Clinic Jacobson Building	W-S	EBR	32	0.86	A
			--	**Total**		**338**	**0.94**	**A**
209	SIG	W Center St - 2nd Ave SW	W Center East to W Center West	E-W	WBT	303	19.33	B
			W Center East to 2nd Ave SW South	E-S	WBL	131	23.52	C
			2nd Ave SW South to W Center West	S-W	NBL	85	53.75	D
			2nd Ave SW South to W Center East	S-E	NBR	43	15.08	B
			W Center West to W Center East	W-E	EBT	120	27.73	C
			W Center West to 2nd Ave SW South	W-S	EBR	213	23	C
			--	**Total**		**894**	**25.06**	**C**
220	SIG	2nd St SW - 2nd Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	6	20.84	C
			2nd St SW East to 2nd Ave SW South	E-S	WBL	114	61.17	E
			2nd Ave SW South to 2nd St SW East	S-E	NBR	36	7.9	A
			2nd Ave SW South to 2nd St SW West	S-W	NBL	11	25.48	C
			2nd St SW West to 2nd Ave SW South	W-S	EBR	49	11.15	B
			2nd St SW West to 2nd St SW East	W-E	EBT	213	20.95	C
			Dropoff East to 2nd St SW West	N-W	SBR	110	38.55	D
			Dropoff East to 2nd Ave SW South	N-S	SBT	10	47.39	D
			Dropoff East to 2nd St SW East	N-E	SBL	90	54.26	D
			--	**Total**		**638**	**35.03**	**D**
302	SIG	2nd St NW - 3rd Ave NW	2nd St NW East to 3rd Ave NW North	E-N	WBR	39	17.66	B
			2nd St NW East to 2nd St NW West	E-W	WBT	78	17.3	B
			3rd Ave NW South to 2nd St NW West	S-W	NBL	36	10.36	B
			3rd Ave NW South to 3rd Ave NW North	S-N	NBT	95	10.69	B
			3rd Ave NW South to 2nd St NW East	S-E	NBR	35	11.9	B
			2nd St NW West to 3rd Ave NW North	W-N	EBL	18	24.85	C
			2nd St NW West to 2nd St NW East	W-E	EBT	103	22.43	C
			--	**Total**		**403**	**16.38**	**B**
306	SIG	1 st St NW - 3rd Ave NW	3rd Ave NW South to 1st St NW West	S-W	NBL	35	11.43	B
			3rd Ave NW South to 3rd Ave NW North	S-N	NBT	181	9.08	A
			1st St NW West to 3rd Ave NW North	W-N	EBL	150	48.59	D
			--	**Total**		**366**	**25.51**	**C**
308	SIG	W Center St - 3rd Ave NW	W Center East to 3rd Ave NW North	E-N	WBR	154	25.96	C
			W Center East to W Center West	E-W	WBT	234	31.89	C
			W Center West to 3rd Ave NW North	W-N	EBL	65	18	B
			W Center West to W Center East	W-E	EBT	332	15.34	B
			--	**Total**		**784**	**22.65**	**C**
319	SIG	2nd St SW - 3rd Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	134	29.33	C
			3rd Ave SW South to 2nd St SW West	S-W	NBL	181	39.67	D
			3rd Ave SW South to 2nd St SW East	S-E	NBR	68	32.71	C
			2nd St SW West to 2nd St SW East	W-E	EBT	196	0.84	A
			--	**Total**		**579**	**23.33**	**C**
401	SIG	2nd St NW - 4th Ave NW	4th Ave NW North to 2nd St NW East	N-W	SBR	71	14.84	B
			4th Ave NW North to 4th Ave NW South	N-S	SBT	415	13.43	B
			4th Ave NW North to 2nd St NW East	N-E	SBL	70	13.18	B
			2nd St NW East to 2nd St NW East	E-W	WBT	9	45.52	D
			2nd St NW East to 4th Ave NW South	E-S	WBL	104	50.24	D
			2nd St NW East to 2nd St NW East	W-E	EBT	51	22.78	C
			2nd St NW East to 4th Ave NW South	W-S	EBR	21	24.94	C
			--	**Total**		**742**	**20.13**	**C**

Node Evaluation Summary

The City engineering standards require that the maximum LOS of the intersection is D and each single movement should not be worse than E. Highlighted in red and yellow the movements with LOS F or E.

Interim Option 2 AM (recommended)

Node	Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
405	UNS	1 st St NW - 4th Ave NW	4th Ave NW North to 1st St NW West	N-W	SBR	287	4.13	A
			4th Ave NW North to 4th Ave NW South	N-S	SBT	179	2.71	A
			4th Ave NW North to 1st St NW East	N-E	SBL	100	2.92	A
			1st St NW East to 1st St NW West	E-W	WBT	19	3.02	A
			1st St NW East to 4th Ave NW South	E-S	WBL	16	3.01	A
			1st St NW West to 1st St NW East	W-E	EBT	50	3.83	A
			1st St NW West to 4th Ave NW South	W-S	EBR	141	2.03	A
			--	**Total**		**793**	**3.22**	**A**
407	SIG	W Center St - 4th Ave NW	4th Ave NW North to W Center West	N-W	SBR	120	8.85	A
			4th Ave NW North to W Center East	N-E	SBL	217	26.07	C
			W Center East to W Center West	E-W	WBT	234	3.75	A
			W Center West to W Center East	W-E	EBT	180	23.51	C
			--	**Total**		**750**	**15.78**	**B**
418	SIG	2nd St SW - 4th Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	264	2	A
			2nd St SW East to 4th Ave SW South	E-S	WBL	52	2.63	A
			2nd St SW West to 2nd St SW East	W-E	EBT	196	29.38	C
			2nd St SW West to 4th Ave SW South	W-S	EBR	94	7.85	A
			--	**Total**		**606**	**11.84**	**B**
517	UNS	2nd St SW - 5th Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	264	0.8	A
			5th Ave SW South to 2nd St SW East	S-E	NBR	58	1.14	A
			2nd St SW West to 2nd St SW East	W-E	EBT	232	0.32	A
			2nd St SW West to 5th Ave SW South	W-S	EBR	123	1.17	A
			--	**Total**		**677**	**0.73**	**A**
613	UNS	1st St SW - 6th Ave SW	6th Ave SW North to 1st St SW West	N-W	SBR	17	1.36	A
			6th Ave SW North to 6th Ave SW South	N-S	SBT	273	2.19	A
			6th Ave SW South to 1st St SW West	S-W	NBL	10	2.68	A
			6th Ave SW South to 6th Ave SW North	S-N	NBT	600	0.79	A
			1st St SW West to 6th Ave SW North	W-N	EBL	44	11.47	B
			1st St SW West to 6th Ave SW South	W-S	EBR	170	8.44	A
			--	**Total**		**1115**	**2.81**	**A**
616	SIG	2nd St SW - 6th Ave SW	6th Ave SW North to 2nd St SW West	N-W	SBR	73	28.28	C
			6th Ave SW North to 6th Ave SW South	N-SW	SBT	116	38.94	D
			6th Ave SW North to 2nd St SW East	N-E	SBL	248	58.72	E
			2nd St SW East to 6th Ave SW North	E-N	WBR	165	22.91	C
			2nd St SW East to 2nd St SW West	E-W	WBT	76	45.74	D
			2nd St SW East to 6th Ave SW South	E-SW	WBL	23	40.14	D
			6th Ave SW South to 2nd St SW West	SW-W	NBL	26	38.51	D
			6th Ave SW South to 6th Ave SW North	SW-N	NBT	237	48.75	D
			6th Ave SW South to 2nd St SW East	SW-E	NBR	23	41.03	D
			2nd St SW West to 6th Ave SW North	W-N	EBL	207	64.31	E
			2nd St SW West to 2nd St SW East	W-E	EBT	84	22.26	C
			2nd St SW West to 6th Ave SW South Bypass	W-S	EBR	68	4.67	A
			--	**Total**		**1347**	**43.49**	**D**
701	UNS	Dropoff East	East Dropoff North to East Dropoff South	N-S	SBT	212	19.76	C
			East Dropoff North to East Dropoff North	N-N	SBU	129	16.16	C
			--	**Total**		**340**	**18.61**	**C**
0		**NETWORK TOTALS**				**11664**	**20.29726**	

Interim Option 2 PM (recommended)

Node	Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
203	UNS	2nd St NW - 2nd Ave NW	2nd St Ave NW North to 2nd St NW West	N-W	SBR	3	0.7	A
			2nd St Ave NW North to Mayo Clinic Jacobson Building	N-S	SBT	15	1.65	A
			2nd St Ave NW North to 2nd St NW East	N-E	SBL	12	2.21	A
			2nd St NW East to 2nd St Ave NW North	E-N	WBR	48	0.81	A
			2nd St NW East to 2nd St NW West	E-W	WBT	81	0.61	A
			2nd St NW East to Mayo Clinic Jacobson Building	E-S	WBL	6	1.79	A
			Mayo Clinic Jacobson Building to 2nd St NW West	S-W	NBL	102	2.46	A
			Mayo Clinic Jacobson Building to 2nd St Ave NW North	S-N	NBT	0	0	A
			Mayo Clinic Jacobson Building to 2nd St NW East	S-E	NBR	9	1.61	A
			2nd St NW West to 2nd St Ave NW North	W-N	EBL	25	1.82	A
			2nd St NW West to 2nd St NW East	W-E	EBT	159	0.55	A
			2nd St NW West to Mayo Clinic Jacobson Building	W-S	EBR	9	0.79	A
			--	**Total**		**468**	**1.19**	**A**
209	SIG	W Center St - 2nd Ave SW	W Center East to W Center West	E-W	WBT	213	35.29	D
			W Center East to 2nd Ave SW South	E-S	WBL	151	42.71	D
			2nd Ave SW South to W Center West	S-W	NBL	82	53.49	D
			2nd Ave SW South to W Center East	S-E	NBR	76	19.39	B
			W Center West to W Center East	W-E	EBT	305	35.5	D
			W Center West to 2nd Ave SW South	W-S	EBR	248	34.41	C
			--	**Total**		**1076**	**36.69**	**D**
220	SIG	2nd St SW - 2nd Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	46	20.38	C
			2nd St SW East to 2nd Ave SW South	E-S	WBL	1	34.35	C
			2nd Ave SW South to 2nd St SW East	S-E	NBR	48	5.89	A
			2nd Ave SW South to 2nd St SW West	S-W	NBL	17	24.3	C
			2nd St SW West to 2nd Ave SW South	W-S	EBR	24	8.49	A
			2nd St SW West to 2nd St SW East	W-E	EBT	237	19.06	B
			Dropoff East to 2nd St SW West	N-W	SBR	130	41.86	D
			Dropoff East to 2nd Ave SW South	N-S	SBT	8	42.57	D
			Dropoff East to 2nd St SW East	N-E	SBL	99	52.17	D
			--	**Total**		**610**	**28.42**	**C**
302	SIG	2nd St NW - 3rd Ave NW	2nd St NW East to 3rd Ave NW North	E-N	WBR	104	15.66	B
			2nd St NW East to 2nd St NW West	E-W	WBT	83	21.22	C
			3rd Ave NW South to 2nd St NW West	S-W	NBL	8	35.61	D
			3rd Ave NW South to 3rd Ave NW North	S-N	NBT	126	27.89	C
			3rd Ave NW South to 2nd St NW East	S-E	NBR	33	30.26	C
			2nd St NW West to 3rd Ave NW North	W-N	EBL	200	15.37	B
			2nd St NW West to 2nd St NW East	W-E	EBT	161	13.46	B
			--	**Total**		**713**	**18.8**	**B**
306	SIG	1 st St NW - 3rd Ave NW	3rd Ave NW South to 1st St NW West	S-W	NBL	35	15.03	B
			3rd Ave NW South to 3rd Ave NW North	S-N	NBT	124	8.24	A
			1st St NW West to 3rd Ave NW North	W-N	EBL	77	33.92	C
			--	**Total**		**236**	**17.7**	**B**
308	SIG	W Center St - 3rd Ave NW	W Center East to 3rd Ave NW North	E-N	WBR	123	23.12	C
			W Center East to W Center West	E-W	WBT	172	31.01	C
			W Center West to 3rd Ave NW North	W-N	EBL	38	28.83	C
			W Center West to W Center East	W-E	EBT	555	41.93	D
			--	**Total**		**888**	**36.82**	**D**
319	SIG	2nd St SW - 3rd Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	199	33.89	C
			3rd Ave SW South to 2nd St SW West	S-W	NBL	147	41.4	D
			3rd Ave SW South to 2nd St SW East	S-E	NBR	98	33.99	C
			2nd St SW West to 2nd St SW East	W-E	EBT	164	0.84	A
			--	**Total**		**608**	**26.81**	**C**
401	SIG	2nd St NW - 4th Ave NW	4th Ave NW North to 2nd St NW East	N-W	SBR	44	24.28	C
			4th Ave NW North to 4th Ave NW South	N-S	SBT	143	23.24	C
			4th Ave NW North to 2nd St NW East	N-E	SBL	39	23.42	C
			2nd St NW East to 2nd St NW East	E-W	WBT	50	34.83	C
			2nd St NW East to 4th Ave NW South	E-S	WBL	41	54.86	D
			2nd St NW East to 2nd St NW East	W-E	EBT	321	18.92	B
			2nd St NW East to 4th Ave NW South	W-S	EBR	39	16.73	B
			--	**Total**		**678**	**23.7**	**C**

Node	Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
405	UNS	1 st St NW - 4th Ave NW	4th Ave NW North to 1st St NW West	N-W	SBR	114	3.31	A
			4th Ave NW North to 4th Ave NW South	N-S	SBT	184	15.24	C
			4th Ave NW North to 1st St NW East	N-E	SBL	36	10.2	B
			1st St NW East to 1st St NW West	E-W	WBT	15	28.21	D
			1st St NW East to 4th Ave NW South	E-S	WBL	20	46.16	E
			1st St NW West to 1st St NW East	W-E	EBT	41	32.91	D
			1st St NW West to 4th Ave NW South	W-S	EBR	69	26.76	D
			--	**Total**		**480**	**16.57**	**C**
407	SIG	W Center St - 4th Ave NW	4th Ave NW North to W Center West	N-W	SBR	30	24.39	C
			4th Ave NW North to W Center East	N-E	SBL	238	59.94	E
			W Center East to W Center West	E-W	WBT	172	3.65	A
			W Center West to W Center East	W-E	EBT	356	38.71	D
			--	**Total**		**796**	**36.66**	**D**
418	SIG	2nd St SW - 4th Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	292	2.57	A
			2nd St SW East to 4th Ave SW South	E-S	WBL	53	3.45	A
			2nd St SW West to 2nd St SW East	W-E	EBT	164	32.25	C
			2nd St SW West to 4th Ave SW South	W-S	EBR	143	11.42	B
			--	**Total**		**653**	**12.07**	**B**
517	UNS	2nd St SW - 5th Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	292	0.7	A
			5th Ave SW South to 2nd St SW East	S-E	NBR	60	1.14	A
			2nd St SW West to 2nd St SW East	W-E	EBT	249	0.25	A
			2nd St SW West to 5th Ave SW South	W-S	EBR	35	1.04	A
			--	**Total**		**636**	**0.59**	**A**
613	UNS	1st St SW - 6th Ave SW	6th Ave SW North to 1st St SW West	N-W	SBR	74	6.12	A
			6th Ave SW North to 6th Ave SW South	N-S	SBT	565	8.16	A
			6th Ave SW South to 1st St SW West	S-W	NBL	74	6.96	A
			6th Ave SW South to 6th Ave SW North	S-N	NBT	348	1.45	A
			1st St SW West to 6th Ave SW North	W-N	EBL	38	12.64	B
			1st St SW West to 6th Ave SW South	W-S	EBR	12	6.49	A
			--	**Total**		**1110**	**5.98**	**A**
616	SIG	2nd St SW - 6th Ave SW	6th Ave SW North to 2nd St SW West	N-W	SBR	142	18.68	B
			6th Ave SW North to 6th Ave SW South	N-SW	SBT	276	23.69	C
			6th Ave SW North to 2nd St SW East	N-E	SBL	161	18.62	B
			2nd St SW East to 6th Ave SW North	E-N	WBR	175	9	A
			2nd St SW East to 2nd St SW West	E-W	WBT	58	20.11	C
			2nd St SW East to 6th Ave SW South	E-SW	WBL	61	23.97	C
			6th Ave SW South to 2nd St SW West	SW-W	NBL	132	54.5	D
			6th Ave SW South to 6th Ave SW North	SW-N	NBT	189	31.4	C
			6th Ave SW South to 2nd St SW East	SW-E	NBR	19	20.91	C
			2nd St SW West to 6th Ave SW North	W-N	EBL	58	25.97	C
			2nd St SW West to 2nd St SW East	W-E	EBT	104	17.04	B
			2nd St SW West to 6th Ave SW South Bypass	W-S	EBR	66	1.13	A
			--	**Total**		**1440**	**23.14**	**C**
701	UNS	Dropoff East	East Dropoff North to East Dropoff South	N-S	SBT	240	25.87	D
			East Dropoff North to East Dropoff North	N-N	SBU	158	19.51	C
			--	**Total**		**398**	**23.51**	**C**
0		**NETWORK TOTALS**				**12356**	**22.02537**	

Node Evaluation Summary W Center St - 6th Ave

Existing Condition AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave SW								
1	L2	26	0	27	0,0	0,650	22,4	LOS C
2	T1	248	0	261	0,0	0,650	22,4	LOS C
3	R2	109	0	115	0,0	0,650	22,4	LOS C
Approach		383	0	403	0,0	0,650	22,4	LOS C
East: W Center St								
4	L2	232	0	244	0,0	0,741	24,8	LOS C
5	T1	174	0	183	0,0	*0,741	24,8	LOS C
6	R2	21	0	22	0,0	0,741	24,8	LOS C
Approach		427	0	449	0,0	0,741	24,8	LOS C
North: 6th Ave NW								
7	L2	29	0	31	0,0	*0,747	26,0	LOS C
8	T1	385	0	405	0,0	0,747	26,0	LOS C
9	R2	55	0	58	0,0	0,747	26,0	LOS C
Approach		469	0	494	0,0	0,747	26,0	LOS C
West: W Center St								
10	L2	7	0	7	0,0	0,180	14,3	LOS B
11	T1	85	0	89	0,0	0,180	14,3	LOS B
12	R2	22	0	23	0,0	0,180	14,3	LOS B
Approach		114	0	120	0,0	0,180	14,3	LOS B
All Vehicles		1393	0	1466	0,0	0,747	23,7	LOS C

Interim Option 2 AM - UNMITIGATED

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave SW								
1	L2	33	0	35	0,0	1,135	102,8	LOS F
2	T1	452	0	476	0,0	1,135	102,8	LOS F
3	R2	157	0	165	0,0	1,135	102,8	LOS F
Approach		642	0	676	0,0	1,135	102,8	LOS F
East: W Center St								
4	L2	117	0	123	0,0	0,614	29,9	LOS D
5	T1	63	0	66	0,0	0,614	29,9	LOS D
6	R2	12	0	13	0,0	0,614	29,9	LOS D
Approach		192	0	202	0,0	0,614	29,9	LOS D
North: 6th Ave NW								
7	L2	28	0	29	0,0	0,370	13,3	LOS B
8	T1	157	0	165	0,0	0,370	13,3	LOS B
9	R2	9	0	9	0,0	0,370	13,3	LOS B
Approach		194	0	204	0,0	0,370	13,3	LOS B
West: W Center St								
10	L2	55	0	58	0,0	0,832	66,8	LOS F
11	T1	107	0	113	0,0	0,832	66,8	LOS F
12	R2	18	0	19	0,0	0,832	66,8	LOS F
Approach		180	0	189	0,0	0,832	66,8	LOS F
All Vehicles		1208	0	1272	0,0	1,135	71,5	LOS F

Interim Option 2 AM - MITIGATED

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave SW								
1	L2	33	0	35	0,0	*0,641	12,7	LOS B
2	T1	452	0	476	0,0	0,641	12,7	LOS B
3	R2	157	0	165	0,0	0,641	12,7	LOS B
Approach		642	0	676	0,0	0,641	12,7	LOS B
East: W Center St								
4	L2	117	0	123	0,0	0,657	31,6	LOS C
5	T1	63	0	66	0,0	*0,657	31,6	LOS C
6	R2	12	0	13	0,0	0,657	31,6	LOS C
Approach		192	0	202	0,0	0,657	31,6	LOS C
North: 6th Ave NW								
7	L2	28	0	29	0,0	0,265	13,6	LOS B
8	T1	157	0	165	0,0	0,265	13,6	LOS B
9	R2	9	0	9	0,0	0,265	13,6	LOS B
Approach		194	0	204	0,0	0,265	13,6	LOS B
West: W Center St								
10	L2	55	0	58	0,0	0,584	29,5	LOS C
11	T1	107	0	113	0,0	0,584	29,5	LOS C
12	R2	18	0	19	0,0	0,584	29,5	LOS C
Approach		180	0	189	0,0	0,584	29,5	LOS C
All Vehicles		1208	0	1272	0,0	0,657	18,3	LOS B

Node Evaluation Summary W Center St - 6th Ave

Existing Condition PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave SW								
1	L2	26	0	27	0,0	0,650	22,4	LOS C
2	T1	248	0	261	0,0	0,650	22,4	LOS C
3	R2	109	0	115	0,0	0,650	22,4	LOS C
Approach		383	0	403	0,0	0,650	22,4	LOS C
East: W Center St								
4	L2	232	0	244	0,0	0,741	24,8	LOS C
5	T1	174	0	183	0,0	*0,741	24,8	LOS C
6	R2	21	0	22	0,0	0,741	24,8	LOS C
Approach		427	0	449	0,0	0,741	24,8	LOS C
North: 6th Ave NW								
7	L2	29	0	31	0,0	*0,747	26,0	LOS C
8	T1	385	0	405	0,0	0,747	26,0	LOS C
9	R2	55	0	58	0,0	0,747	26,0	LOS C
Approach		469	0	494	0,0	0,747	26,0	LOS C
West: W Center St								
10	L2	7	0	7	0,0	0,180	14,3	LOS B
11	T1	85	0	89	0,0	0,180	14,3	LOS B
12	R2	22	0	23	0,0	0,180	14,3	LOS B
Approach		114	0	120	0,0	0,180	14,3	LOS B
All Vehicles		1393	0	1466	0,0	0,747	23,7	LOS C

Interim Option 2 PM - UNMITIGATED

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave SW								
1	L2	26	0	27	0,0	0,795	32,3	LOS D
2	T1	248	0	261	0,0	0,795	32,3	LOS D
3	R2	109	0	115	0,0	0,795	32,3	LOS D
Approach		383	0	403	0,0	0,795	32,3	LOS D
East: W Center St								
4	L2	232	0	244	0,0	0,860	38,9	LOS E
5	T1	174	0	183	0,0	0,860	38,9	LOS E
6	R2	21	0	22	0,0	0,860	38,9	LOS E
Approach		427	0	449	0,0	0,860	38,9	LOS E
North: 6th Ave NW								
7	L2	29	0	31	0,0	0,886	40,7	LOS E
8	T1	385	0	405	0,0	0,886	40,7	LOS E
9	R2	55	0	58	0,0	0,886	40,7	LOS E
Approach		469	0	494	0,0	0,886	40,7	LOS E
West: W Center St								
10	L2	7	0	7	0,0	0,426	24,9	LOS C
11	T1	85	0	89	0,0	0,426	24,9	LOS C
12	R2	22	0	23	0,0	0,426	24,9	LOS C
Approach		114	0	120	0,0	0,426	24,9	LOS C
All Vehicles		1393	0	1466	0,0	0,886	36,6	LOS E

Interim Option 2 PM - MITIGATED

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave SW								
1	L2	26	0	27	0,0	0,650	22,4	LOS C
2	T1	248	0	261	0,0	0,650	22,4	LOS C
3	R2	109	0	115	0,0	0,650	22,4	LOS C
Approach		383	0	403	0,0	0,650	22,4	LOS C
East: W Center St								
4	L2	232	0	244	0,0	0,741	24,8	LOS C
5	T1	174	0	183	0,0	*0,741	24,8	LOS C
6	R2	21	0	22	0,0	0,741	24,8	LOS C
Approach		427	0	449	0,0	0,741	24,8	LOS C
North: 6th Ave NW								
7	L2	29	0	31	0,0	*0,747	26,0	LOS C
8	T1	385	0	405	0,0	0,747	26,0	LOS C
9	R2	55	0	58	0,0	0,747	26,0	LOS C
Approach		469	0	494	0,0	0,747	26,0	LOS C
West: W Center St								
10	L2	7	0	7	0,0	0,180	14,3	LOS B
11	T1	85	0	89	0,0	0,180	14,3	LOS B
12	R2	22	0	23	0,0	0,180	14,3	LOS B
Approach		114	0	120	0,0	0,180	14,3	LOS B
All Vehicles		1393	0	1466	0,0	0,747	23,7	LOS C

ROCHESTER
PUBLIC WORKS

City of Rochester
Development Services and Infrastructure Center
4001 West River Parkway NW, STE 100
Rochester, MN 55901-7090

Phone: 507-328-2400
Fax: 507-328-2401

May 17, 2024

Public Works has reviewed the following traffic study, submitted in April 2024 for the Bold Forward Unbound project. The analysis and findings are acceptable with conditions of approval noted below.

As a reminder, the following items were listed as conditions of approval for the interim scenario during construction of Bold Forward Unbound. For this memo, these items are assumed to have been completed, but may need to be included in the development agreement associated with this final project:

- An Intersection Control Evaluation (ICE) Report shall be completed for the intersection of West Center St and 6th Ave NW/SW, with the agreed upon mitigation constructed prior to the permanent closures of 3rd Ave SW and 4th Ave SW. The ICE Report shall study, at a minimum, both a traffic signal with the necessary turn lanes, and a mini-roundabout.
- The traffic signal at 2nd St SW and 2nd Ave SW shall be modified to include signal indications for the new southbound approach to the intersection. The traffic signal shall be modified again after completion of the interim scenarios for the final project.
- The coordinated traffic signal timings along the 2nd St SW corridor shall be updated to accommodate the signal modifications at 2nd Ave SW, and to enhance the operations of the signal at 6th Ave SW. Traffic signal timings upstream and downstream along 2nd St SW may also need to be adjusted to accommodate the change in traffic flows.
- Traffic signal timings at the intersections of West Center St with 3rd Ave NW/SW and 4th Ave NW/SW shall be updated to accommodate the change in traffic patterns.
- Pavement markings shall be modified on West Center St from west of 4th Ave SW to the east through the intersection with 3rd Ave SW to remove the parking lane, add a dedicated eastbound through lane at 4th Ave SW, add a dedicated eastbound left-turn lane at 3rd Ave SW, and move the bike lane to the curb between 3rd Ave SW and 4th Ave SW. The pavement markings shall be modified again after completion of the interim scenarios for the final project.

With the findings of the traffic study for the final project, the additional following conditions will be required for approval of the traffic study, and obligations for improvements shall be memorialized in an executed development agreement:

- As streets are reconstructed after completion of building and utility construction, the streetscape shall be updated to meet DMC design guidelines, and on-street bike lanes shall be converted to off-street protected cycle tracks.

- Curb extensions shall be constructed in the northeast and southeast corners of the intersection of 4th Ave NW and 1st St NW, to reduce the length of crosswalk across 4th Ave NW, and to improve visibility of pedestrians at the intersection.
- Prior to the vacation of 3rd Ave SW and 4th Ave SW, additional traffic analysis shall be completed along 4th St SW due to 3rd Ave SW and 4th Ave SW having been closed at the time of data collection. The analysis shall specifically review the operations at the intersections with 3rd Ave SW, 4th Ave SW, and 6th Ave SW, and as an update to the traffic analysis for the recently opened Discovery Square Parking Ramp.
- An Intersection Control Evaluation (ICE) Report shall be completed for the intersection of 2nd St NW and 6th Ave NW, with the agreed upon mitigation subsequently constructed. The ICE Report shall study, at a minimum, both a traffic signal with the necessary turn lanes, and a mini-roundabout.
- In discussions with the consultant, MIC-HUB, it was noted that mitigation at Civic Center Dr NW and 6th Ave NW may not be needed opening year due to increases in projected background growth. Additional sensitivity analysis shall be completed to determine a projected timeframe for when improvements will be needed to satisfy the City's traffic service standards. Design analysis shall also be completed to verify that the proposed mitigation at this location will meet Minnesota Municipal State Aid Street (MSAS) design standards.
- This study proposes that City Loop should be rerouted to 2nd Ave SW. The 2nd Ave SW corridor from West Center St to 2nd St SW shall be redesigned to prioritize pedestrian and bicycle movement.
- As part of the realignment of the bicycle facility network, a two-way off-street cycle track shall be constructed on West Center St between 2nd Ave NW/SW and 4th Ave NW/SW.
- This study proposes the ground floor lobby of the new hospital be open to the public and with permeability allowing public pedestrian travel where 3rd Ave SW and 4th Ave SW are proposed to be vacated. As proposed, this lobby shall remain open to public pedestrian travel.

It should also be noted that the following items discussed in the report will not be required for approval of the traffic study:

- Mitigation is not required to address the Level of Service F for the northbound left turning movement at West Center St and 2nd Ave SW.

Dillon Dombrovski, PE

Deputy Public Works Director / City Engineer
City of Rochester, Minnesota

MAYO CLINIC

Traffic & Circulation Report - REV03

MIC HUB

April 2024

Traffic & Circulation Report

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1 Traffic & Circulation Study

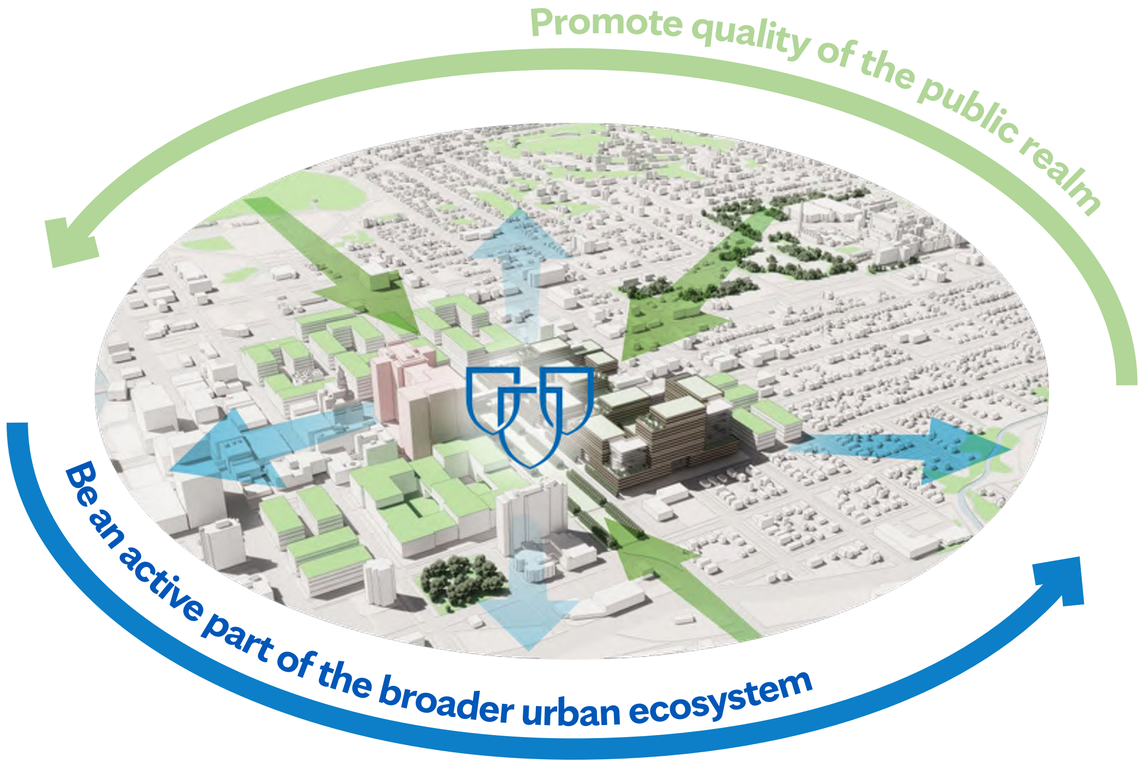
Introduction

The Bold Forward Unbound in Rochester project looks at the development of new hospital and clinic buildings as an extension of the downtown Mayo Clinic Campus in Rochester.

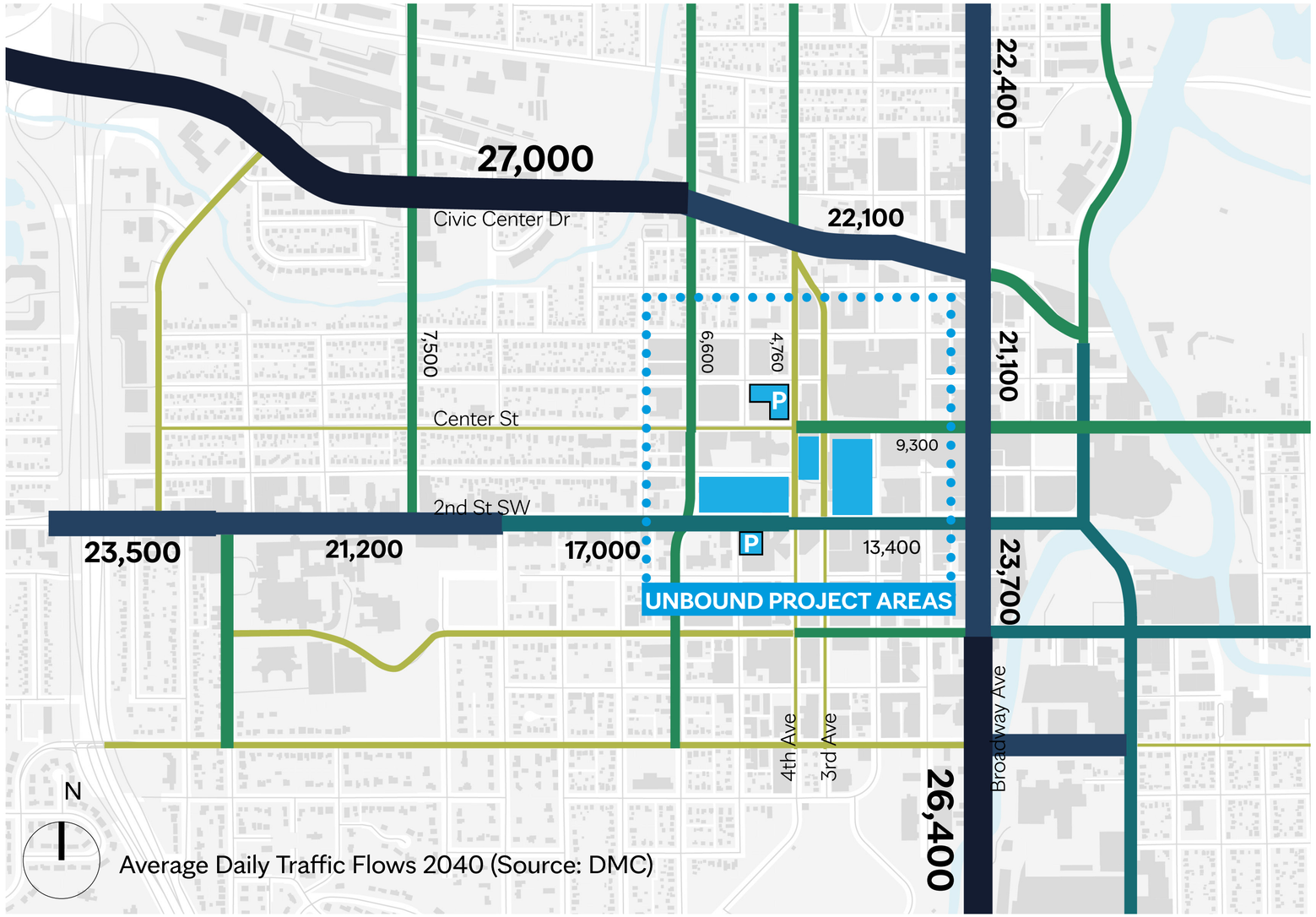
The new buildings are located on the Ozmun and Damon sites, and they will be connected on the ground floor by a continuous and enclosed pedestrian space that unifies the new development with the Mayo-Gonda building into a single campus.

The intervention requires the closure of two stretches of 3rd and 4th Avenue both for car and bicycle traffic.

The project also includes two new parking garages to replace Damon ramp and accommodate the new demand of the Clinic extension. They are located north and south of the campus.



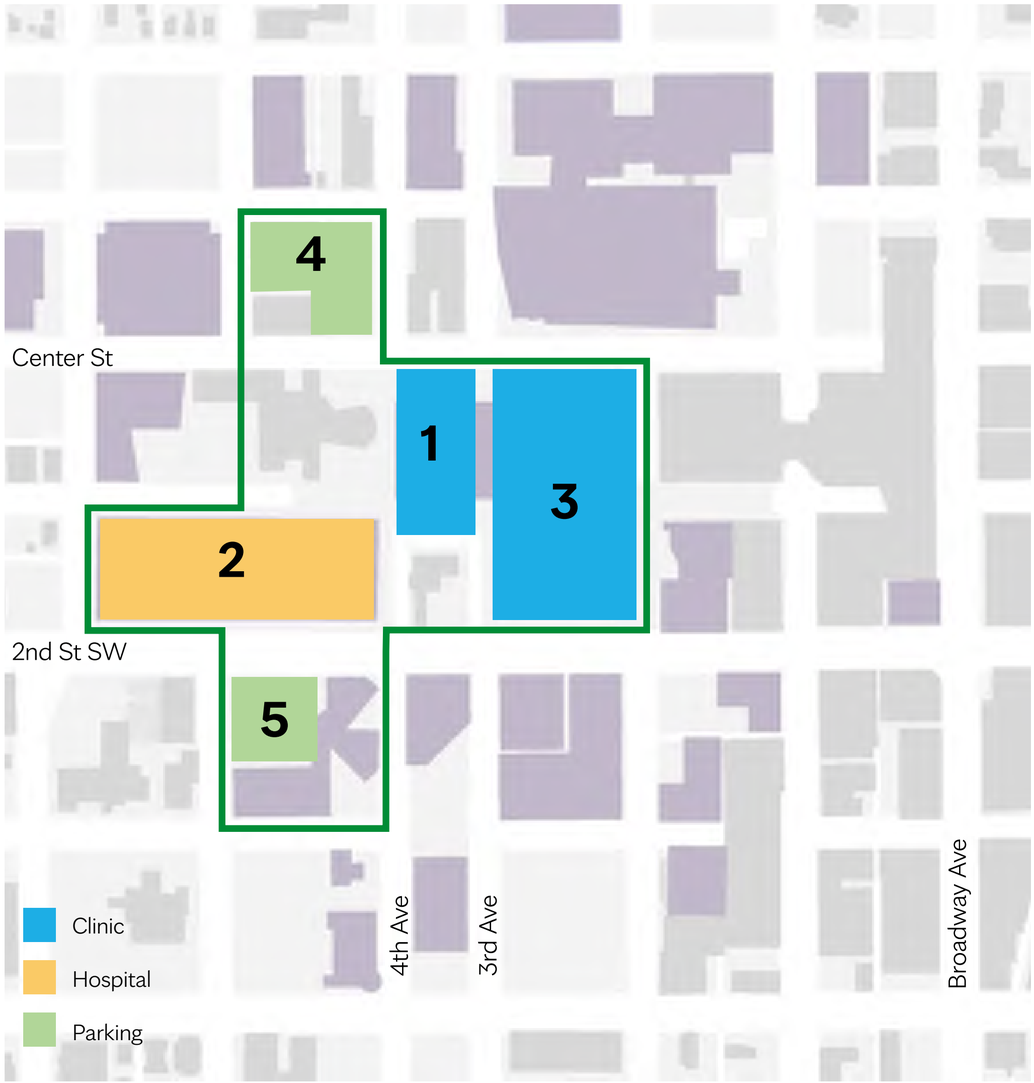
Unbound Project - Area location



The Unbound project was developed based on the knowledge of the wider Rochester context gathered during the pre-concept phase. At the time, data from Mayo and the DMC had been studied to frame the current and future design of the downtown area. Data from different sources and levels of detail were gathered to understand the mobility systems of the city.

The focus of the project is the expansion of the hospital on the Damon and Ozmun sites, including also the Mayo/ Gonda building to which the new extension will be connected. These 3 blocks and their surroundings were analyzed in greater depth to grasp in detail the transport dynamics that characterize the site and assess the exact impacts of the development. Thus, other than the existing data, a field survey was undertaken to measure traffic and capture quantitative and qualitative aspects of it.

Unbound Project



The future Mayo hospital facilities are planned to be accomplished by 2030. The project encompasses the construction of another clinic facility, the Damon Building, on the site of Damon Parking Ramp (1) and the construction of the Hospital of the Future Building, which will replace Ozmun Building (2).

Mayo/Gonda Building (3) remains in its current condition.

In support of the planned interventions, the two parking facilities (4 and 5) will be built north and south, forming the core of the project to cope with the increased demand.

UNBOUND PROJECT

1. DAMON BUILDING
2. HOSPITAL OF THE FUTURE
3. MAYO/GONDA BUILDING
4. NORTH PARKING
5. SOUTH PARKING

Traffic & Circulation Study

CITY TRAFFIC

TRAFFIC SURVEY CAMPAIGN

TRAFFIC MODEL

ASSESSMENT OF THE IMPACTS OF THE NEW DEVELOPMENT

DROP-OFF

TRAFFIC SURVEY

GENERAL DROP-OFF VS VALET ANALYSIS

DWELLING TIME SURVEY

DROP-OFF SIZING AND DESIGN

PARKING

PARKING FLOWS

OCCUPANCY PROFILES

PARKING DEMAND

PARKING SIZING AND DESIGN

The Traffic Study aims to assist the Design Team in assessing the functioning of the future mobility system of the Unbound Project. The study was structured in order to develop an overall and integrated mobility scheme that addresses all the most relevant aspects, with particular care given to supporting the most sustainable transport means through the implementation of parking strategies and enhancing pedestrian connectivity.

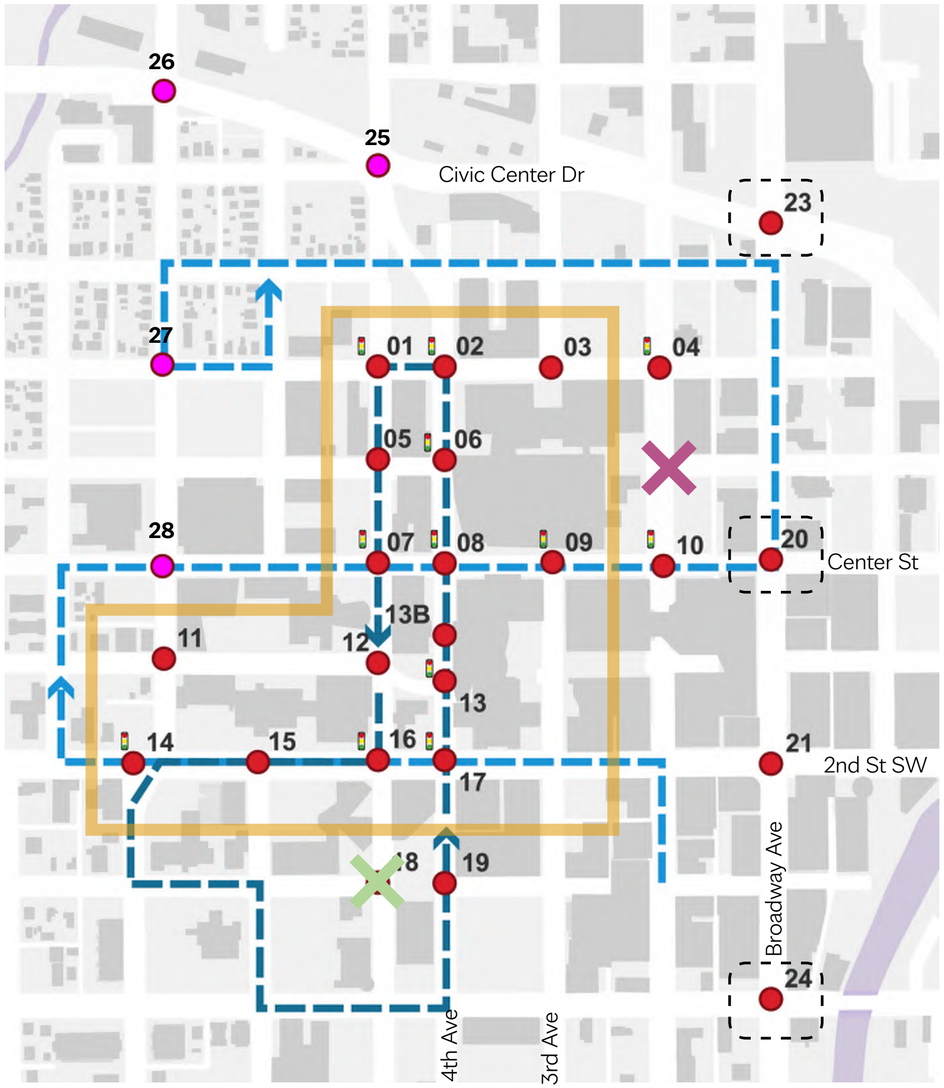
The study focuses on three main topics:

- City traffic: Analyzed through traffic surveys and a traffic simulation model. These data and models were used to assess the impact of the new Mayo facilities on the external road network.
- Access strategy: Drop-offs. Data regarding patients' and visitors' arrival/departure was carefully analyzed, and, together with future projections, a system of drop-offs was set up and detailed in terms of sizing, design, and usage.
- Parking strategy and design: Based on the current Mayo parking data and future projections, a strategy was defined in order to meet future demand and provide a good arrival experience for visitors and patients.

2 Data Gathering

2.1 Traffic Survey

Methodology



- Intersection counts in 2022
- Intersection counts in 2023
- Intersection counts (surveyed for future use but not analyzed for current study)
- Paths with on-board dash-cam for travel time survey
- A stretch of 1st Avenue between 1st Street and W Center Street was closed during the traffic surveys
- 3rd st SW and 4th Ave intersection was closed during the traffic surveys due to ongoing constructions
- Micro scale analysis

The traffic surveys were conducted on June 14th, 15th, and 16th, 2022, from Tuesday to Thursday, which represent the typical and most busy days of the week for the hospital and the clinic. The traffic model and counts, however, were based on Tuesday, which was deemed to be the most relevant day.

During this period, schools were already closed; however, it was considered, in agreement with WSB, the local traffic consultant, that the downtown traffic would not be considerably affected by the school's traffic.

For each intersection, all allowed movements were registered, considering six classes of vehicles (bicycles, motorbikes, cars, LGVs, HGVs, and buses) and pedestrians.

The counts were aggregated in 15-min periods and lasted a total of 5 hours:

- AM peak (from 7:00 am to 9:00 am)
- PM peak (from 2:30 pm to 5:30 pm)

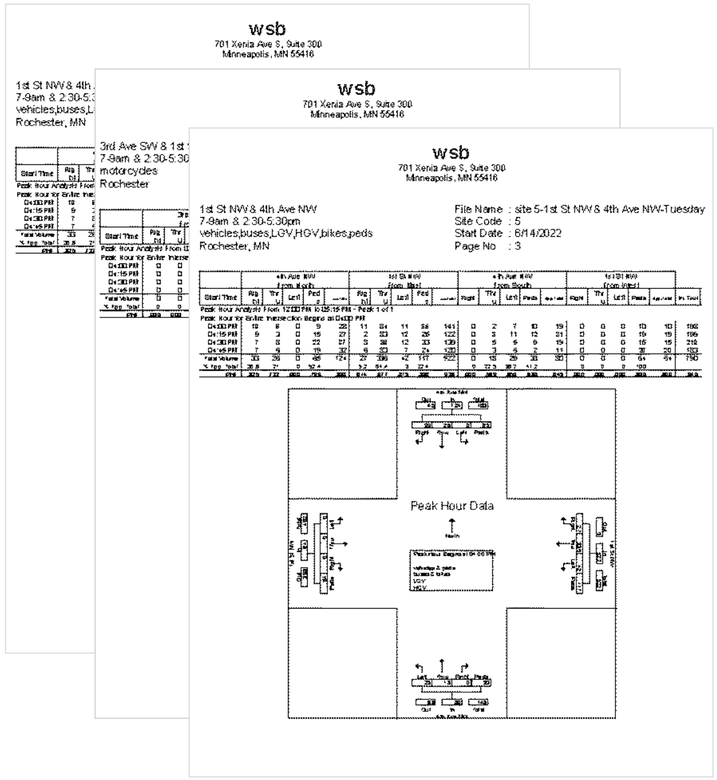
A travel time survey was also undertaken during the campaign using a vehicle with an on-board dash cam. These recordings were later used to calibrate the traffic model.

A new survey was conducted in April 2023, which included 4 additional intersections (25-28), following the request of the City. These intersections were modelled with Sidra software.

Surveyed Data

Videos and counts were performed and provided by WSB. All movement counts of all intersections were registered at 15-minute intervals and delivered on count sheets (the complete document of traffic counts can be found in the appendices, A.1).

Surveys were recorded, and counts were performed on video to have the possibility of consulting them at a later stage.


wsb
701 Xenia Ave S, Suite 300
Minneapolis, MN 55416

wsb
701 Xenia Ave S, Suite 300
Minneapolis, MN 55416

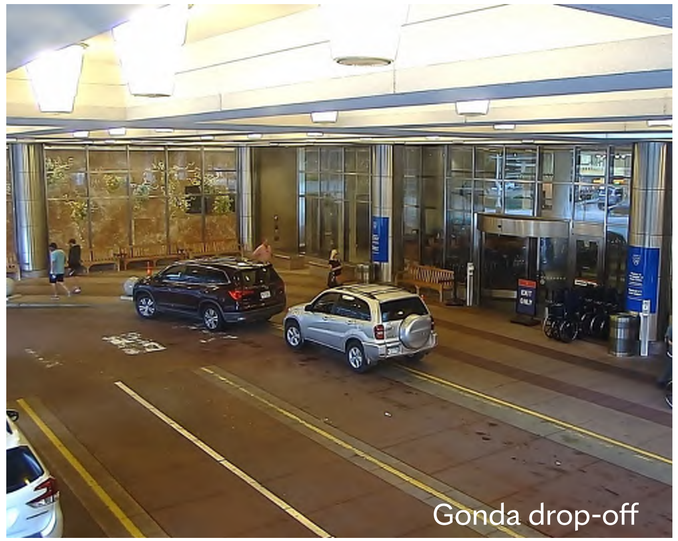
wsb
701 Xenia Ave S, Suite 300
Minneapolis, MN 55416

1st St NW & 4th Ave NW
7-9am & 2:30-5:30pm
vehicles,buses,LGV,HGV,bikes,peds
Rochester, MN

File Name : site 5-1st St NW & 4th Ave NW-Tuesday
Site Code : 5
Start Date : 6/14/2022
Page No : 3

Peak Hour Data









Surveyed Data

Vehicle classes



PEDESTRIANS



BICYCLES



MOTORCYCLES



PASSENGER CARS



LGV (vans, pick-up trucks)



HGV (tippers, drop sides, flat-bed lorries, etc.)



BUSES

Along with the values correspondent to the traffic flows, the vehicle composition has also been surveyed. Traffic flow composition represents the share of different vehicle classes that are characterized by different dimensions, driving behaviors, and possible restrictions.

The classes are:

- Bicycles: 2-wheel vehicles used as private mode
- Motorcycles: 2-wheel vehicles used as private mode
- Private Cars: 4-wheel vehicles used as private mode
- Light Goods Vehicles (LGV): 4-wheel vehicles used to carry goods. This category includes all the vans and light commercial trucks under 3,5 t.
- Heavy Goods Vehicles (HGV): More than 4-wheeled vehicles used to carry goods. This category includes all commercial trucks weighing more than 3.5 t.
- Bus: Buses and coaches*.

In addition to these vehicle classes, pedestrians were also counted at each intersection in the study area.

*Shuttles were counted separately only for the Gonda drop-off survey.

City of Rochester Data

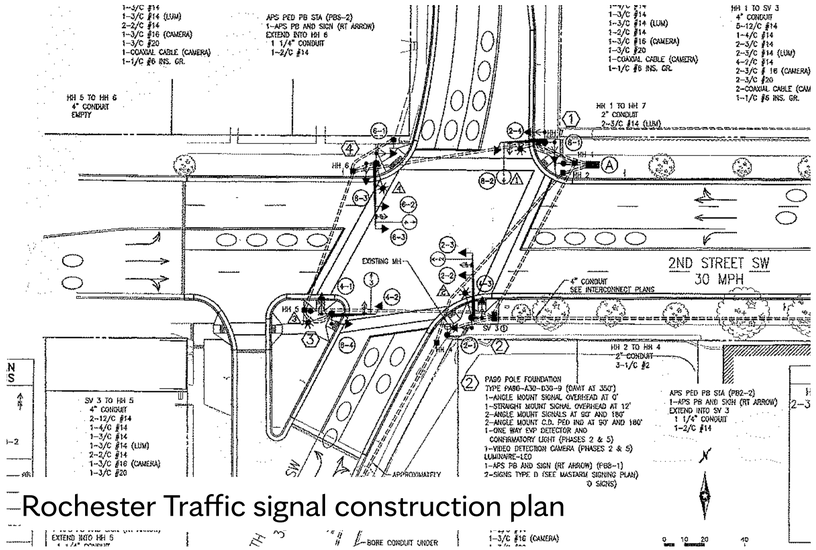
Signal phasing

Signal phasing documents were provided by the City of Rochester. Videos were also used to calibrate the simulations and better understand the usage of actuated movements such as pedestrian push-button

In Rochester, there are two types of signals:

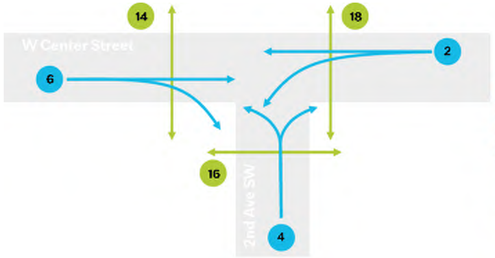
- Fixed: the signals have a fixed green interval.
- Actuated: the phases' intervals change according to the amount of traffic in each direction. Different types of sensors are used to detect the presence of vehicles or pedestrians and adjust the green light interval accordingly.

Below are the maps provided by the city, and on the side is an example of a fixed and an actuated signal cycle study.



Rochester Traffic signal construction plan

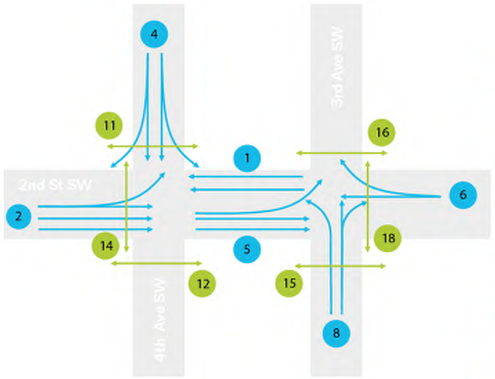
Fixed signal: W Center St. & 2nd Ave SW (AM/PM cycle)



	Allowed Manoeuvres	Green Time (s)	Yellow Time (s)	Red Time (s)
	2	31	3	42
	4	31	3	42
	6	31	3	42
	14	12	17	47
	16	12	17	47
	18	12	17	47



Actuated signal: 2nd St. SW & 3rd/4th Ave SW (AM cycle)

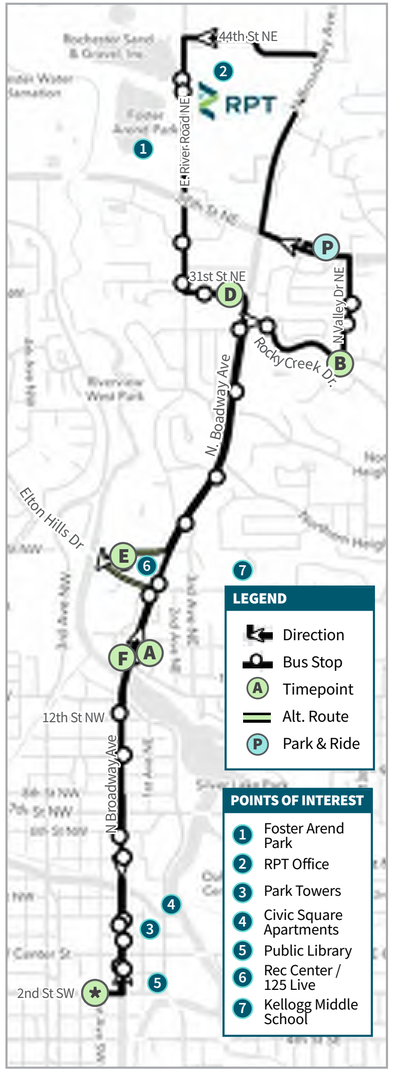


	Allowed Manoeuvres	Green Time (s)		Yellow Time (s)
	1 (Stage 1 to 2) (Stage 3 to 2)	22	17	6
	1 (Stage 1 to 3) (Stage 3 to 1)	31	28	-
	2	22	-	6
	4	21	-	7
	5 (Stage 1 to 3)	22	-	6
	5 (Stage 1 to 2)	31	21	-
	6	22		6
	8	17		8
	11	7		8
	12	7		7
	14	7		18
	15	7		7
	16	7		9
	18	7		14

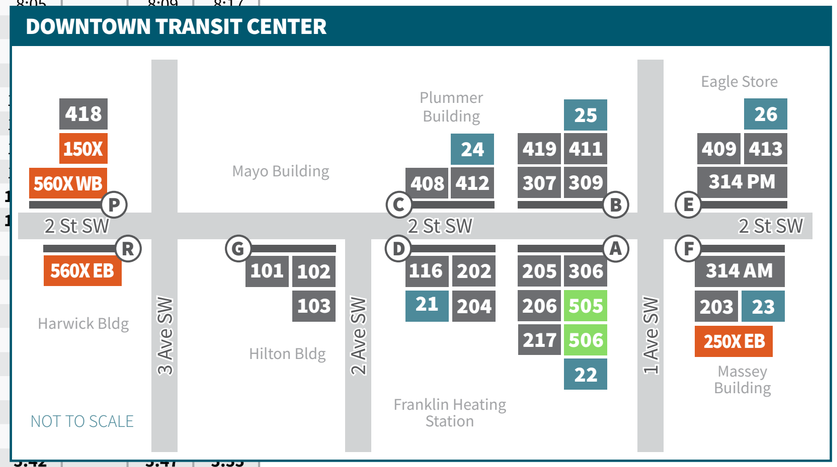


City of Rochester Data

Public transportation



Weekday • 30-min service							
Depart Downtown Transit Center G	Silver Lake Center	Rocky Creek Dr & N. Valley Dr	N. Broadway Park & Ride	Olympic Village	125 Live	River Center Plaza	Arrive Downtown Transit Center
*	A	B	P	D	E	F	*
		5:29	5:31	5:39		5:43	5:50
5:45	5:50	5:55	5:57	6:05		6:09	6:17
6:15	6:20	6:25	6:27	6:35		6:39	6:47
6:45	6:50	6:55	6:57	7:05		7:09	7:17
7:15	7:20	7:25	7:27	7:35		7:39	7:47
7:45	7:50	7:55	7:57	8:05		8:09	8:17
8:15	8:20	8:25	8:27				
8:45	8:50	8:55	8:57				
9:18	9:23	9:29	9:32				
9:48	9:53	9:59	10:02				
10:18	10:23	10:29	10:32				
10:48	10:53	10:59	11:02				
11:18	11:23	11:29	11:32				
11:48	11:53	11:59	**12:02**				
12:18	**12:23**	**12:29**	**12:32**				
12:48	**12:53**	**12:59**	**1:02**				
1:18	**1:23**	**1:29**	**1:32**				
1:48	**1:53**	**1:59**	**2:02**				
2:18	**2:23**	**2:29**	**2:32**				
2:50	**2:55**	**3:02**	**3:04**				
3:20	**3:25**	**3:32**	**3:34**				
3:50	**3:55**	**4:02**	**4:04**				
4:20	**4:25**	**4:32**	**4:34**				
4:50	**4:55**	**5:02**	**5:04**				
5:20	**5:25**	**5:32**	**5:34**				
5:50	**5:55**	**6:02**	**6:04**	**6:12**		**6:17**	**6:25**
6:20	**6:25**	**6:32**	**6:34**	**6:42**		**6:47**	**6:55**



Times shown in bold are P.M. Letters correspond to timepoints on the map. If your stop is between timepoints, use the time given for the timepoint before your stop to avoid missing the bus.

Rochester Transit Maps and Schedule

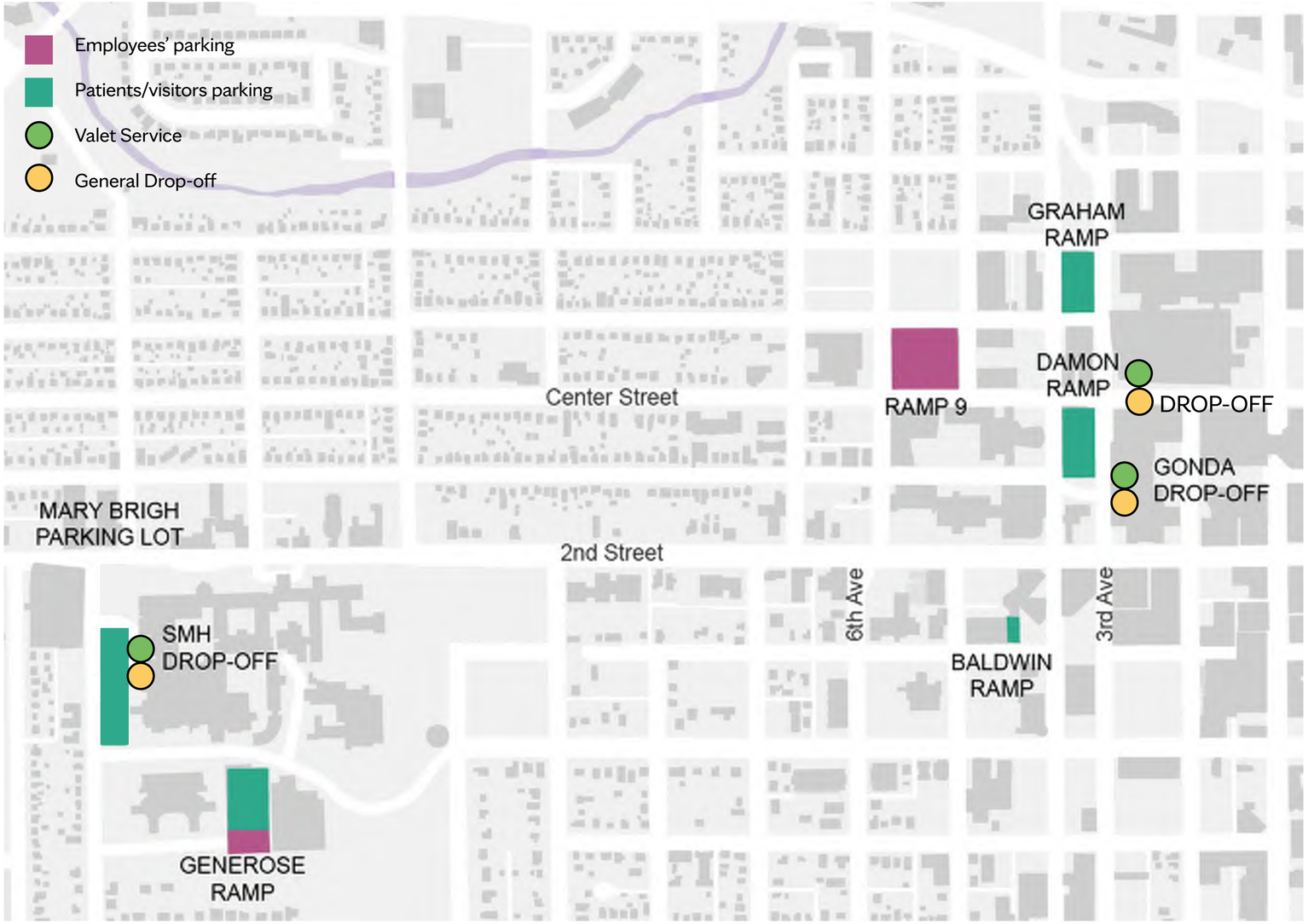
Rochester Public Transit was also included in the database for the traffic study. The bus routes consist of 40 weekday fixed routes and 8 weekend/holiday routes.

The downtown transit center is located on 2nd Street between 1st and 3rd Avenue SW, and for this reason, all public transit lines within the model use this street. All the analyzed lines and correspondent public transport stops are the input for the traffic modelling exercise, along with the performed traffic counts campaign.

The information regarding the precise schedule of each line and directions is taken from the official sites of public transport service provider (https://www.rochestermn.gov/government/departments/public-transportation). On the side are some examples.

2.2 Mayo Provided Data & Observations

Mayo Provided Data



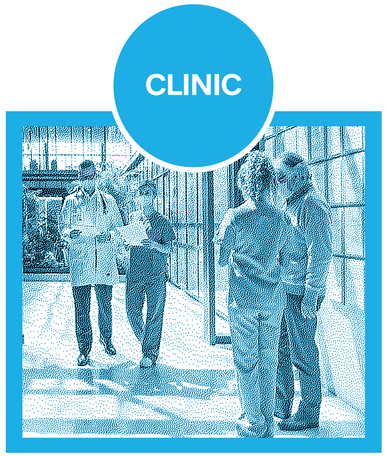
The field traffic survey was complemented with data provided by the Mayo Clinic Transport Unit:

- Mayo's parking facilities data, regarding the number of entrances and exits in visitor parking ramps (Damon, Graham, Baldwin, Mary Brigh, and Generose) - 14th to 16th June, 2022;
- Mayo's parking facilities data, regarding the number of entrances and exits in employees parking ramps (Ramp 9) - 14th to 16th June, 2022;
- Mayo's valet parking data, considering the number of vehicles parked and returned by hour and by drop-off (Charlton, Gonda, and Mary Brigh) - 14th to 16th June, 2022;
- Security cameras' footage from Gonda and Saint Mary's Hospital drop-offs, that enabled a detailed analysis of the operation of these spaces;

Additional data about drop-off counts and analysis was provided by WSB, who performed various studies from 2016 to 2022.

- Gonda drop-off vehicular circulation data (October 2021)
- Traffic counts in various downtown locations (from 2016 to 2022)
- Mary Brigh drop-off analysis (2022)

Mayo Types of Users





USERS	Users are sometimes in wheelchairs, but the majority of patients are able to walk	Mobility-impaired users require care, are slower, and need assistance
TIME	Pick-ups and drop-offs are generally faster	Pick-ups and drop-offs may take longer
TRAFFIC	High traffic flows at peaks. For example, the Damon ramp at Gonda has peaks of 370 veh/h parking access	Lower traffic flows and more distributed throughout the day. For example, Generose and Mary Brigh ramps

During the various conversations with the Mayo team, we were able to outline a simplified division of the complex system of user segments that visit the campus daily.

The simplest and most effective distinction was to divide between clinic and hospital patients, given their considerably different mobility behaviors. The former are generally outpatients who visit the hospital during the day to have check-ups and exams, while the latter are inpatients who generally spend the night at the hospital and most of the time have had surgery.

Besides user profiles, clinics and hospitals also have distinct traffic patterns, valet usage, and parking demand,which we will analyze in the following pages.

Drop-offs Observation



Gonda drop-off



Mary Brigh drop-off

What we measured:

- Traffic flows for different user types;
- Pick-up vs. drop-off;
- Time spent to drop-off/pick-up;
- Valet vs. general drop-off usage;
- Combined actions (drop-off+parking or parking+pick-up).

Drop-off areas represent the most common arrival experience, and they are often very congested during peak hours. For this reason, these areas are one of the main foci of the mobility project for the new campus.

In order to gather a deep understanding of the drop-off dynamics, we have observed the two main arrival points, one for each macro-function: the Gonda western entrance for the clinic and the Mary Brigh drop-off for the hospital. Although SMH is not part of the Unbound project, its observation served as a reference to understand inpatient mobility habits, which will in any case be part of the new campus.

Three main components have to be observed while looking at drop-offs:

- General drop-off: patients coming with a private vehicle or a ride-hailing service to drop-off. They may park after or come from the parking facility;
- Valet parking: patients who use the valet services without going to the parking;
- Shuttles: patients who arrive with shuttles from other cities, the airport, or hotels.

Other than quantitative measures, it was also crucial to analyze these areas with a qualitative approach in order to identify different behaviors, issues, and flaws.

Drop-offs Counts

Peak hour figures

Charts on this page represent the traffic at Gonda and Mary Brigh drop-offs. The total traffic flows have been observed in the traffic surveys. The number of valet users was already provided by Mayo for the same day of the survey, including the split between pulls and parks. The remaining flows were assumed to be general drop-ff users. The percentage split between drop-off and pick-up is derived from WSB “Gonda drop-off vehicular circulation data (October 2021)”.

Park: when a car is dropped of

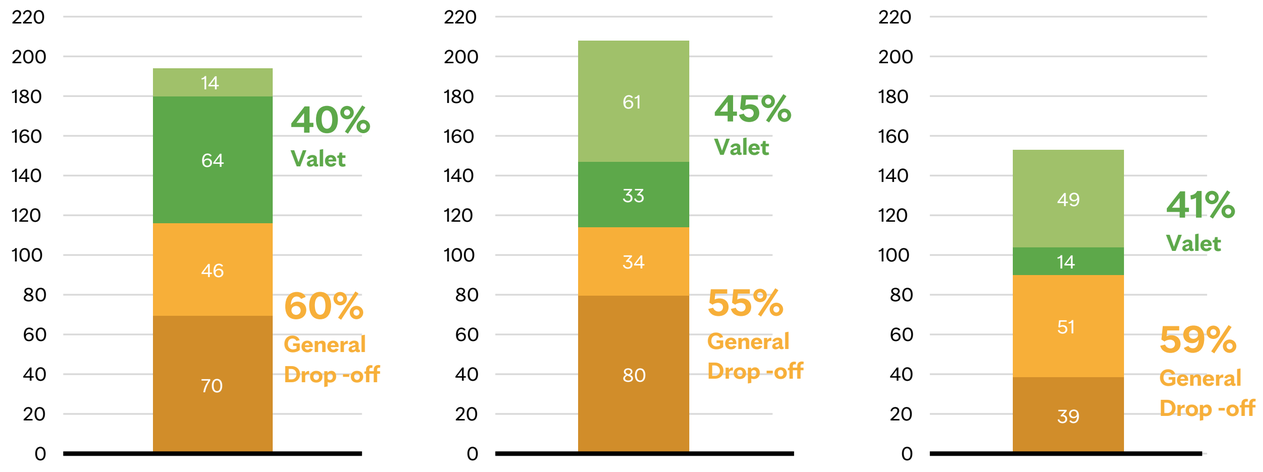
Pull: wehn a car is returned to the owner

Valet parking:
- Pull
- Park

General Drop-off
- Pick-up
- Drop-off

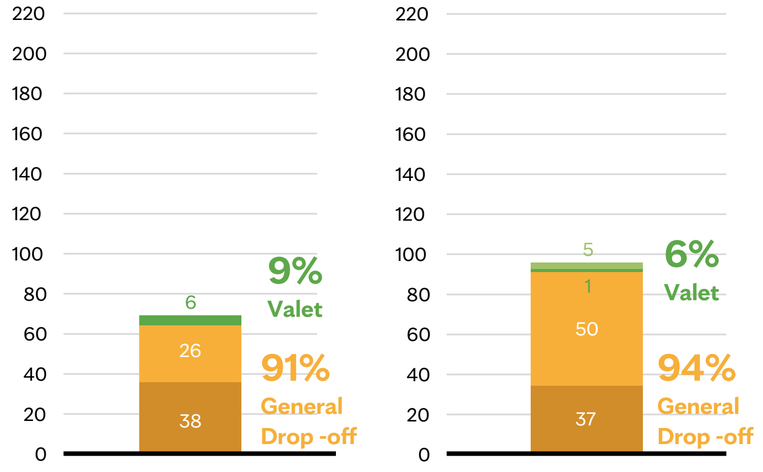
CLINIC

GONDA DROP-OFF



HOSPITAL

MARY BRIGH DROP-OFF



Drop-offs Dwell Time

Average and maximum time

Dwelling time at drop-offs for different user types was measured on the security camera videos provided by Mayo. The time of measurement is counted from when cars slow down to park to when they start moving to drive away. Valet takes generally much longer than general drop-off, and, as expected, clinic general drop-off is shorter than hospital's.

Park: when a car is dropped off

Pull: wehn a car is returned to the owner

CLINIC

GONDA DROP-OFF

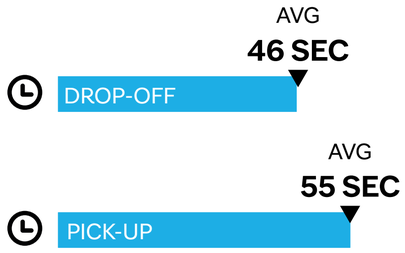
HOSPITAL

MARY BRIGH DROP-OFF



DWELL TIME AT GENERAL DROP-OFF

(from when cars slow down to park to when they start moving to drive away)





Difference between drop-off and pick-up was not understandable from the footage as the main stopping point was under the canopy



DWELL TIME AT VALET SERVICE

(from when cars slow down to park to when they start moving to drive away)



Valet average dwell time accounts for the time the car is at the drop-off in a normal condition, not considering additional delays due to peaks and to service inefficiencies related to the distance of the remote lots, which will be solved by placing valet parking close to vale tdrop-off points in the future

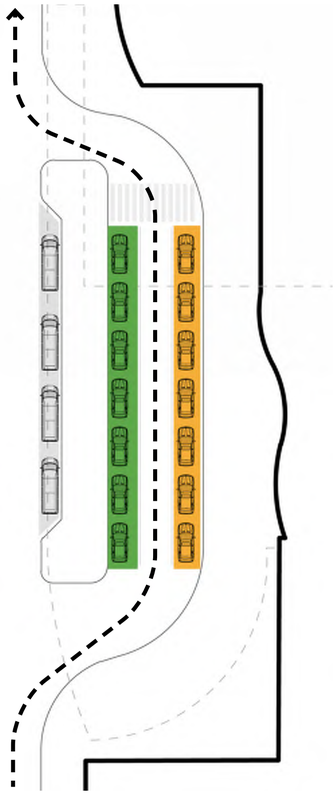


Not enough available information for hospital valet.
Dwell time assumed as per clinic valet

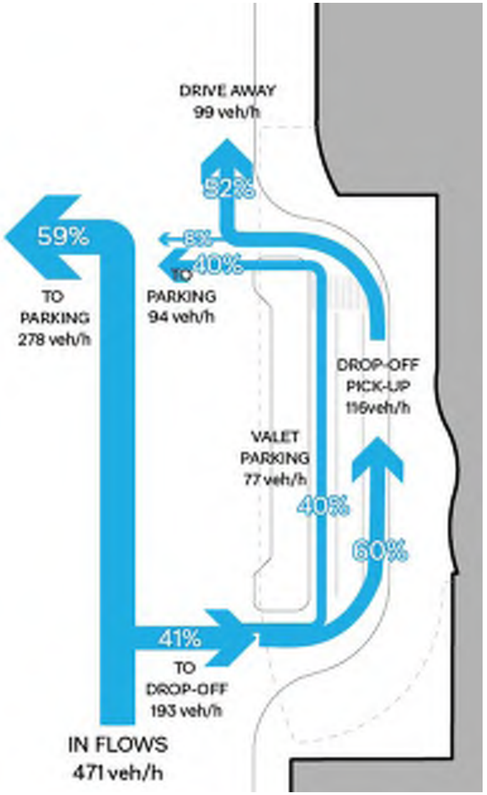
Drop-offs Layout and Flows Distribution

The diagrams on this page show the configuration of the two main drop-offs and a distribution of flows at various destinations.

GONDA DROP-OFF

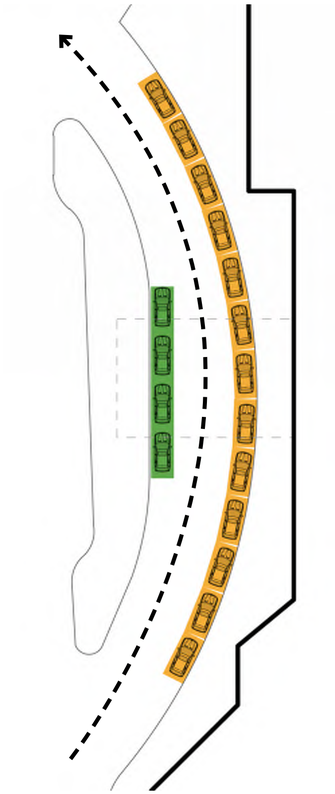


7 bays General Drop-off
7 bays Valet
4 bays Shuttle

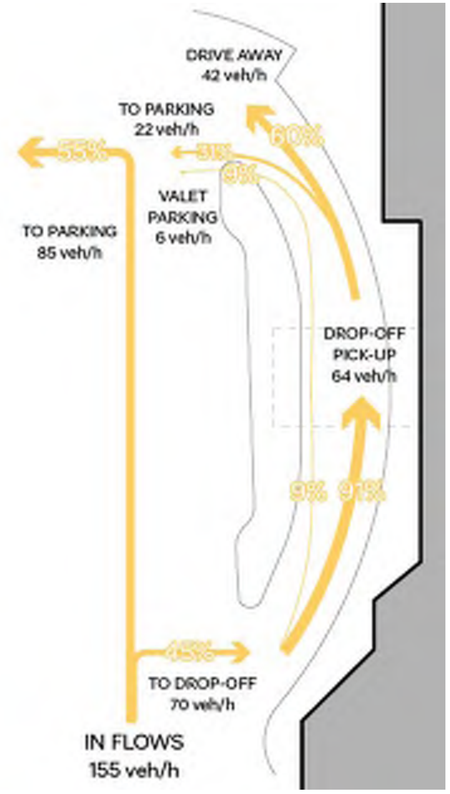


Clinic Flows Distribution
AM PEAK

MARY BRIGH DROP-OFF

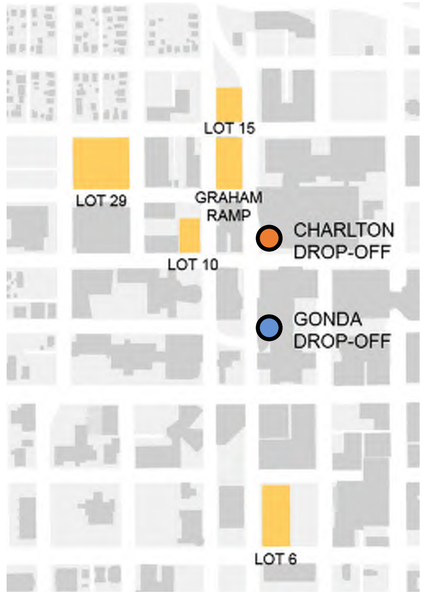


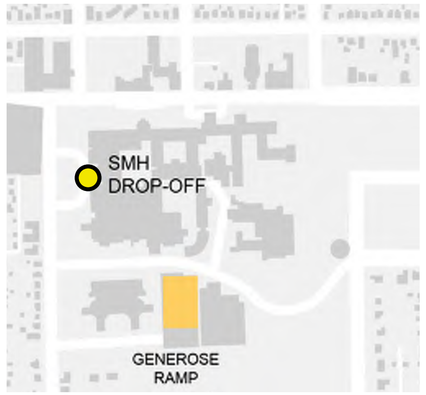
13 bays General Drop-off
4 bays Valet



Hospital Flows Distribution
AM PEAK

Valet Parking Data





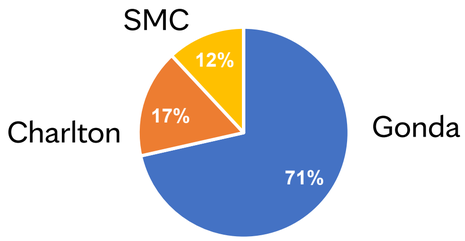
Drop-off

Parking facilities used by valet

Total share of daily valet parks and pulls

Park: when a car is dropped off

Pull: wehn a car is returned to the owner

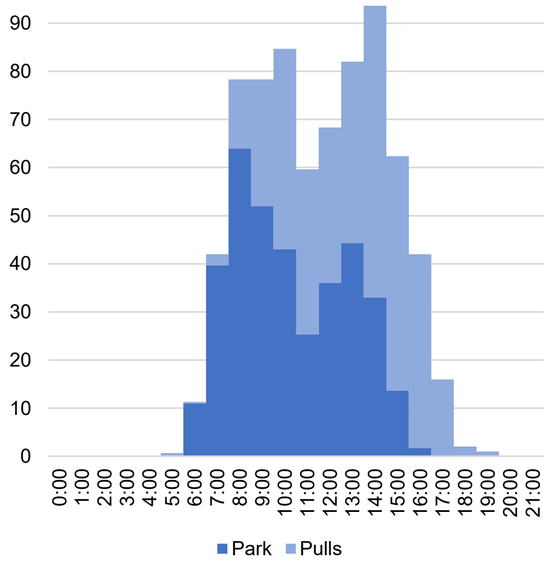


The provided valet parking data corresponds to three of Mayo Clinic's drop-offs where the service is offered: Gonda, Charlton, and Saint Mary's Hospital. The charts below represent the typical daily park/pull profiles based on the average of the three provided days (14th to 16th June, 2022).

Gonda drop-off is by far the most demanding with respect to this type of service, accounting for more than 70% of the daily valet trips. In the next slides, it will be studied in more detail.

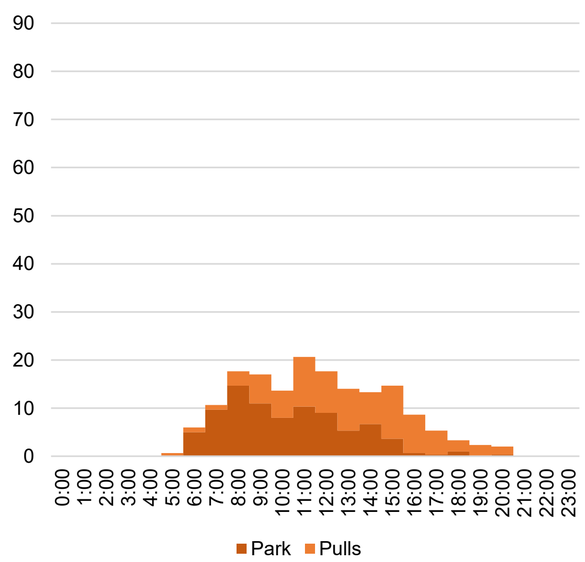
C

GONDA



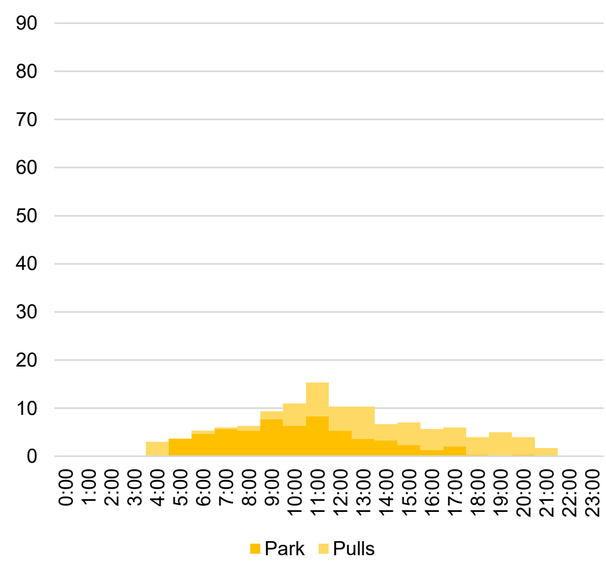
H

CHARLTON



H

SAINT MARY'S CAMPUS



Shuttle Survey

Shuttle survey was performed by Mayo in February 2023 in order to estimate the current flows. The survey showed that the flow at Gonda West door drop-off corresponds to 23 shuttles in the AM peak and to 16 shuttles in the PM peak.

Detailed shuttle data is not currently available, and therefore a dedicated survey campaign could allow us to properly measure this mode of transport both in terms of vehicles and passengers transported.

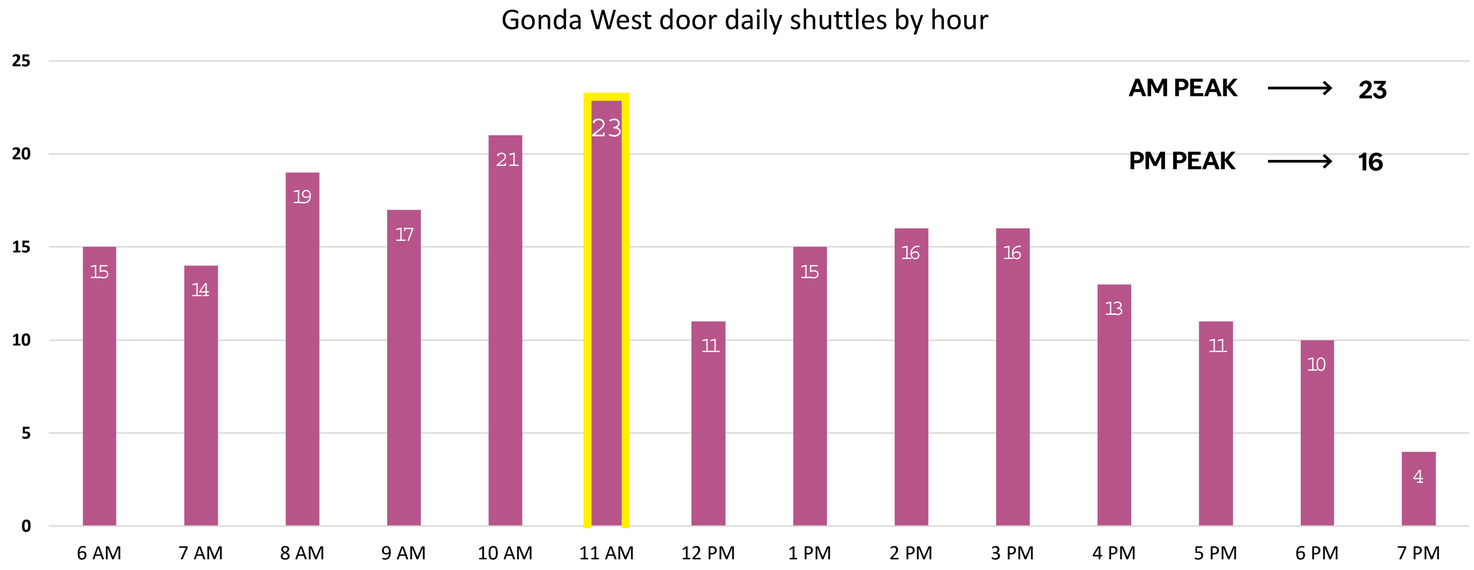
With the survey we have collected the following data:

- Shuttle **TRAFFIC** (Vehicles per hour)
- Vehicle per Shuttle **OPERATOR**
- **SIZE/TYPE** of shuttle

Location of survey:
GONDA DROP-OFF

	frequency
Snap Shuttle	
Route 1	every 55 min
Route 2	every hour
Route 3	every hour
Star Shuttle	every hour
Chamberlain	every 1.30 hour

* These are the main fixed routes, but there are other operators that provide on-demand services.



Drop-offs General Observations

GONDA DROP-OFF

As seen in previous slides, the Gonda drop-off is one of the main arrival points of the Mayo Downtown Campus, with more than 1500 vehicles daily. From both site visits and discussions with the Mayo team, it is clear that this area is critical and that it suffers congestion every day during peak times.

The reason for the congestion is mainly due to the fact that the valet can't move all the cars that are dropped off during the peak. These vehicles remain parked in the drop-off lanes for long periods of time, sometimes up to 30-40 minutes. To cope with the sudden capacity decrease, vehicles form a fourth irregular lane, but the drop-off still can't process all the incoming traffic, creating queues on 3rd Avenue.



MARY BRIGH DROP-OFF

Unlike the Gonda, the drop-off areas of Saint Mary's Campus are never characterized by queues or congestion.

As seen in previous slides, the hospital traffic flows at drop-offs are generally lower and more spread throughout the day. Additionally, the share of valet users, which create queues at the downtown clinic, is less than 10% at the hospital.

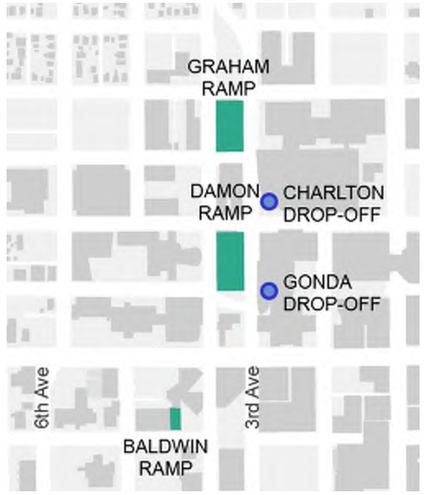
Both the Mary Brigh and Generose drop-offs are generously sized and never congested, which is a better condition for patients who are often weaker and have more mobility issues compared to the clinic visitors.

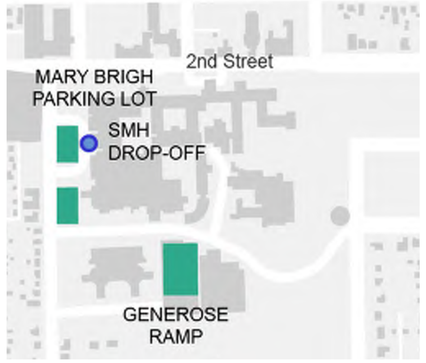


Visitors' Parking Facilities

Drop-off

Visitors parking facilities





The data provided regarding parking facilities dedicated to visitors and patients concerns their capacity and the number of entries and exits during the day. The data were further analyzed to understand occupancy and saturation.

The four parking structures witness the arrival profiles of users of different macro-functions. Specifically, Damon, serving the Mayo-Gonda complex, is a good reference for clinic users, while Generose and Mary Brigh are relevant for hospital users. Also, Baldwin visitors' parking data was provided, but exits were not counted and, therefore, have not been considered.

Slight adjustments were made, in accordance with Mayo, to reach consistency between entries and exits to recreate the most realistic occupancy curves. Parking areas are open 24h and a minimum overnight occupancy has been considered.

The curves on this page represent the average of the three days that were provided (14th to 16th June, 2022).

Entries

Exits

Entries and Exits columns in the charts are stacked

Capacity

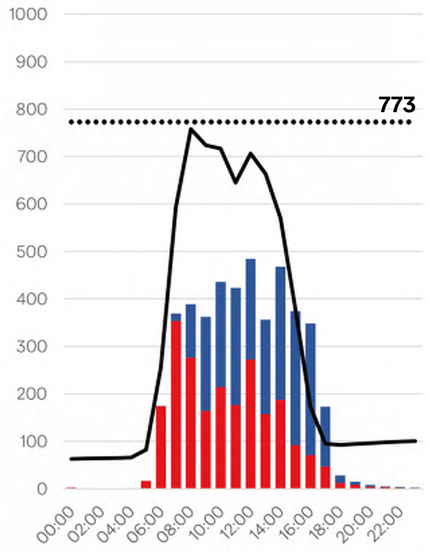
Occupancy curve

C Clinic

H Hospital

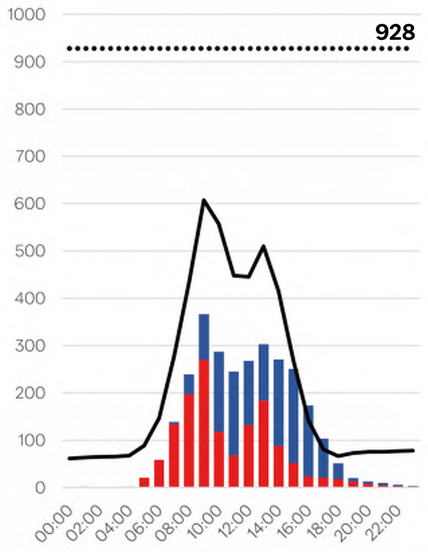
C

DAMON RAMP



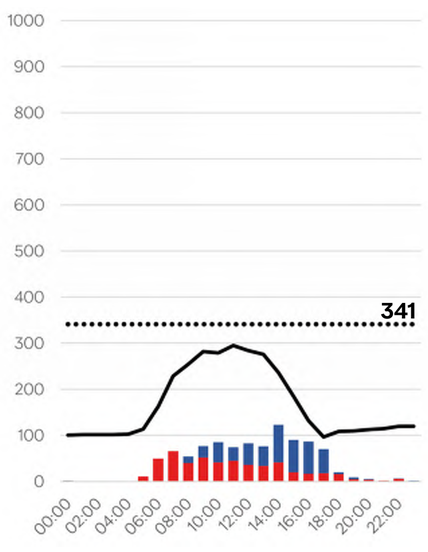
C H

GRAHAM RAMP



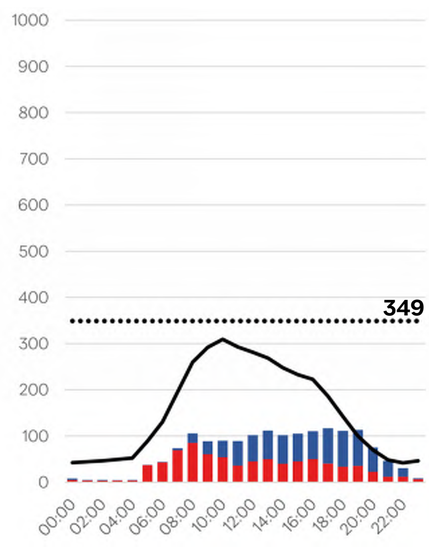
H

GENEROSE RAMP



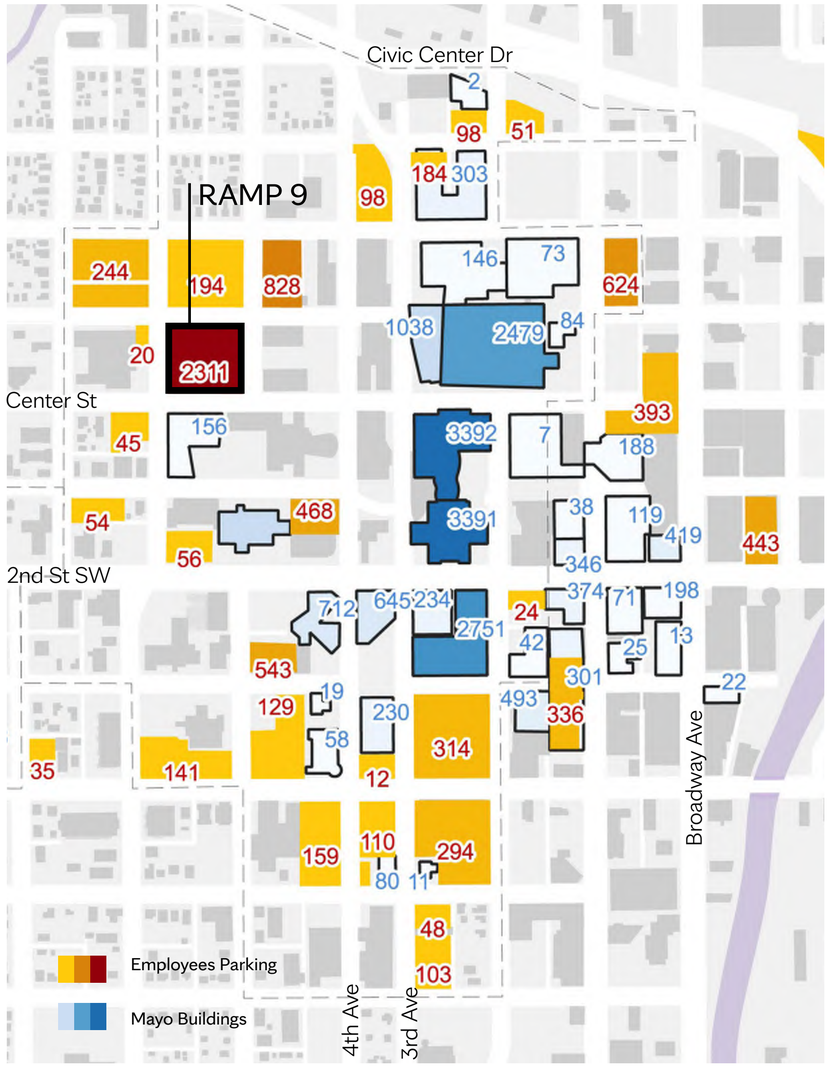
H

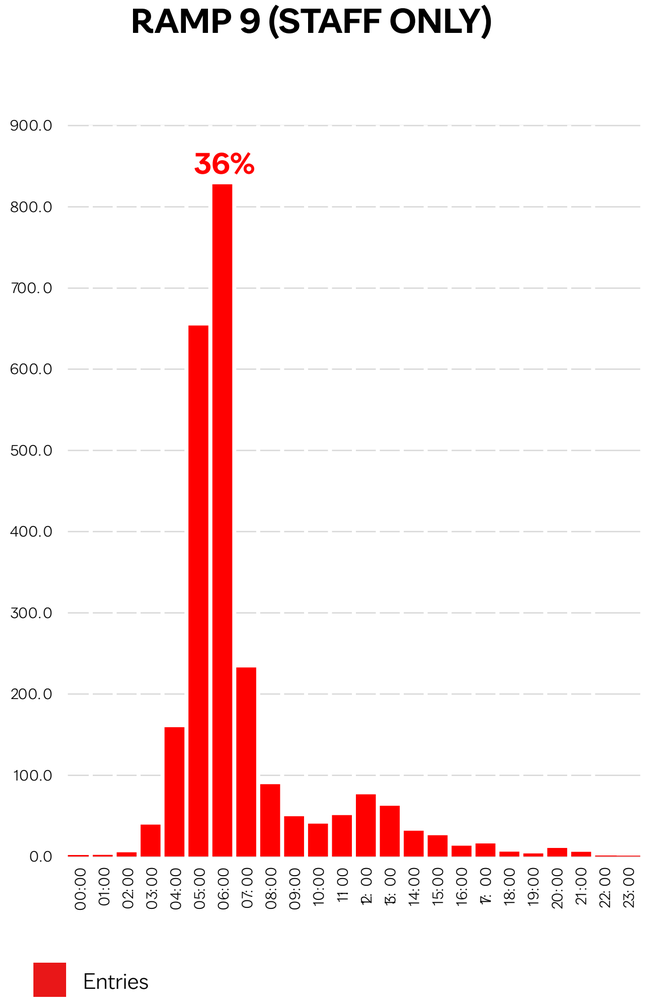
MARY BRIGH RAMP



Entries and Exits columns in the charts are stacked

Employees' Parking Facilities





The system of employee parking areas is very complex and is composed of lots, ramps, and remote lots connected to shuttle services.

Most of these parking structures are not regulated by barriers, and therefore no detailed traffic information is available.

Mayo provided the entry data for the biggest employee ramp, which can serve as a good reference to better understand traffic patterns generated by employees. Ramp 9, located downtown, counts more than 2300 car parking spaces.

The arrival profile clearly highlights a very defined and concentrated peak hour from 6:00 am to 7:00 am, where 36% of daily entrances occur. As we'll see in the following slides, this peak hour doesn't overlap with the city's peak nor with the visitor's.

Exit data is not recorded and therefore is not available.

Drop-offs and Parking Data Recap

Peak hour figures

C

Clinic Drop-off and Parking Data (Damon + Mayo/Gonda)

Peaks	To parking (Damon) veh/h	From Parking (Damon) veh/h	Shuttles (veh/h)	Gonda West Drop-Off	Drop-off type	Veh/h	%	Movement Type	Veh/h	%	Average time (sec)	Max time (sec)
DOWNTOWN (8:00-9:00)	277	112	23	194	General Drop-off	116	60%	Drop-off	70	60%	46	150
								Pick-up	46	40%	55	180
					Valet	78	40%	Park	64	82%	125	200
								Pull	14	18%	136	290
DOWNTOWN (2:30-3:30)	140	282	16	208	General Drop-off	114	55%	Drop-off	80	70%	46	150
								Pick-up	34	30%	55	180
					Valet	94	45%	Park	33	35%	125	200
								Pull	61	65%	136	290

H

Hospital Drop-Off and Parking Data (Mary Brigh + Generose)

Peaks	To parking (M-Brigh+ Generose) veh/h	From Parking (M-Brigh+ Generose) veh/h	Shuttles (veh/h)	Mary Brigh Drop-Off	Drop-off type	Veh/h	%	Movement Type	Veh/h	%	Average time (sec)	Max time (sec)
SMH AM (8:00-9:00)	125	34	8	74	General Drop-off	65	88%	Drop-off	39	60%	66	127
								Pick-up	26	40%		
					Valet	9	12%	Park	8.3	94%	125	200
								Pull	0.5	6%	136	290
SMH PM (4:00-5:00)	67	130	NA	124	General Drop-off	116	94%	Drop-off	50	43%	66	127
								Pick-up	66	57%		
					Valet	8	6%	Park	2	24%	125	200
								Pull	6	76%	136	290

*The table on this page shows a summary of all the traffic data surveyed at Downtown and at Saint Mary's: parking and drop-off flows in the peak hours are listed for Hospital and Clinic functions.

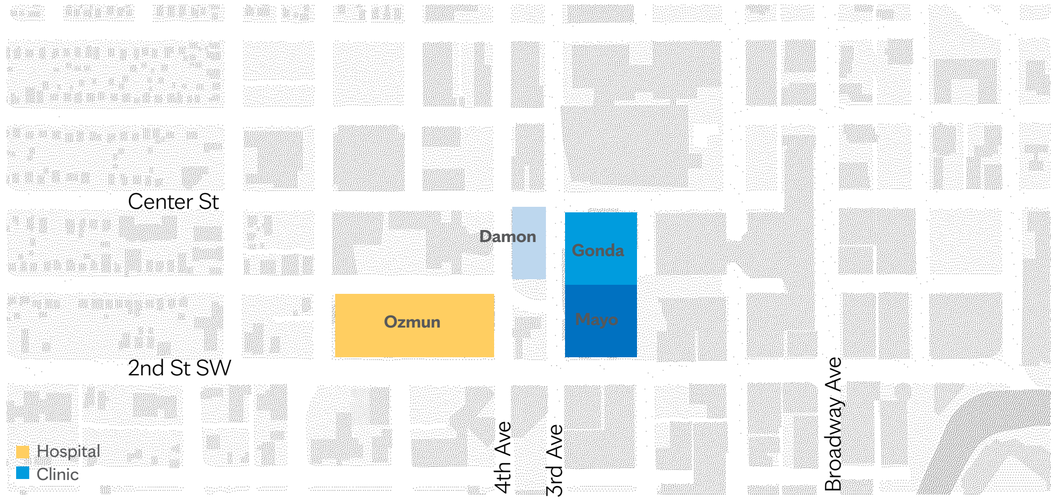
3 Trip Generation & Trip Distribution

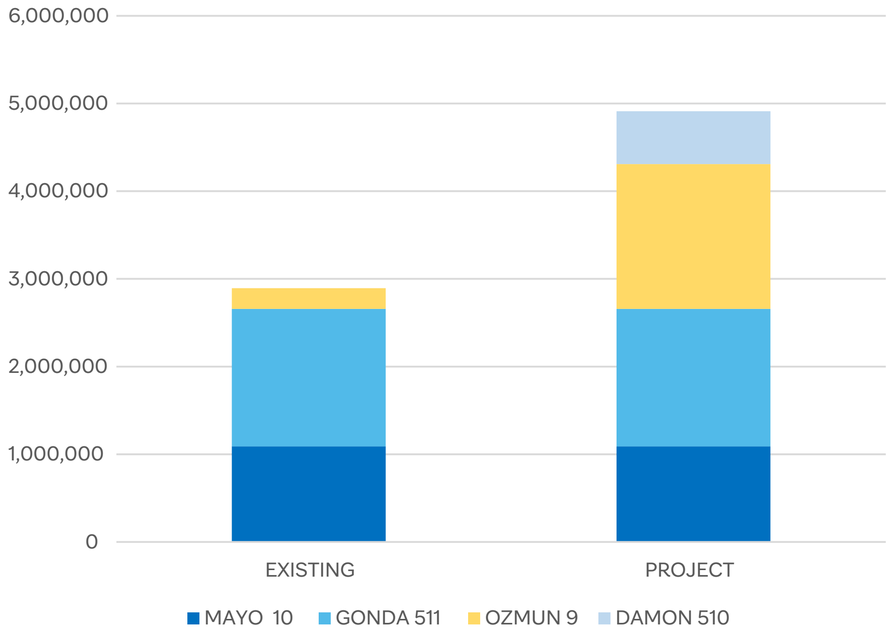
3.1 Project Quantities & Future Traffic and Parking Demand

Landuse Growth Comparison

The charts and table on the side represent the GFA
(gross floor area) assumptions for
the future scenario of the Unbound Project.
The new project looks at the construction of another clinic facility on
the site of Damon Parking Ramp, and the construction of the
Hospital of the Future Building, which will replace Ozmun Building.
Mayo/Gonda Building remains as per existing condition.
Also other Mayo plots downtown, such as Methodist
and Baldwin remain unchanged

	ROCOG TAZ	EXISTING SF	PROJECT SF
MAYO	10	1,090,180	1,090,180
GONDA	511	1,567,590	1,567,590
OZMUN	9	236,460	1,650,000
DAMON	510	0	600,000
Total		2,894,230	4,907,770



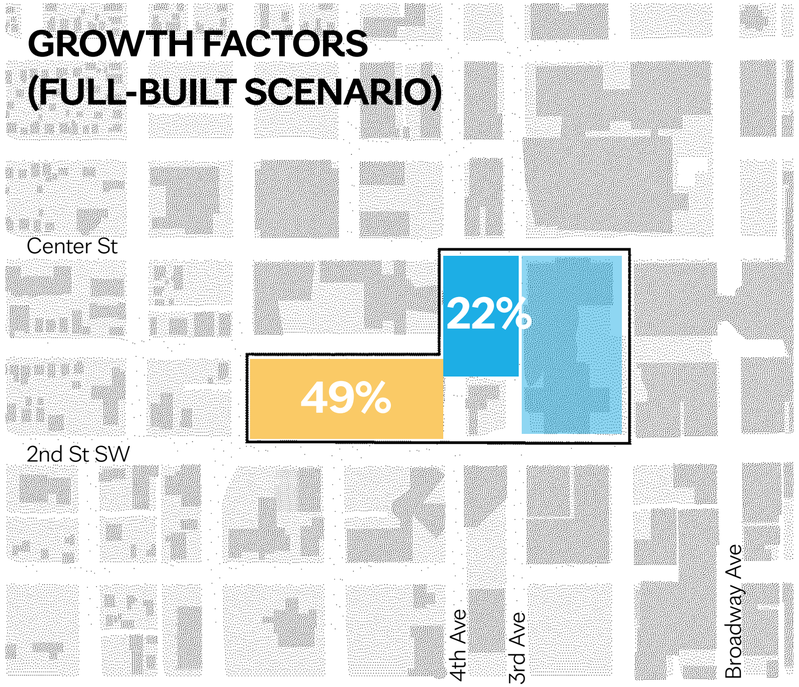


Determination of Growth Factors

AVAILABLE NUMBERS	ADDITIONAL PATIENTS/BEDS	GROWTH FACTORS
CLINIC		
GONDA/MAYO **3,899 patients daily** **2,750,754 sf**	LINK BUILDING **850 patients** **600,000 sf**	The new Damon Building will be **22%** of Gonda/Mayo
HOSPITAL		
ST. MARY'S HOSPITAL **956 beds** **427,967 sf**	HOF (OZMUN SITE) **470 beds** **1,650,000 sf**	The new Ozmun Hospital will be **49%** of SMH

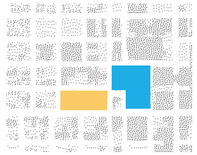
By comparing projections with current numbers, it was possible to establish the future growth factors for the different lots.

By looking at the main clinic and hospital complex (Mayo/Gonda and Saint Mary's campus), we derived growth factors comparing the number of beds/ patients of the existing and of the project scenarios. These were later applied to parking and traffic data in order to plan the mobility of the new campus.



Application of Growth Factors

PM Peak figures



CURRENT PEAK TIMES NUMBERS

GROWTH FACTORS

CAMPUS DEMAND PROJECT (Including Mayo/ Gonda, Damon and Ozmun traffic)

Vehicles arriving at clinic's drop-off
(Gonda West)

208 veh/h

The new Damon Building is estimated to increase the demand to

122%

of the current Gonda/Mayo complex.

253 veh/h

Vehicles entering clinic's parking structures
(Damon + 60% Graham)
IN
OUT

240 veh/h
391 veh/h

292 veh/h
476 veh/h

Vehicles arriving at hospital's drop-off
(Generose + Mary Brigh)

186 veh/h

The new Ozmun Hospital will be

49%

of SMH

91 veh/h

Vehicles entering hospital's parking structures
(Generose + Mary Brigh)
IN
OUT

81 veh/h
143 veh/h

40 veh/h
70 veh/h

1222 veh/h
Future destination traffic
(Including Mayo/ Gonda, Damon and Ozmun traffic)

Trip Generation

The following table summarizes the mobility data to which the growth factors have been applied. Project refers to the sites of: Mayo/Gonda, Damon and Ozmun.

Clinic Drop-off and Parking Data (Damon + Mayo/Gonda)

C

Peaks	To parking	From Parking
MORNING (8:00-9:00)	397	312
AFTERNOON (2:30-3:30)	292	476

Drop-off traffic (veh/h)	Drop-off type	Veh/h	%	Movement Type	Veh/h	%	Average time (sec)	Max time (sec)
236	General Drop-off	*141*	*60%*	Drop-off	*85*	*60%*	*46*	*150*
				Pick-up	*57*	*40%*	*55*	*180*
	Valet	*95*	*40%*	Park	*78*	*82%*	*125*	*200*
				Pull	*17*	*18%*	*136*	*290*
253	General Drop-off	*139*	*55%*	Drop-off	*97*	*70%*	*46*	*150*
				Pick-up	*42*	*30%*	*55*	*180*
	Valet	*115*	*45%*	Park	*40*	*35%*	*125*	*200*
				Pull	*74*	*65%*	*136*	*290*

Hospital Drop-Off and Parking Data (Ozmun)

H

Peaks	To parking	From Parking
MORNING (8-9)	61	17
AFTERNOON (4:00-5:00)	40	70

To DO In/Out flows (veh/h)	Drop-off type	Veh/h	%	Movement Type	Veh/h	%	Average time (sec)	Max time (sec)
36	General Drop-off	*32*	*88%*	Drop-off	*19*	*60%*	*66*	*127*
				Pick-up	*13*	*40%*		
	Valet	*4*	*12%*	Park	*4.10*	*94%*	*125*	*200*
				Pull	*0.24*	*6%*	*136*	*290*
61	General Drop-off	*57*	*94%*	Drop-off	*25*	*43%*	*66*	*127*
				Pick-up	*33*	*57%*		
	Valet	*4*	*6%*	Park	*0.87*	*24%*	*125*	*200*
				Pull	*2.84*	*76%*	*136*	*290*

3.2 Trip Distribution

City Scale Trip Distribution



Traffic survey results that are tested in the micro simulations did not provide sufficient understanding on the origin and destination of the flows related to Mayo campus in the city scale. For this reason, ROCOG CUBE macro model (described in the chapters 5 and 6) is used in order to evaluate the proportion of hospital users arriving from/to the different parts of downtown area through the selection of the zones of interest. Similar analysis is done for the project scenario for the estimation of the origin-destination distribution of the flows associated with the future UNBOUND project.

Where do Gonda/Mayo Users Come From ?

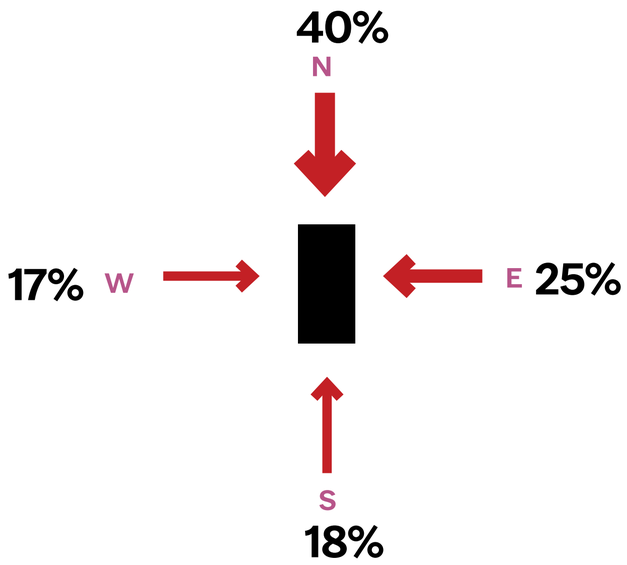
SELECT LINK ANALYSIS

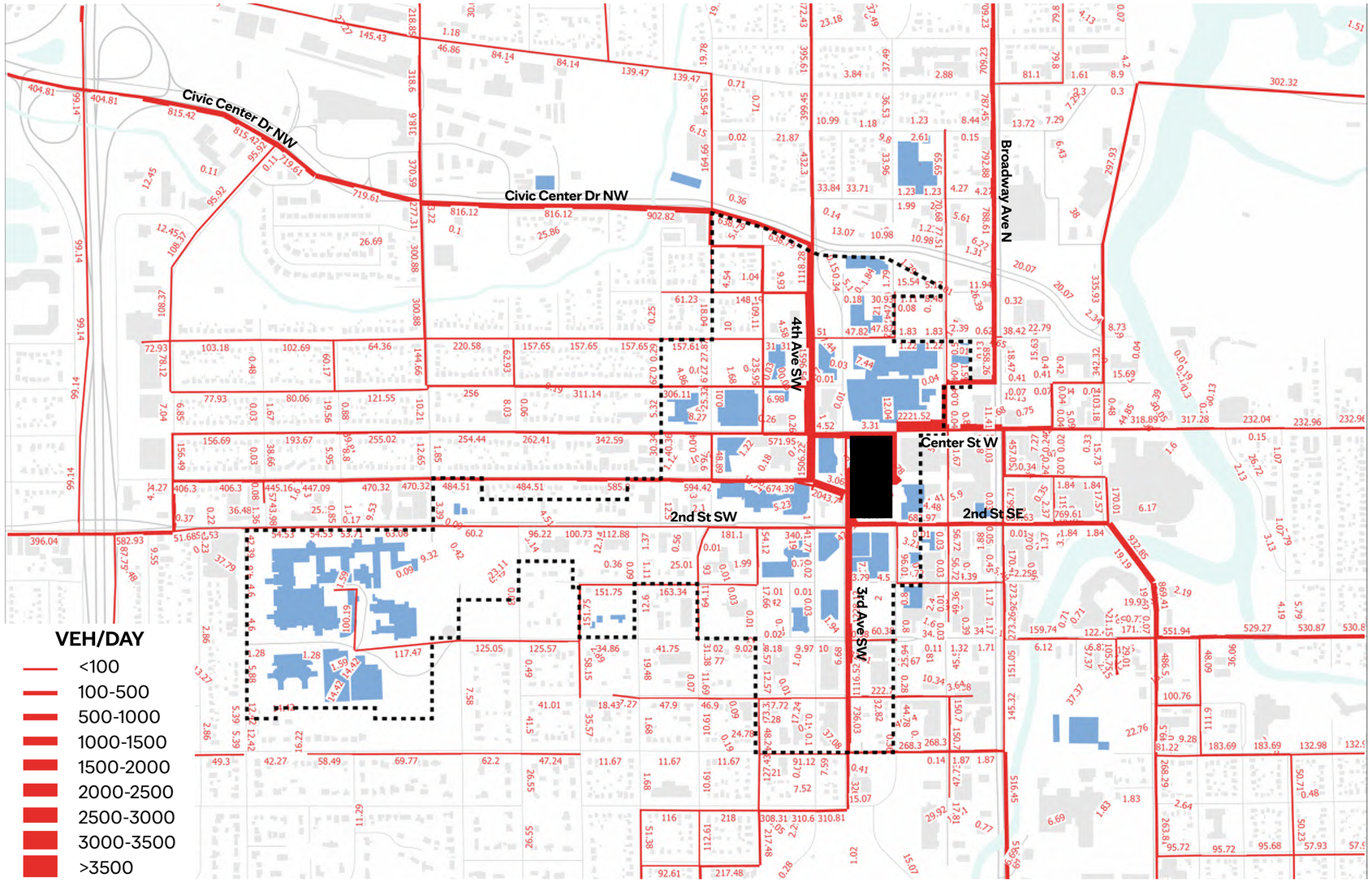
YEAR: 2045

DAILY TRIPS: 7,000

Incoming flows

Select link map is a tool that shows the origins and the destinations of trips to and from a given block (in this map Mayo/Gonda building).
The width of the lines represents the intensity of the flows, and the numbers represent the daily traffic flow (visitors, not employees).





Where do Gonda/Mayo Users Go To ?

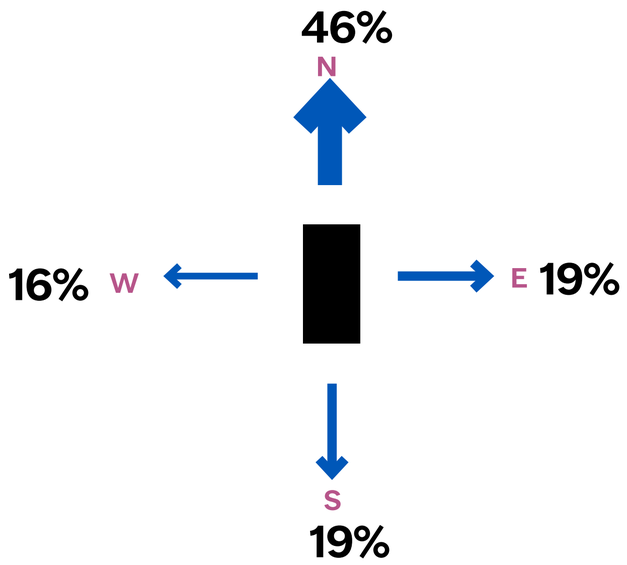
SELECT LINK ANALYSIS

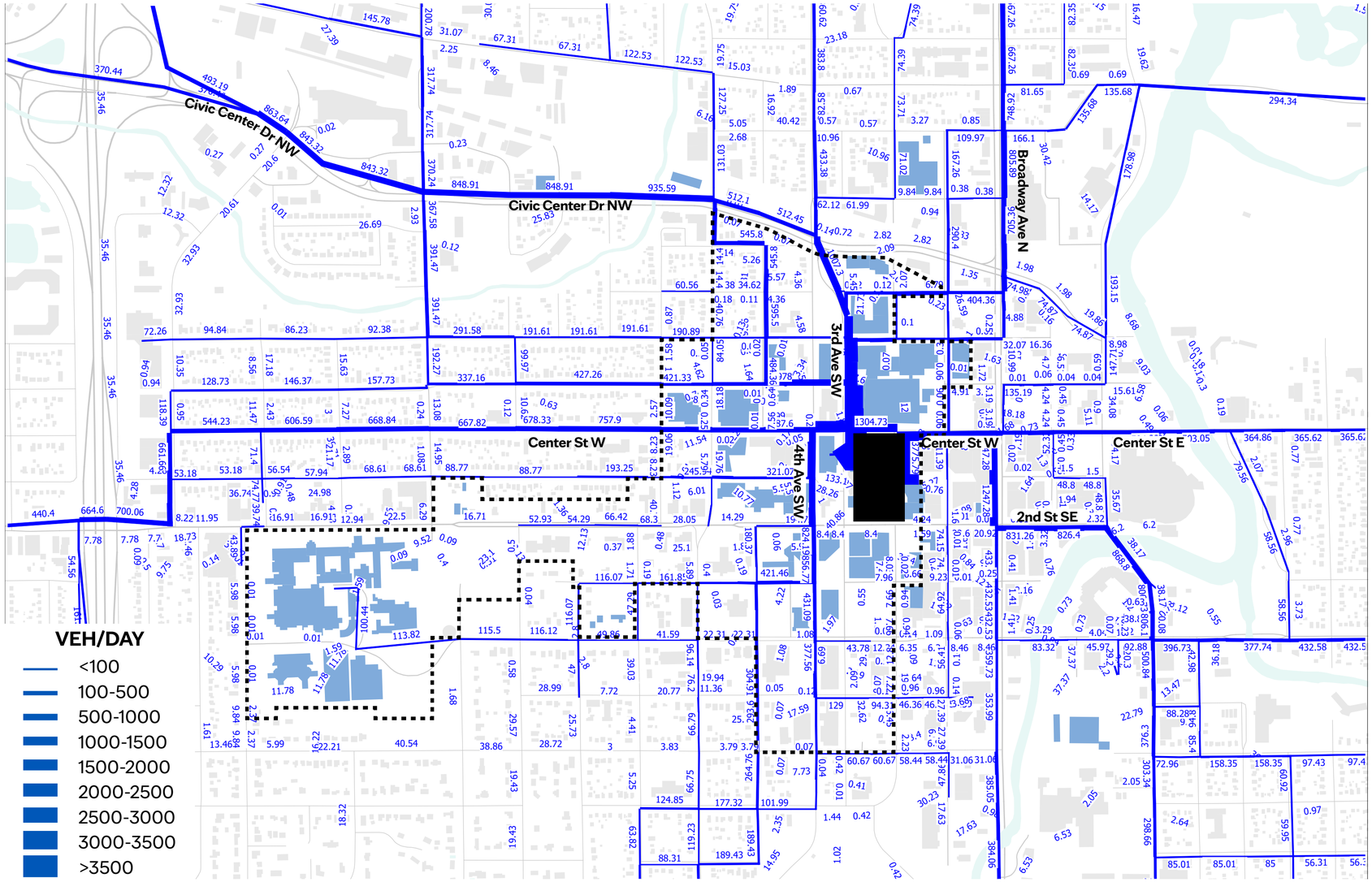
YEAR: 2045

DAILY TRIPS: 7,000

Outgoing flows

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The width of the lines represent the intensity of the flows, and the numbers represent the daily traffic flow (visitors, not employees).

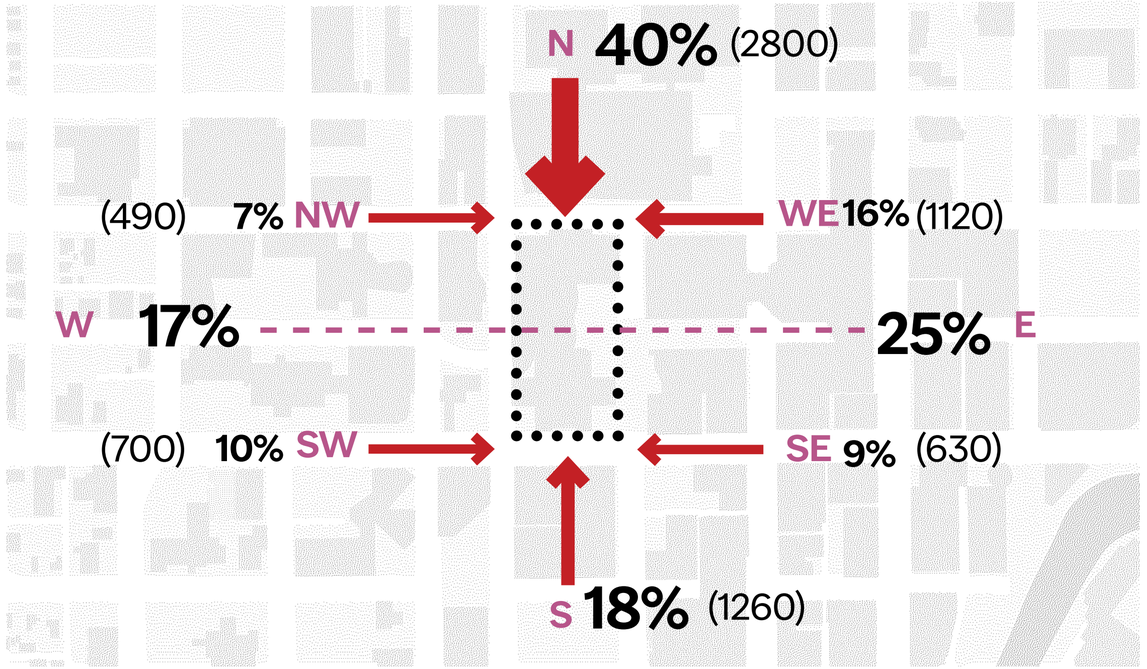




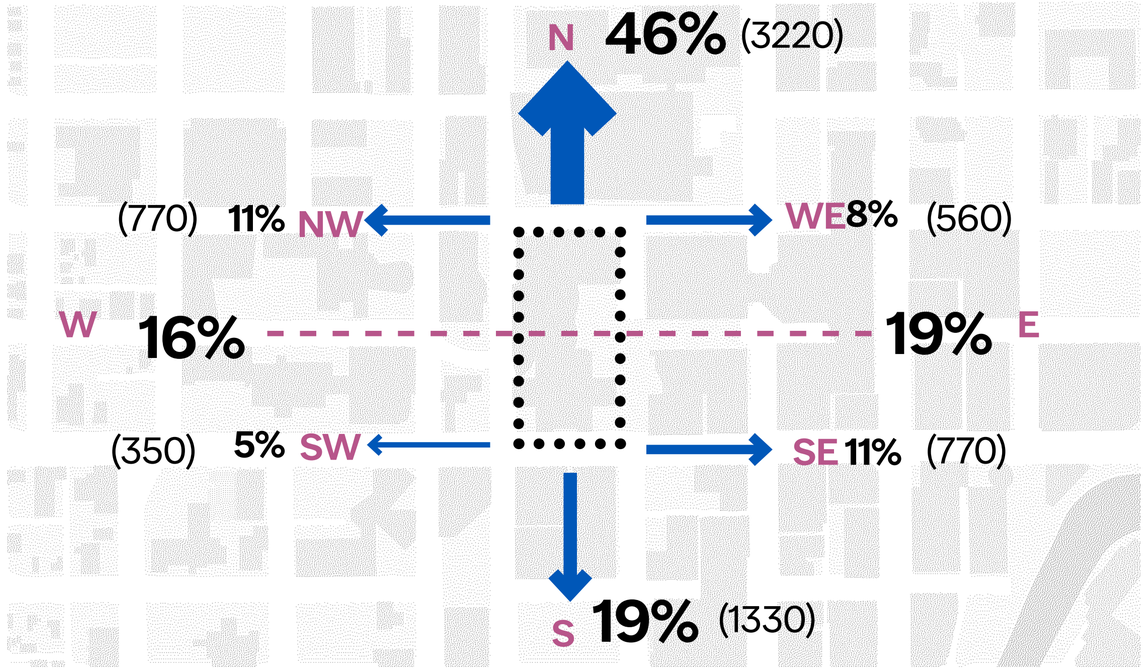
Clinic Users Arrival

TOTAL TRIPS DAILY (ABOUT 7000 PERSON TRIPS)

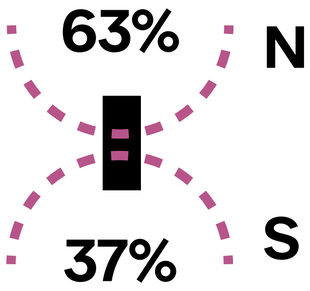
MAYO/GONDA
INCOMING FLOWS

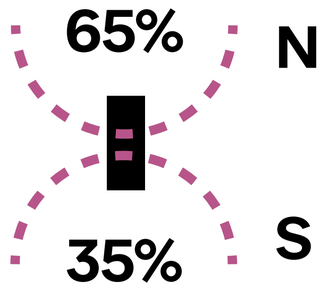


MAYO/GONDA
OUTGOING FLOWS



The trip distribution (%) above is derived from the ROCOG model, by selecting the specific highlighted zone. Absolute numbers represent the number of person trips as extracted from Cube. In the charts on the side we are extracting the split between Northern and Southern drop-off.

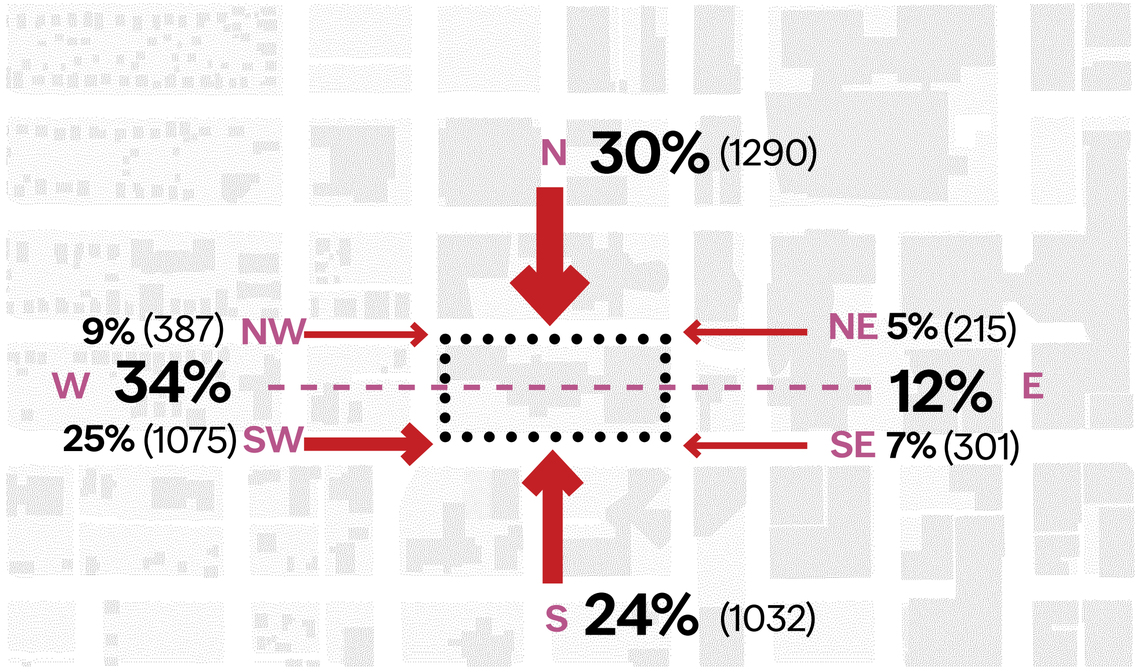




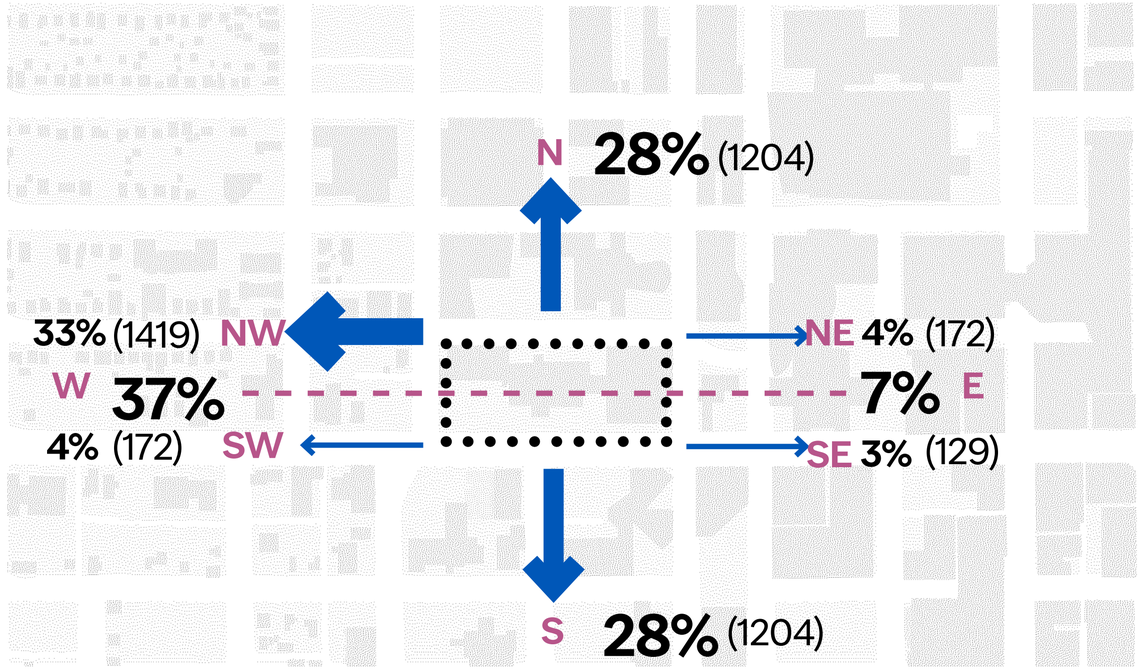
Clinic Users Arrival

TOTAL TRIPS DAILY (ABOUT 4300 PERSON TRIPS)

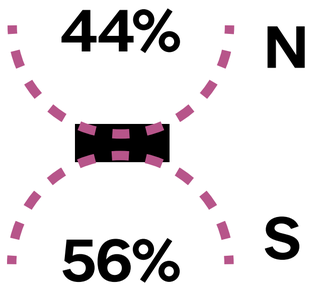
OZMUN
INCOMING FLOWS

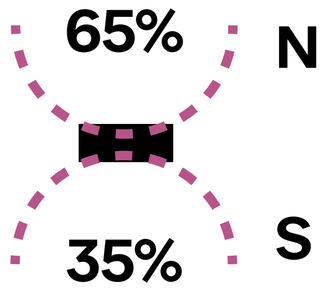


OZMUN
OUTGOING FLOWS



The trip distribution (%) above is derived from the ROCOG model, by selecting the specific highlighted zone. Absolute numbers represent the number of person trips as extracted from Cube. In the charts on the side we are extracting the split between Northern and Southern drop-off.





Trip Distribution

The maps on the side show the assumed trip distribution of the flows of the clinic and hospital visitors at the dropoffs. These are based on the previously shown analysis at the macro scale, but include a bias that induces the majority of clinic trips to go to north access and the majority of Hospital users to go to south access.
It should be noted that the clinic flows represent the majority, about **85%** of the total visitors flows.
For parking there is a slight difference in the hospital component, for which we assume that only a very residual component will park in the north garages (Graham and North), since both the south and the west dropoff are very well connected to south and in any case, this parking is closer and better connected to Ozmun compared to the northern ones.

PARKING - Trip Distribution

80% - (614 veh/h)

P
North/Graham
768 veh/h (in+out)
South Baldwin
P

20% - (154 veh/h)

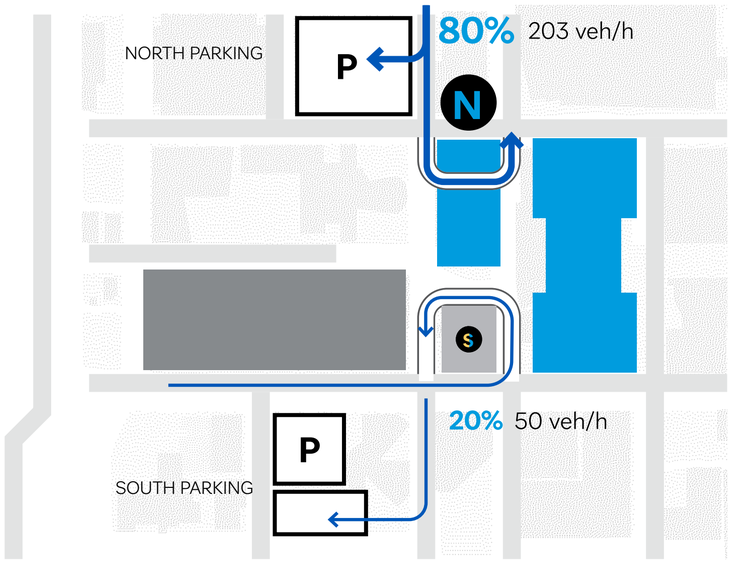
10% - (11 veh/h)

P
North/Graham
110 veh/h (in+out)
South Baldwin
P

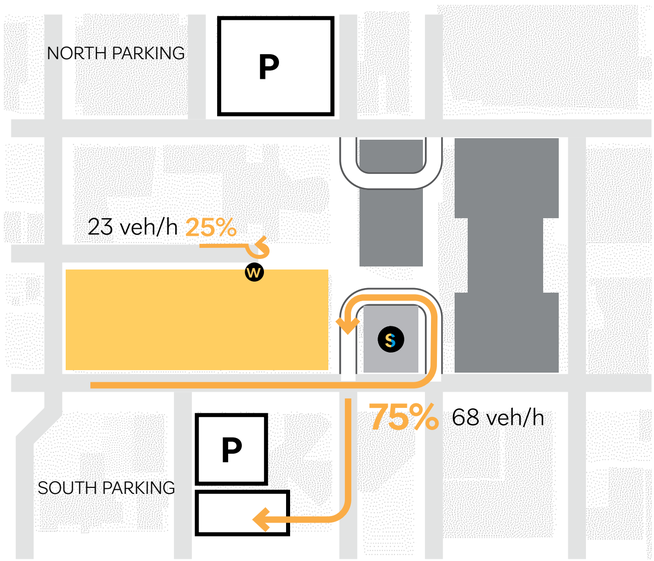
90% - (99 veh/h)

DROPOFF - Trip Distribution

CLINIC
TOTAL TRIPS 253 veh/h

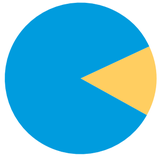


HOSPITAL
TOTAL TRIPS 91 veh/h



PM PEAK HOUR BI-DIRECTIONAL FLOWS: **1,222 veh/h (PARKING + DROPOFF)**

CLINIC (OUTPATIENT): **85%**



HOSPITAL (INPATIENT): **15%**

4 Parking and Drop-off Strategy

Future Parking Overview - Visitors Structures

The map on the side shows the three main visitors parking Garages: Graham, North and South.

The first two are mainly used by clinic users and are located in the north, close to the entrance of the new clinic building.

The south parking is located in a more convenient location for the hospital users, but it will likely host some demand of clinic users, as currently happens for the Baldwin parking garage.

North parking garage also hosts a drop-off space that visitors will use either for dropping off someone or to leave their car at the valet.

PARKING PROVISION RECAP

DEMOLISHED PARKING

- **DAMON** (demolished): 773 parking spaces - visitors
- **OZMUN** (demolished): 468 parking spaces - staff

VISITORS PARKING (PROJECT SCENARIO)

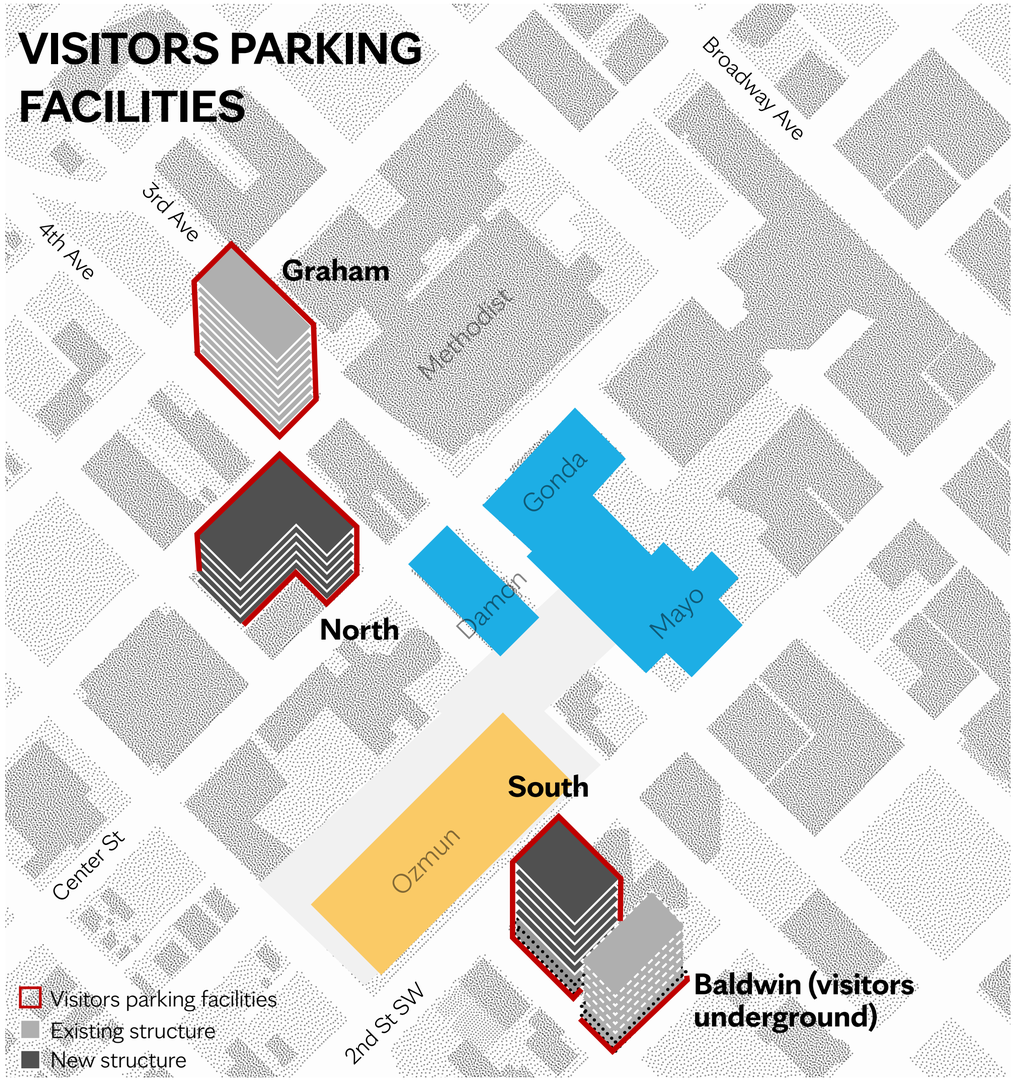
- **GRAHAM**: 926 parking spaces - (existing - spare capacity for staff)
- **NORTH**: 800 parking spaces - (new)

NORTH FACILITIES

- **BALDWIN**: 160 parking spaces - (existing - underground garage)
- **SOUTH**: 500 parking spaces - (new)

SOUTH FACILITIES

TOTAL: 2386 parking spaces
(capacity for visitors parking, including valet in the project scenario)



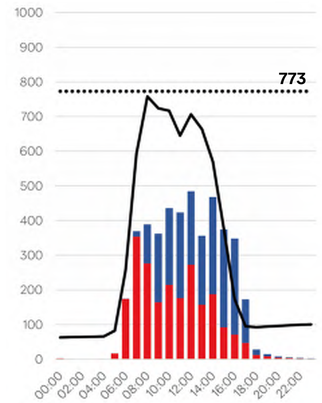
Future Parking Demand Estimation

Based on the growth factor calculated previously, we can estimate the future parking demand of the new campus. To calculate the visitors parking demand, we started from the Damon and Graham components related to the Mayo/Gonda users + the Generose and Mary Brigh ramps for the hospital component.

PARKING DEMAND

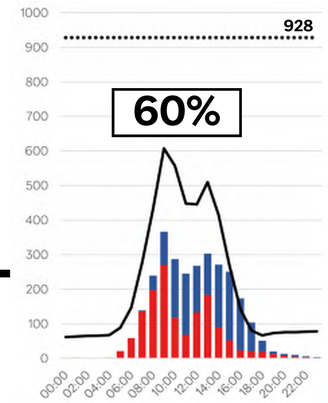
MAYO/GONDA PARKING DEMAND

100% of DAMON RAMP



+

60% of GRAHAM RAMP



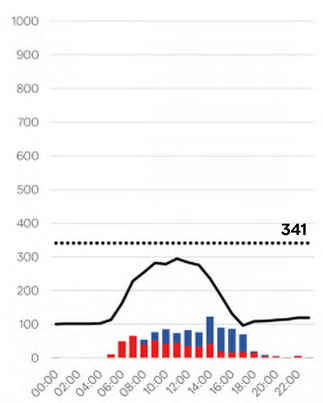
x

122%

+

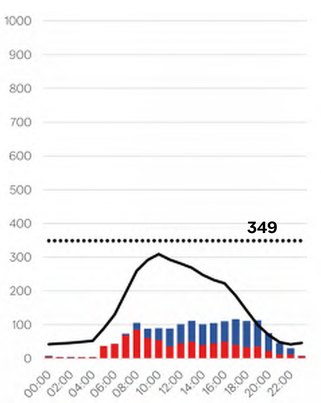
SMC PARKING DEMAND

GENEROSE RAMP



+

MARY BRIGH RAMP



x

49%

Parking demand is calculated based on actual demand and not on the size of the existing facilities.

CLINIC

4,749 daily patients

1,504 cps

HOSPITAL

470 beds

282 cps

cps = car parking spaces

Future Parking Demand Estimation

PARKING DEMAND

1,786 cps

cps = car parking spaces

CLINIC DEMAND

1,504 cps

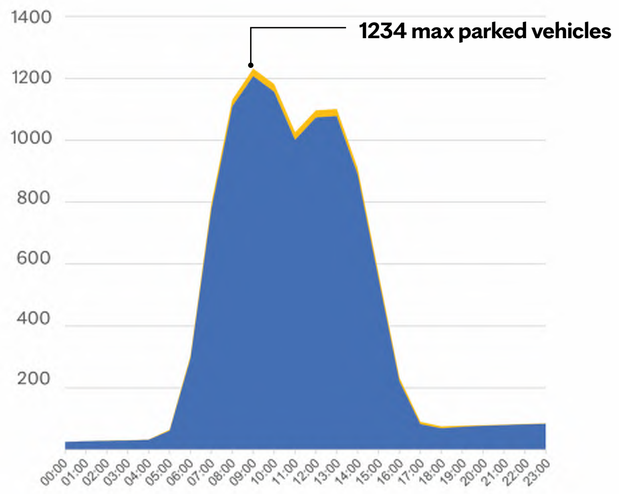
HOSPITAL DEMAND

282 cps

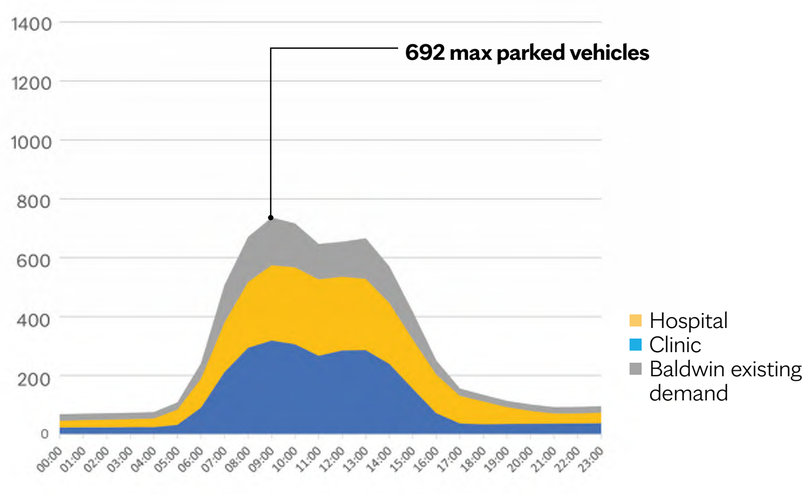
N	80%	1,203 cps	Demand of north parking facilities
N	10%	28 cps	
S	20%	300 cps	Demand of south parking facilities
S	90%	253 cps	
S	Baldwin existing demand	161 cps	

The total parking demand of 1,786 parking spaces has been distributed between the north and south facilities following the trip distribution just calculated. Baldwin demand was then added to the south parking as the new south parkign and the existing Baldwin will work in sinergy. the clinic and hospital users have two different arrival profiles. The max demand is given by the stacking of the different curves.
The maximum demand highlighted in the curves is a result of the stacking of different arrival profiles of the clinic and hospital users.
The parking capacity foreseen by the project is sufficient to cater for the demand of all visitors (valet and self-parkers) and any spare capacity will be used as staff parking.

NORTH FACILITIES: 1234 CPS



SOUTH FACILITIES: 692 CPS



A Conservative Parking Projection

*This slide shows a collection of assumptions that have been considered while calculating the parking demand

PARKING PROJECTIONS INCLUDE:



+10%

Additional 10% buffer on top of calculated demand.



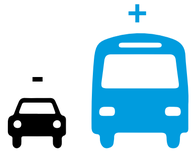
Parking (about 200 cps) dedicated to the valet service at drop-offs, which is currently located in remote lots. The target is to maximize valet efficiency by bringing parking closer to the drop-off locations. The lots that are currently used for valet will be kept as buffer for possible over-spill and for staff.

PARKING PROJECTIONS DON'T INCLUDE (YET):



+4%

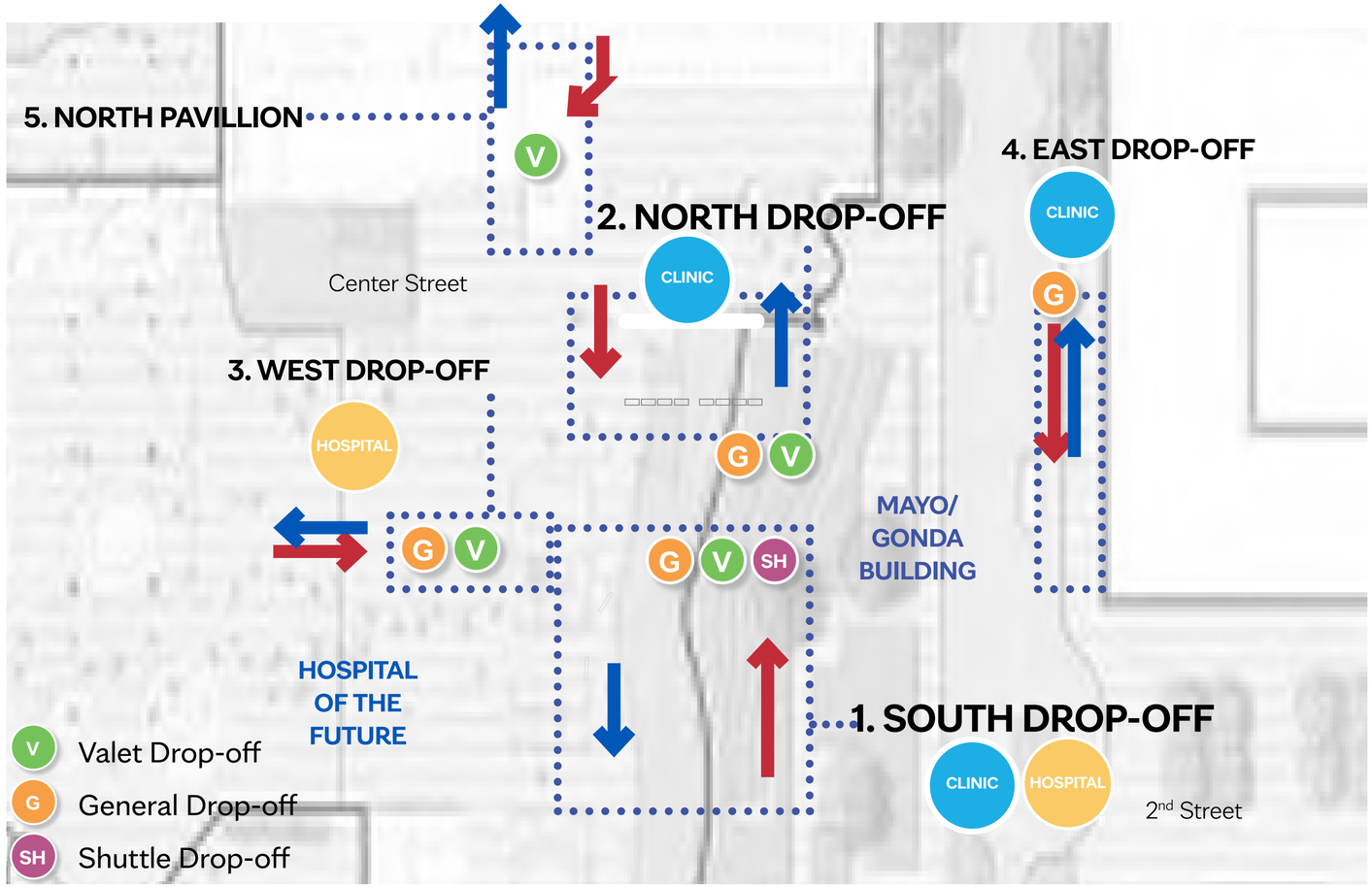
Any demand decrease due to telemedicine or remotization of some clinic services. For example It is foreseen that in 2030 11% of visits will be virtual (+4% compared to today).



Any decrease of demand due to a change in mobility habits thanks to the introduction of new modes (Mayo on-demand shuttle) and the DMC/Link projects implementation.

New Drop-off & Accesses Location

Number and location of drop-offs



The drop-off study follows the architecture design of the future Mayo's facilities, for which two main and two secondary points of access were planned.

These accesses were characterized according to their function, hierarchy, and location, thus allowing a balanced traffic flows distribution.

Main Drop-off Areas:

South drop-off: the main access, which will concentrate the majority of the arrival trips, whether for the clinic or for hospital;

North drop-off: dedicated to clinic patients, it has the most direct access for patients/visitors coming from the 4th Ave or Center Street;

Secondary Drop-off Areas:

3. West drop-off: the least busy access, planned for hospital patients and design to be more private, caring for patients with special needs.

4. East drop-off: dedicated to clinic patients coming to the east entrance of the Mayo/Gonda building, it is designed flexibly to accommodate different phases of the project

5.North Pavilion drop-off: dedicated to valet operation

Hospital
Clinic
entrance
exit

5 Traffic Study Methodology

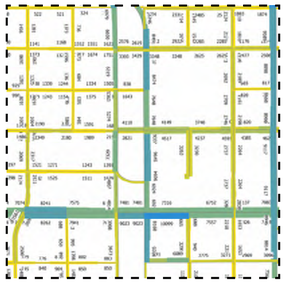
Traffic Model Methodology

The following pages describe the methodology and results of the traffic simulations carried out to assess the traffic impact of the Unbound project. The main objectives of the traffic model are the following:

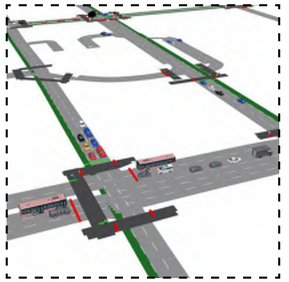
- Verify that the flows generated by the campus expansion are compatible with the road network.
- Assess the impact on traffic of the interruption of 3rd and 4th Avenues to create a car-free campus from 6th to 2nd Avenue.
- Assess the operations, layout, and capacity of the new drop-off and valet service areas.
- Verify that the new parking facilities and their access points are properly located and sized.

MODELING TOOLS AND SCALES OF ANALYSIS
Due to the magnitude and importance of the new project, the traffic study has been carried out both at the macro and micro scales, using three different modelling tools:

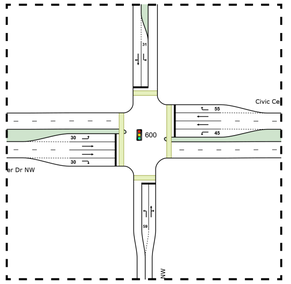
Macro scale model (City): based on the ROCOG traffic model, developed with the Cube software. The analysis at this scale will help to better understand the redistribution of traffic at city level caused by the closure of the two segments of 3rd and 4th Avenue and an introduction to the project.
Micro scale model (Campus): a multimodal simulation developed with PTV Vissim with the interaction of vehicles, pedestrians, and public transport has been carried out at the scale of the campus, including 19 intersections surrounding the project site. The main output of this simulation is to verify that the level of service at each intersection is acceptable and in line with city engineering standards. Additionally, the simulation assesses the operations and appropriate sizing of the drop-off areas of the clinic, one of the most important and critical points of the patient's arrival experience.
Micro scale model (Intersections): an analysis carried out on five specific intersections that were not included in the campus model but were deemed critical by the City. This analysis was done using the software Sidra Intersections and is aimed at defining the level of service and saturation of the intersections and eventually defining possible upgrades or modifications to their layout.



CUBE



PTV VISSIM



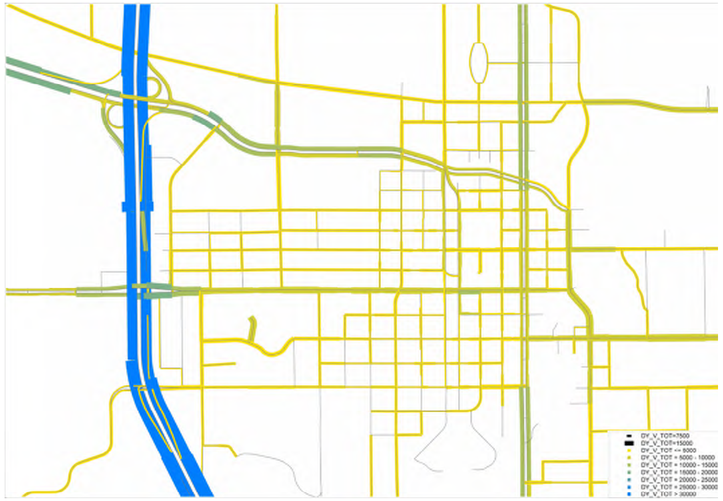
SIDRA INTERSECTIONS

MACRO SCALE

MICRO SCALE

Scenarios

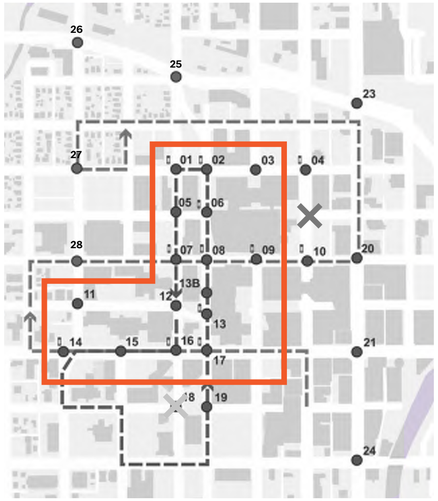
The simulations are carried out on different scenarios that are based on available existing models or traffic counts performed specifically for the Unbound project.



CUBE

Macro scale model (City):

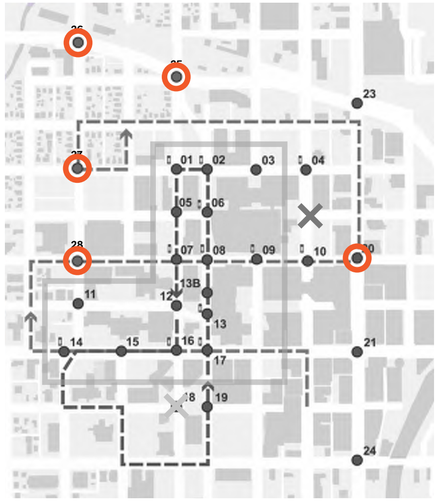
- Existing condition 2018
- Reference Scenario 2045 (no-build) – not including the Unbound project and the network modifications
- Project Scenario 2045 (build) - including the Unbound project and the network modifications



PTV VISSIM

Micro scale model (Campus):

- Existing condition 2022 – based on the most updated traffic counts available, carried out for the project in June 2022
- Project Scenario 2045 - including the Unbound project and the network modifications



SIDRA INTERSECTIONS

Micro scale model (Intersections):

- Existing condition 2022 – based on the most updated traffic counts available, carried out for the project in April 2023
- Project Scenario 2045 - including the Unbound project and the network modifications

Macro to Micro Methodology

As highlighted in “Appendix A: Trip Generation Memo,” the trip generation of the ROCOG model, based on the ITE rates, results in overestimation compared to the actually observed traffic flows at the Rochester Clinic. The purpose of macro scale traffic models is to study traffic at the urban, county, or region scale, therefore it is possible that the description of traffic at the block scale does not match the detailed observation done at the micro scale.

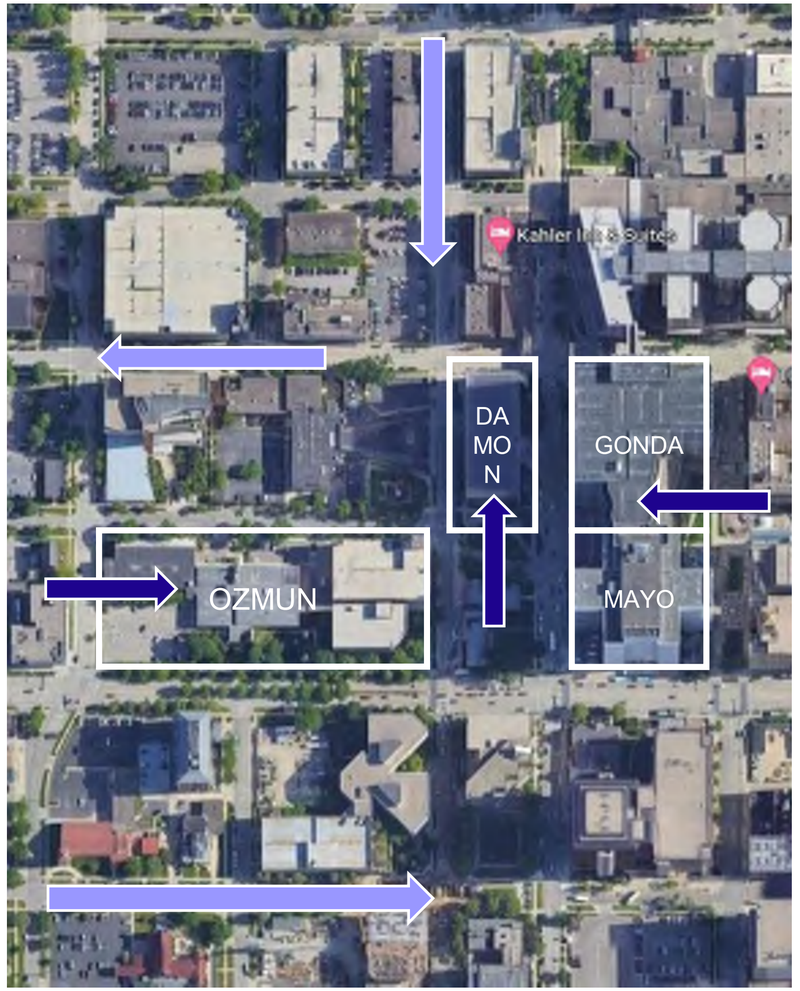
For this reason, we have developed a methodology to import the macro-scale data into the micro-scale simulations while still reflecting the actual observed and projected quantities of the Unbound project.

The macro scale analysis shown in the next slides has been carried out without changing the Cube trip generation parameters, but only changing the landuse and parking quantities and modifying the network to represent the proposal of the project.

The macro model will provide a reliable analysis of the Avenues closure at the macro scale, which will then be analysed in detail at the campus/intersection scale with Vissim. The traffic flows of the macro model have been divided into two components:

The Unbound traffic: generated and attracted by the 4 project Traffic Analysis Zones (TAZ): Mayo, Gonda, Ozmun, and Damon. For this component, we’ll extract the trip distribution matrix from the macro model; this will indicate how the Clinic flows are distributed on the network in %. The actual traffic flows will be calculated with dedicated trip generation based on the observed data. Then the trips will be assigned to the network using the distribution matrix of origins and destinations of each of the 4 project TAZs. Percentage distribution is calculated starting from the Select link tool and then applied to all the entry points of the Vissim model.

The Background traffic: all the remaining traffic on the network including also other Mayo plots outside of the 4 project TAZs. For this component, we extract the traffic difference (delta) between 2018 base scenario and 2045 project scenario on every link of the network. We then apply the delta (in the form of absolute numbers for the results >0 or in the percentage change otherwise) to the traffic flows of the Vissim/Sidra current scenarios based on 2022–2023 counts.



Methodology - Peak Hour Assumptions

MACRO SCALE – PEAK HOUR

The ROCOG model times of day include two peak periods of three hours (6am to 9am and 3pm and 6pm). Since the micro simulations refer to peak periods of one hour, we need to convert the macro numbers.
The methodology used in the macro model suggests increasing the hourly capacity of the street by 2.5 and comparing it with the 3-hour traffic. Starting from this assumption, we have determined that the peak hour is about 40% of the traffic in the 3-hour period. This assumption is also confirmed by the parking data of the Mayo facilities shown in the tables on this page.

DAMON

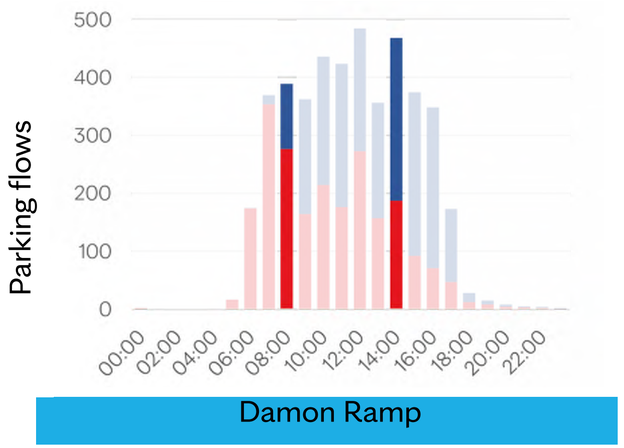
Time slot	Entries	Exits	Transits	% in	% out	% transits	
00:00	3	0	3	0%	0%	0%	
01:00	1	0	1	0%	0%	0%	
02:00	1	0	1	0%	0%	0%	
03:00	1	0	1	0%	0%	0%	
04:00	1	0	1	0%	0%	0%	
05:00	17	0	17	1%	0%	0%	
06:00	**174**	**1**	**175**	**8%**	**0%**	**4%**	**19%**
07:00	**354**	**16**	**369**	**16%**	**1%**	**8%**	**40%**
08:00	**277**	**112**	**389**	**12%**	**5%**	**9%**	**42%**
09:00	164	198	362	7%	9%	8%	
10:00	215	221	436	10%	10%	10%	
11:00	176	248	424	8%	11%	10%	
12:00	273	212	484	12%	10%	11%	
13:00	157	199	356	7%	9%	8%	
14:00	187	281	468	8%	13%	11%	
15:00	**92**	**282**	**374**	**4%**	**13%**	**8%**	**42%**
16:00	**71**	**277**	**348**	**3%**	**13%**	**8%**	**39%**
17:00	**47**	**125**	**172**	**2%**	**6%**	**4%**	**19%**
18:00	13	15	28	1%	1%	1%	
19:00	9	6	15	0%	0%	0%	
20:00	5	3	8	0%	0%	0%	
21:00	4	1	5	0%	0%	0%	
22:00	3	1	4	0%	0%	0%	
23:00	2	1	2	0%	0%	0%	
TOTAL	**2240**	**2200**	**4440**	**100%**	**100%**	**100%**	

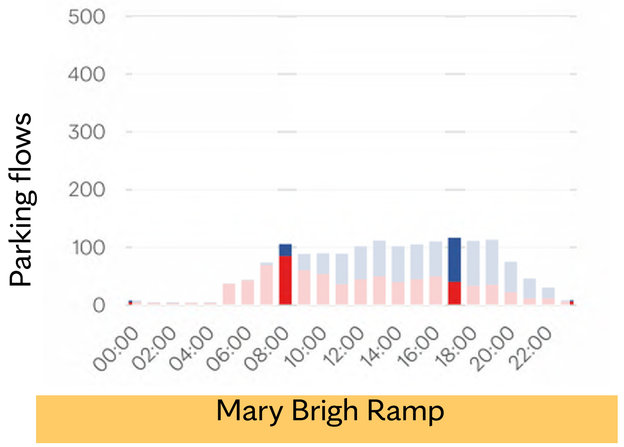
ST MARY'S CAMPUS

Time slot	Entries	Exits	Transits			% transits	
00:00	6	4	10	0%	0%	0%	
01:00	4	1	6	0%	0%	0%	
02:00	3	1	5	0%	0%	0%	
03:00	4	1	5	0%	0%	0%	
04:00	5	1	6	0%	0%	0%	
05:00	48	0	48	4%	0%	2%	
06:00	**92**	**1**	**94**	**7%**	**0%**	**4%**	**24%**
07:00	**134**	**4**	**139**	**10%**	**0%**	**5%**	**35%**
08:00	**125**	**34**	**159**	**10%**	**3%**	**6%**	**41%**
09:00	112	53	165	9%	4%	6%	
10:00	95	80	175	7%	6%	7%	
11:00	81	82	163	6%	6%	6%	
12:00	81	103	184	6%	8%	7%	
13:00	84	104	188	6%	8%	7%	
14:00	81	143	224	6%	11%	9%	
15:00	**65**	**130**	**195**	**5%**	**10%**	**8%**	**34%**
16:00	**67**	**130**	**197**	**5%**	**10%**	**8%**	**34%**
17:00	**58**	**129**	**187**	**4%**	**10%**	**7%**	**32%**
18:00	49	82	131	4%	6%	5%	
19:00	40	82	122	3%	6%	5%	
20:00	26	54	80	2%	4%	3%	
21:00	14	34	48	1%	3%	2%	
22:00	18	19	37	1%	1%	1%	
23:00	7	3	10	1%	0%	0%	
TOTAL	**1301**	**1275**	**2576**	**100%**	**100%**	**100%**	

Definition of the peak hour

Parking peak hours



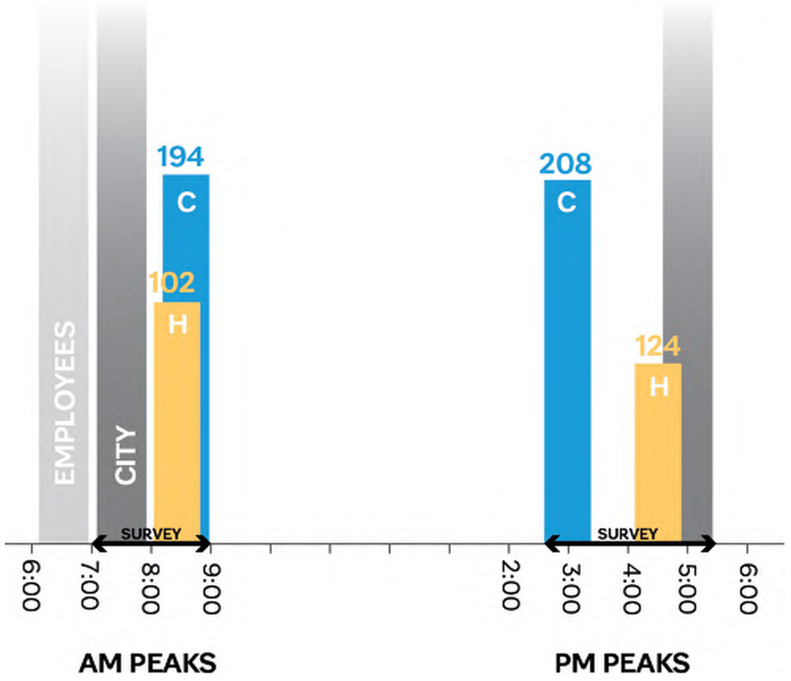


MACRO SCALE - PEAK HOUR

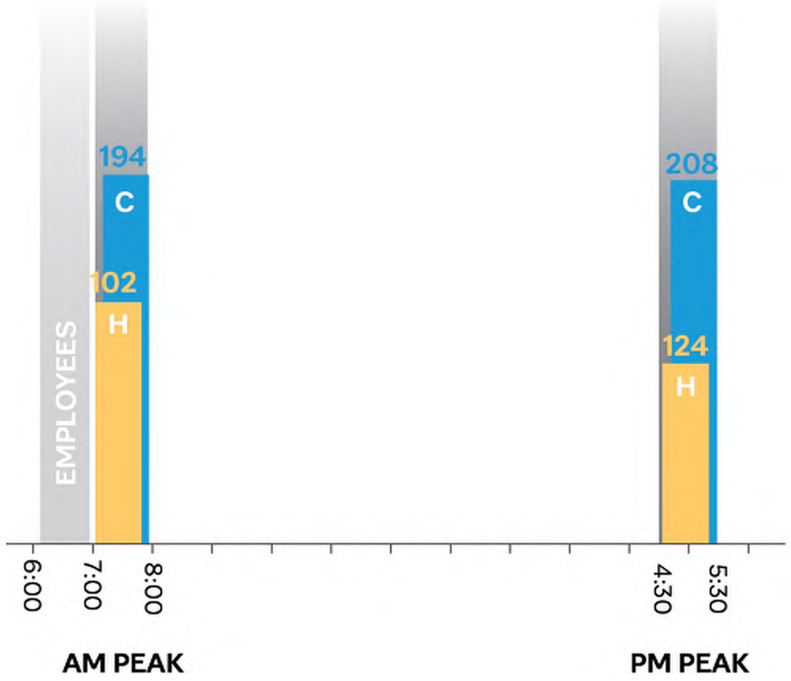
As previously mentioned, each scenario has been simulated in the two peak hours of AM and PM.

Usually in a traffic model, the peak hours are established by looking at the overall city traffic; however, in this specific case, our main targets are to specifically simulate hospital drop-offs and parking accesses. As shown on the diagram below, if we take into account the city's background traffic, the hospital, and the clinic, we can see that they occur at different times:

In order to stay conservative, all peaks were overlapped to match the city's peak (7-8am and 4.30–5.30 pm), creating a worst-case scenario where the network is under more stress.



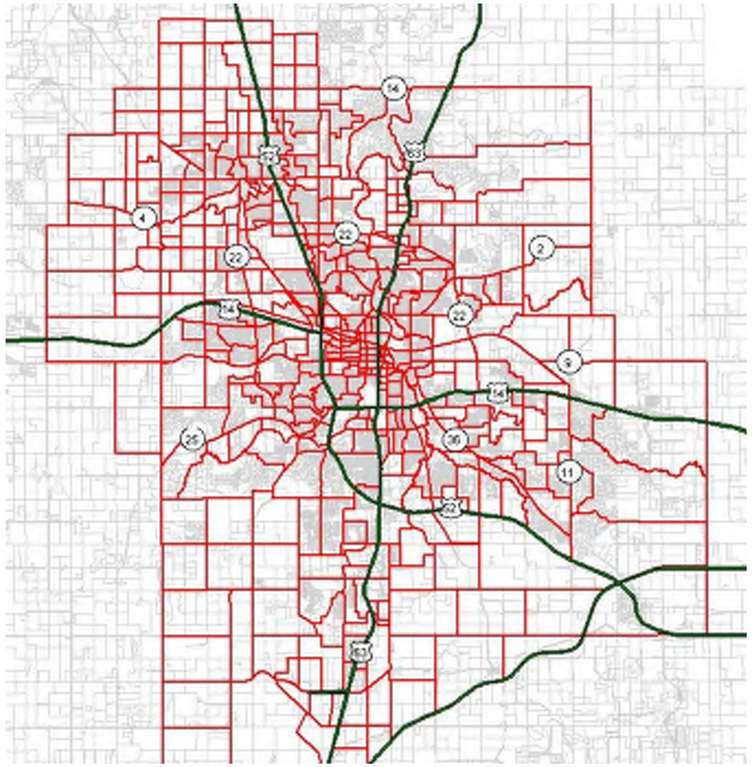
Drop-off peak hours (actual)



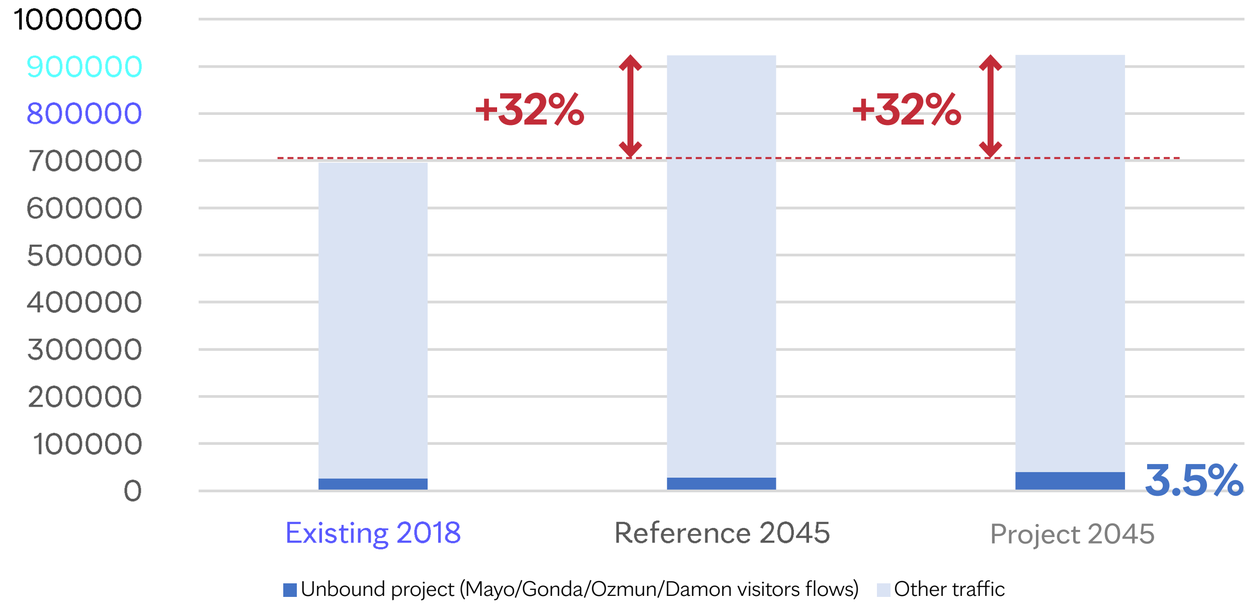
Drop-off peak hours (as simulated)

6 Macro Scale Simulations

City Wide Traffic Overview



CITY TRAFFIC: TOTAL DAILY VEHICULAR FLOWS



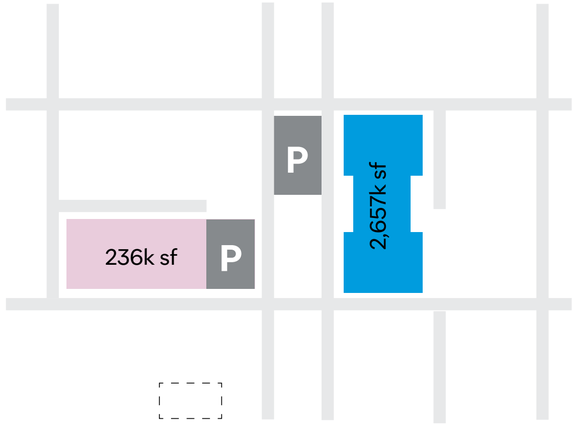
The main target of the macro simulation analysis is to assess the impact of the future Mayo Unbound project on the downtown traffic condition.
The analysis is based on the future scenario of the Rochester Olmsted Council of Governments (ROCOG) traffic model which refers to 2045 and which will be used as a reference for the city traffic growth.
The Unbound project refers to 2030, but will be tested in the ROCOG future scenario. The chart above represents all daily traffic of the City and the percentages show that the total change from existing scenario to future is about +32% while the weight of the Unbound project is about 3.5% of the total.

6.1 Project Scenarios

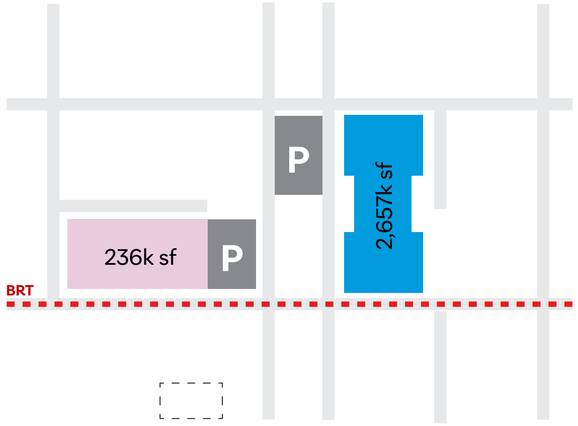
Scenarios Quantities

The macro scale reference scenario 2045 (no-build) is based on the ROCOG future scenario 2045 which already includes a new hospital building on the Ozmun site. In the Reference Scenario 2045 (no-build) of this study we keep the GFA of the 4 project plots as per 2018 scenario in order to fully grasp the impact of the new Unbound project and reflect the actual foreseen quantities.

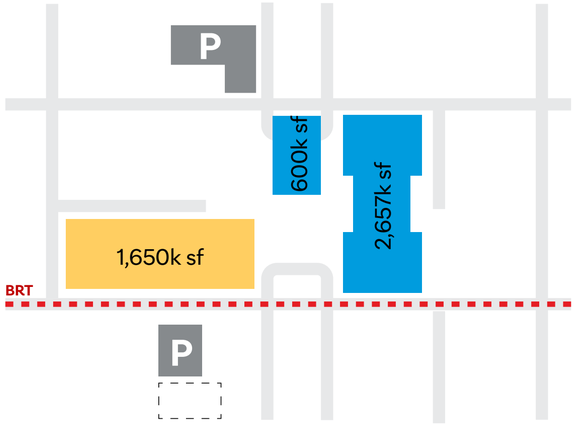
2018 EXISTING



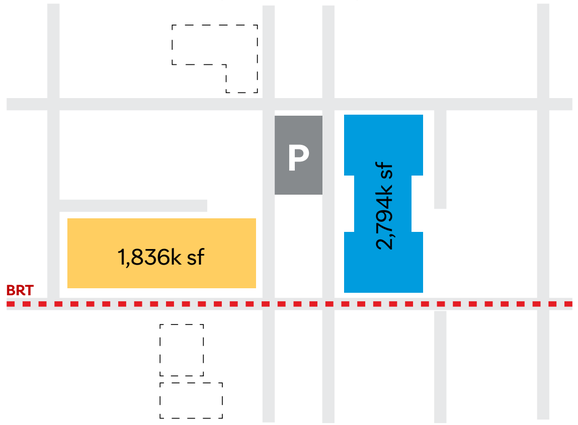
2045 REFERENCE
(THIS STUDY)



2045 PROJECT



2045 REFERENCE
(ROCOG)



Scenarios Quantities

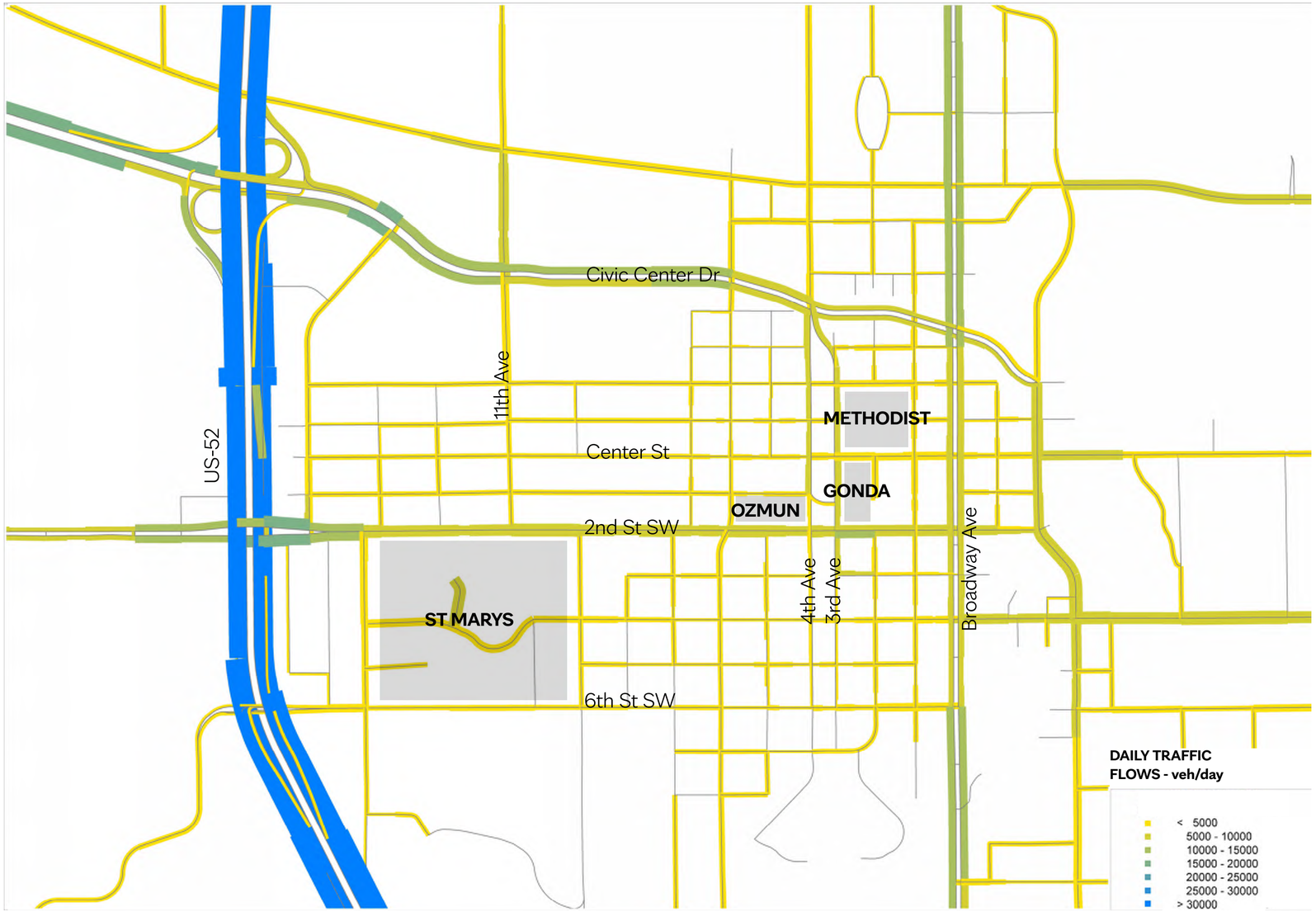
For the sake of understanding the differences in traffic distribution on the city scale, the provided CUBE Voyager macro model is utilized. Already existing scenario Yr2018_181 is chosen to be considered as suitable one for the existing condition scenario.
Additionally, 2 more scenarios are created:

- Reference – future city scenario that accounts for the changes foreseen in 2045 on the macro level, but keeping Mayo demand and parking provision as for the current scenario.
- Project – future scenario (2045) with the implementation of the Unbound project from the demand part, the parking strategies, and the network layout

NAME	CUBE_name	Network	BRT	Downtown Parking facilities	PnR facilities	Landuse	NOTE
BASE (existing)	Yr2018_181	Original_181	no	Parking_2018	PARKING_PnR_2018	LU_2018_Upd2022	Scenario is taken as originally provided by the developer of the ROCOG model
REFERENCE (no-build)	Yr2045_EC1_ LUMayo2018	EC1	yes	Parking_2045_ Mayo2018	PARKING_PnR_2045	LU_2045_Mayo2018_ Upd2023	LU file and Parking file take a basis the future scenario 2045 original files, but bring back to the 2018 values the zones and parking lots of Mayo (all the area)
PROJECT (build)	Yr2045_EC2	EC2	yes	Parking_2045_EC2	PARKING_PnR_2045	LU_2045_Upd2023	Newly created project scenario with the implementation on the network changes, LU values and parking strategy foreseen in the Unbound project

Daily Traffic Volumes - Existing Scenario (2018)

The map on the right shows the traffic volumes of 2018, (ROCOG base scenario) on the downtown network and allows to analyze the order of magnitude of the flows distribution in the area and evaluate the importance of the different streets, as a starting point of the exercise. Besides US-52, which holds the largest traffic volumes, Downtown main circulation arteries are Civic Center Drive, 2nd Street, 3rd and 4th Avenues and Broadway. The rest of the network has low and evenly spread traffic.



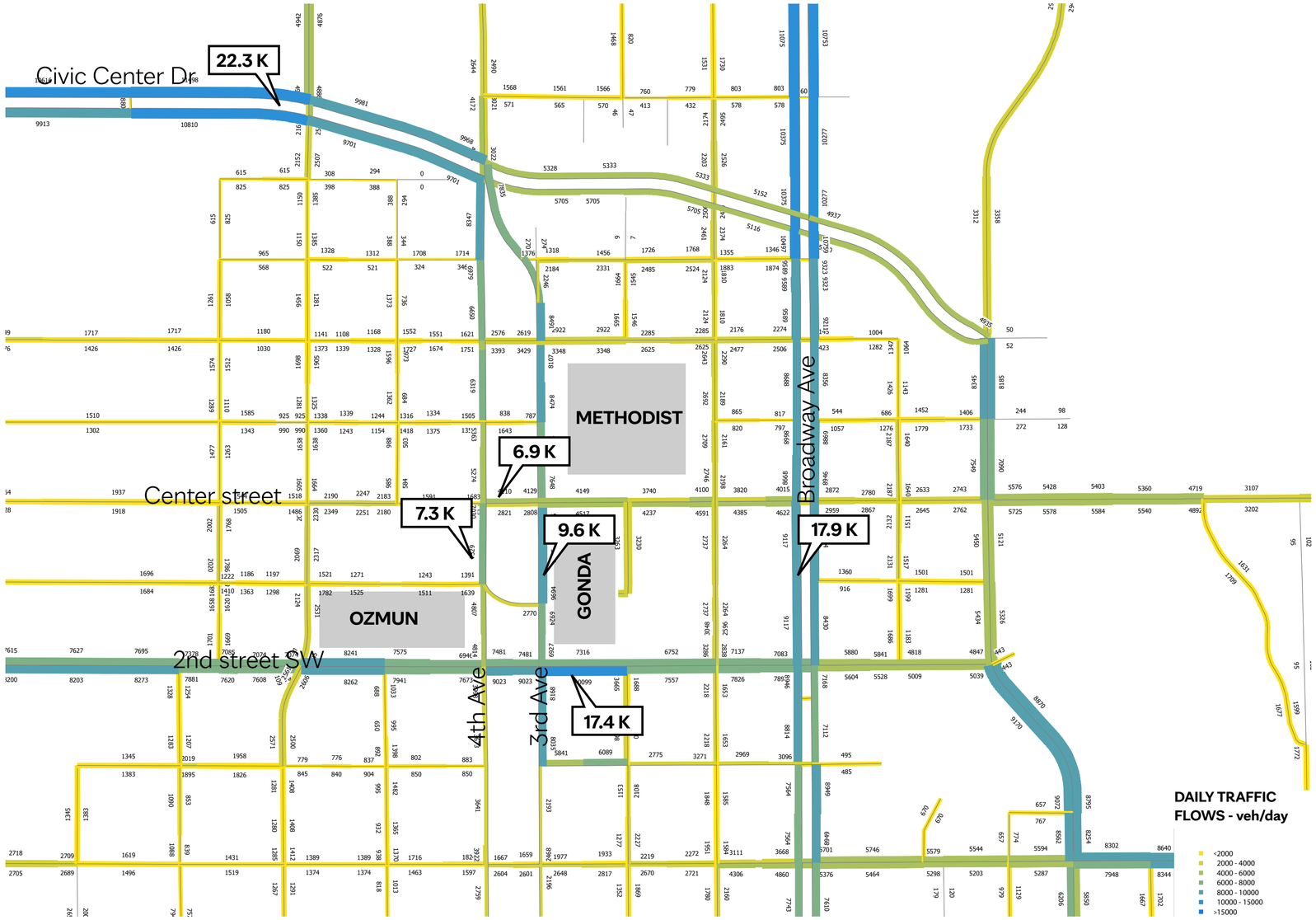
Daily Traffic Volumes - Existing Scenario (2018)

4th and 3rd Avenue play an important role in the downtown flows' distribution: combined, they hold almost the same traffic as Broadway Ave.

2nd Street SW is currently one of the main arteries downtown and holds 60% more traffic than the other main east-west road, Center St.

From the flowchart it's possible to see clearly that the Mayo Clinic and its parking areas have a significant impact on the distribution of the Downtown traffic flows:

- the traffic on Civic Center Drive clearly decreases after the intersection with 3rd and 4th Avenue;
- the traffic on the two Avenues is much higher north of 2nd St SW, around the Mayo/Gonda and Methodist area.
- Center Street traffic strongly decreases west of the intersection with 4th Avenue, witnessing the attractivity of the Mayo downtown facilities.



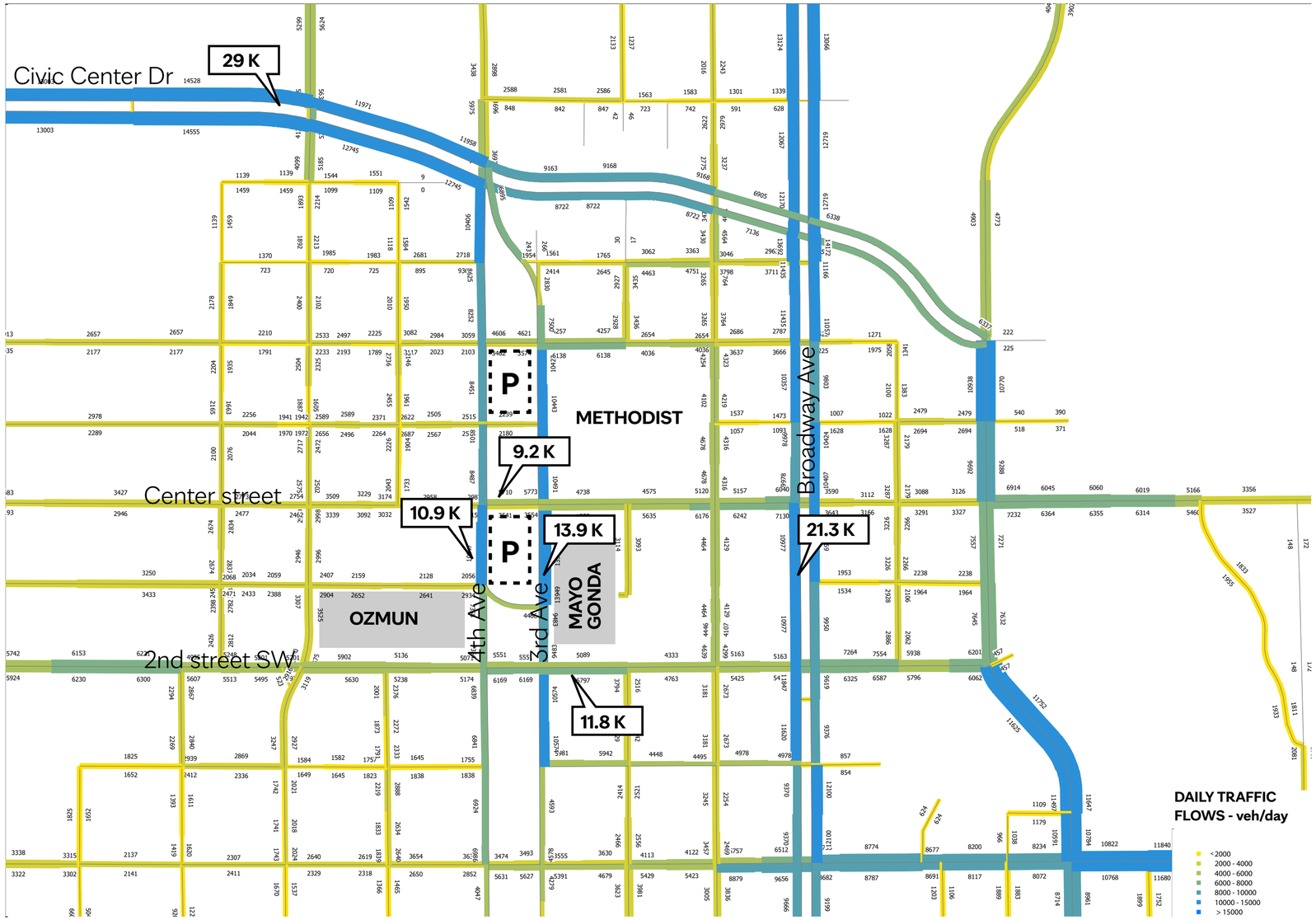
Daily Traffic Volumes - Reference Scenario (2045) - no build

The 2045 reference scenario shows an overall traffic growth in the downtown area, due to the increased demand brought by the DMC projects. As can be seen in the map below, the traffic increase is evenly spread, except for 2nd St due to the capacity reduction related to the BRT:

- 2nd St from 17.4k to 11.8k veh/day (-32%)
- 4th Ave from 7.3k to 10.9k veh/day (+ 49%)
- 3rd Ave from 9.6k to 13.9k veh/day (+ 44%)

Difference - Existing 2018 and Reference 2045

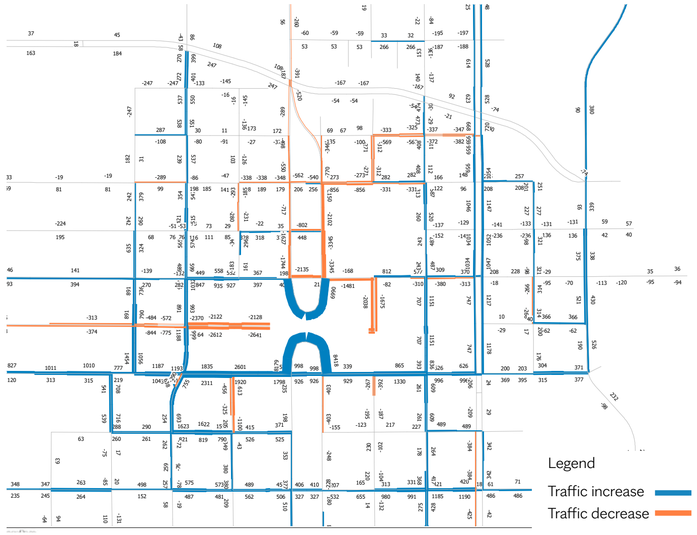


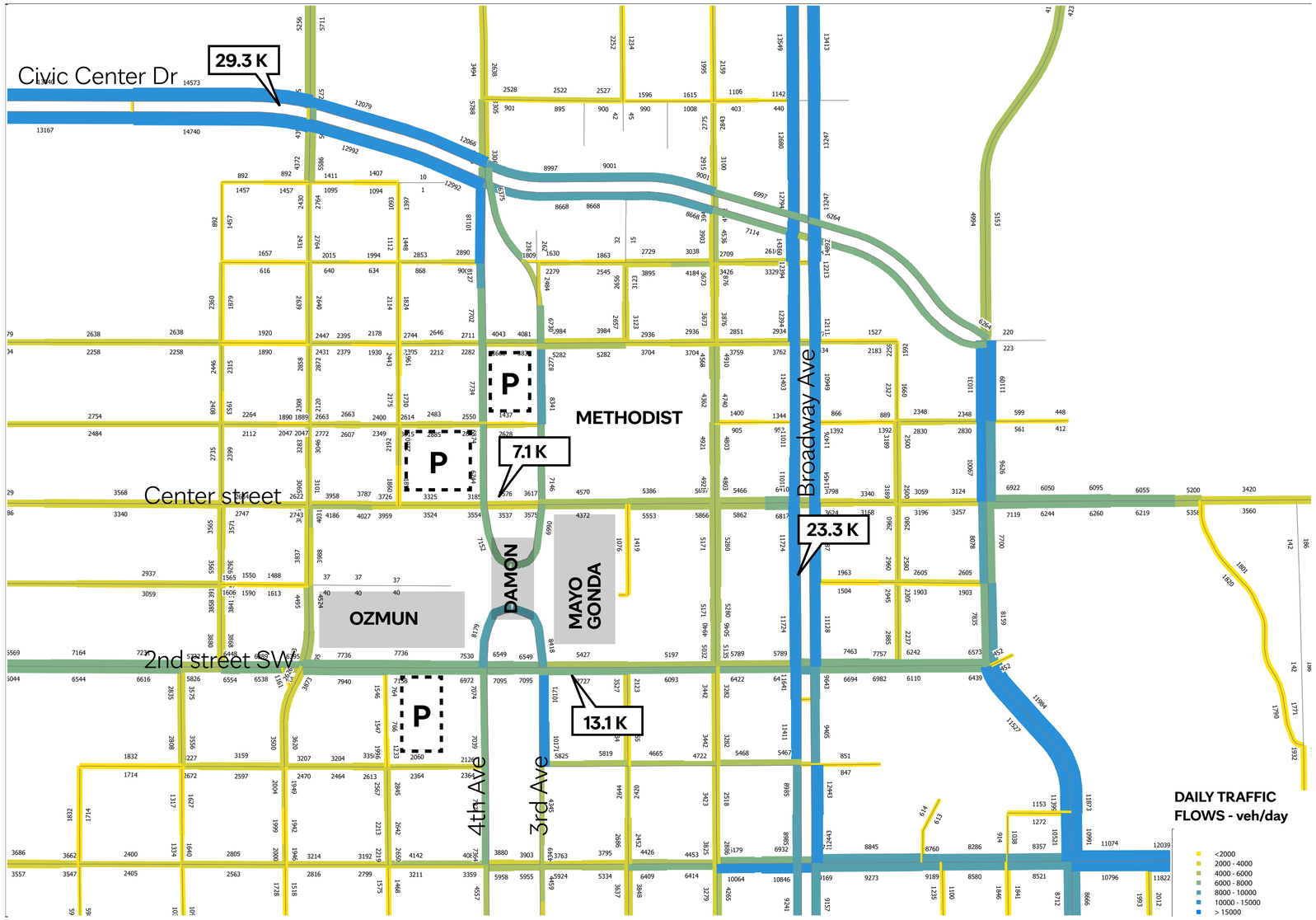


Daily Traffic Volumes - Project Scenario (2045)

Between the reference and project scenario, there will not be a major difference in terms of traffic quantity. However, with the Mayo Unbound project in place and the closure of the two roads, the through-traffic that used to go through the Avenues will be redistributed among streets between 2nd St NW and Center St.

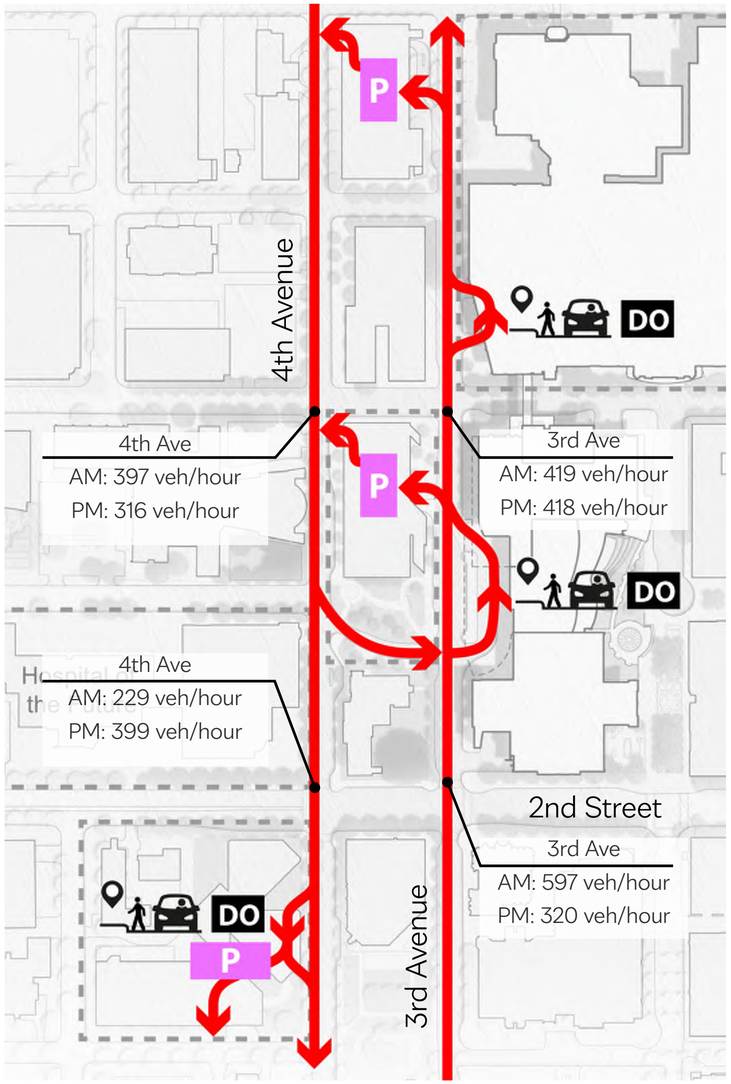
Difference - Reference 2045 and Project 2045

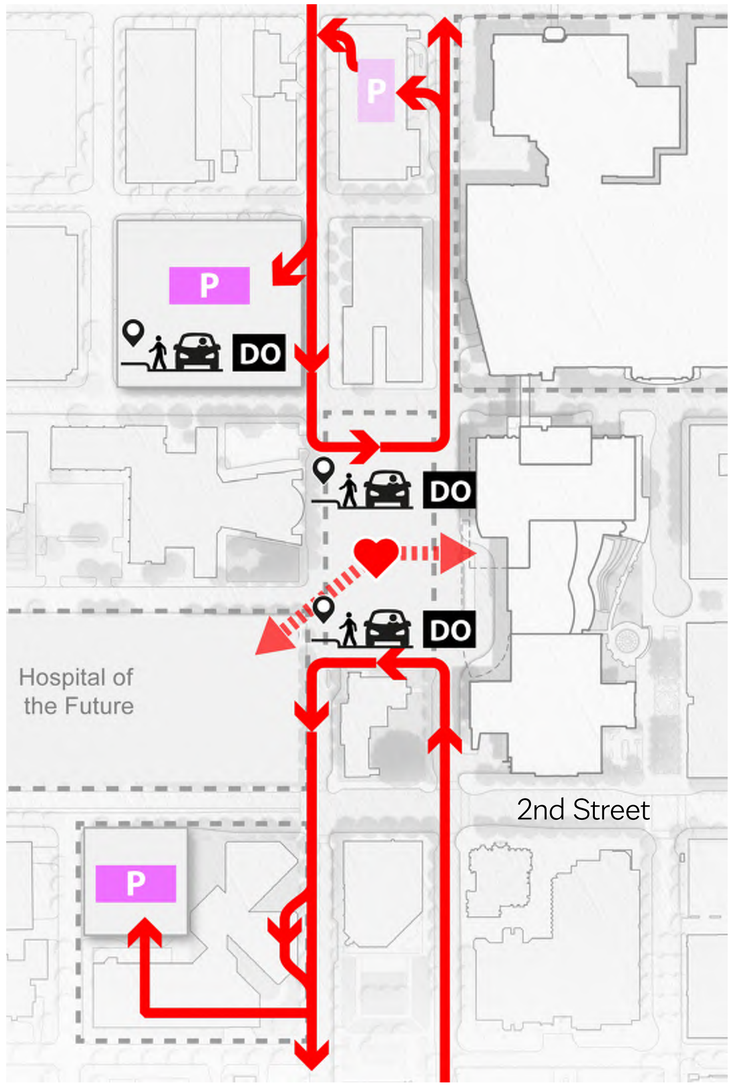




6.2 Impact of Avenues Closure

Changes on the street network





The greatest change in the network with the new Mayo Downtown Campus will be the interruption of the 3rd and 4th Avenues for vehicular traffic, creating a unified medical Campus with an uninterrupted pedestrian space.

That said, it is important to understand what is the impact on future traffic and, in case of some dysfunction, what can be done to compensate for it.

As shown on the next pages, the closure of 3rd and 4th Avenue and of 1st Street SW will cause:

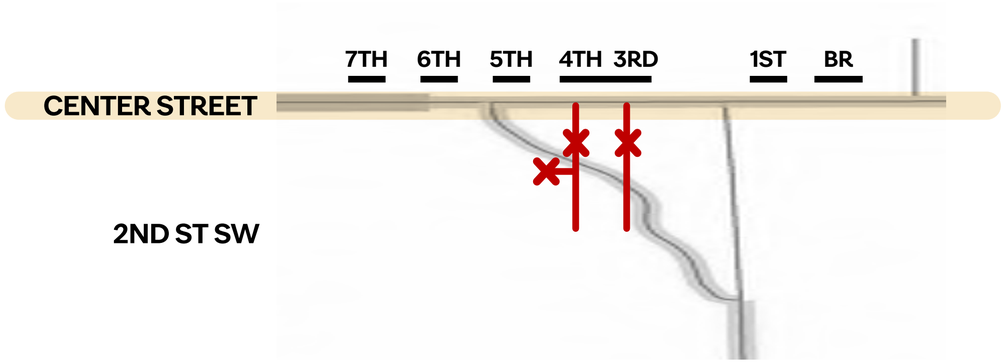
- redistribution of N-S through traffic, particularly on 6th Avenue and Broadway Avenue for the flows coming from north.
- redistribution of E-W traffic on Center, 2nd Street SW and 3rd Street SW.

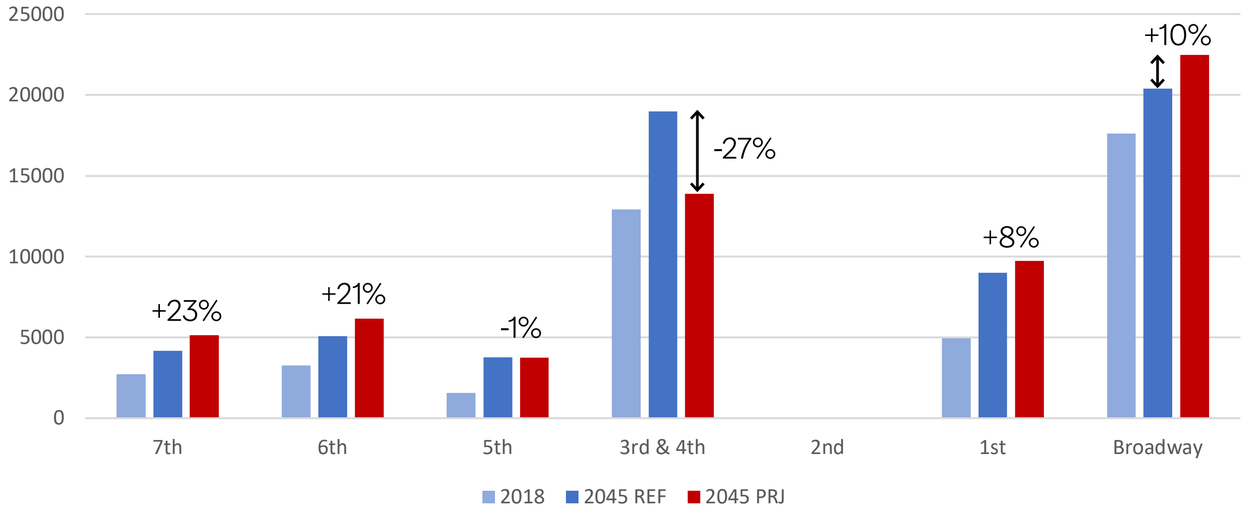
In any case it should be noted that, even if interrupted, the Avenues will still carry a large amount of traffic witnessing that the majority of traffic is to and from downtown rather than through it.

Impact of the Avenue Closure - N-S direction

NORTH

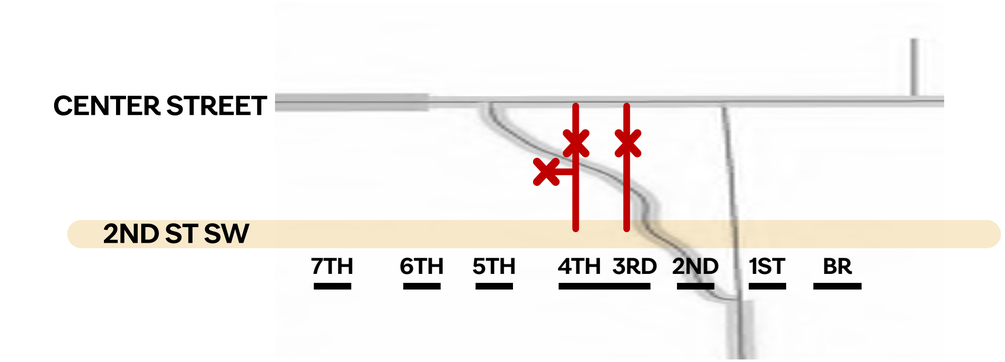
(Bidirectional flows on the Avenues north of the intersection with Center Street)

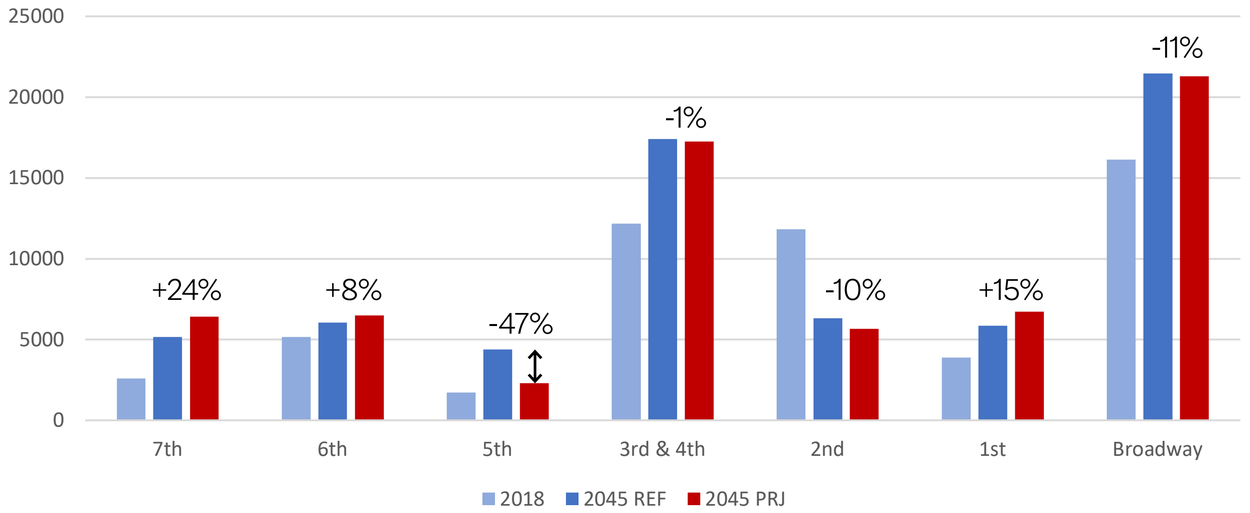




SOUTH

(Bidirectional flows on the Avenues south of the intersection with 2nd Street)





Impact of the Avenue Closure - North

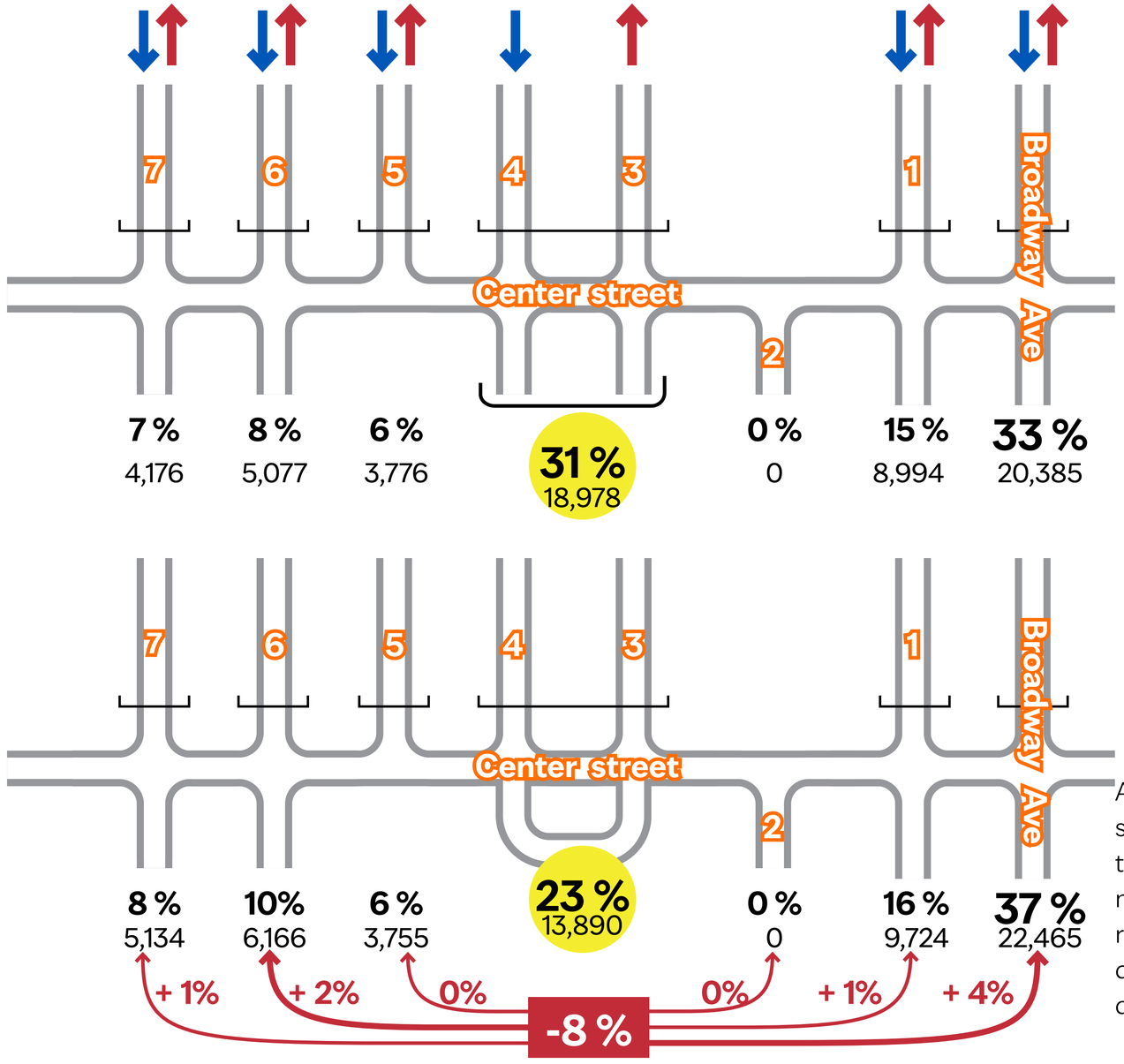
2045 reference

TOTAL DAILY TRAFFIC ON THE AVENUES : **61,386 veh/day**
– between 1st street NW and Center

The numbers show the distribution of traffic among the 8 vertical Avenues. Today 3rd and 4th hold 31% of traffic, with the closure, about one-third of this traffic (8%) will be distributed on parallel streets. The even distribution will create limited growth on the other Avenues.

2045 project

TOTAL TRAFFIC ON THE AVENUES : **61,134 veh/day**
– between 1st street NW and Center



Absolute numbers show the daily traffic from cube model. Percentages represent the distribution on the different roads.

Impact of the Avenue Closure - South

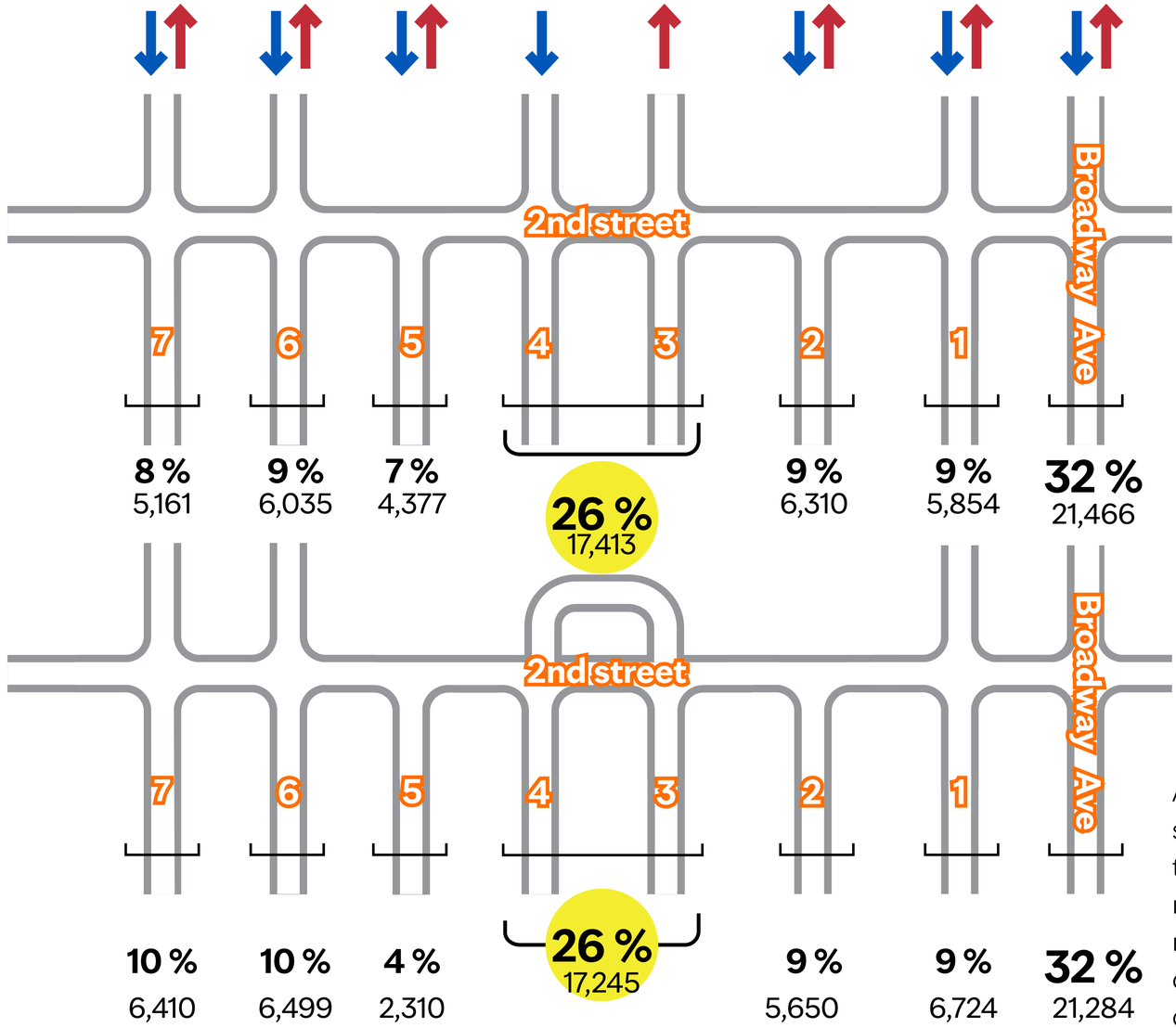
2045 reference

TOTAL DAILY TRAFFIC ON THE AVENUES : **66,616 veh/day**
– between 3rd street SW and 2nd street SW

The distribution of traffic among the Avenues south of 2nd St does not change after the closure of the 3rd and 4th Avenues.

2045 project

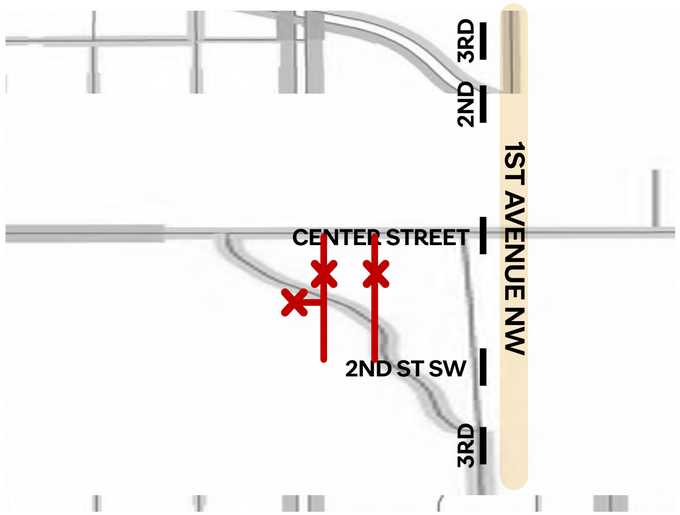
TOTAL TRAFFIC ON THE AVENUES : **62,122 veh/day**
– between 3rd street SW and 2nd street SW

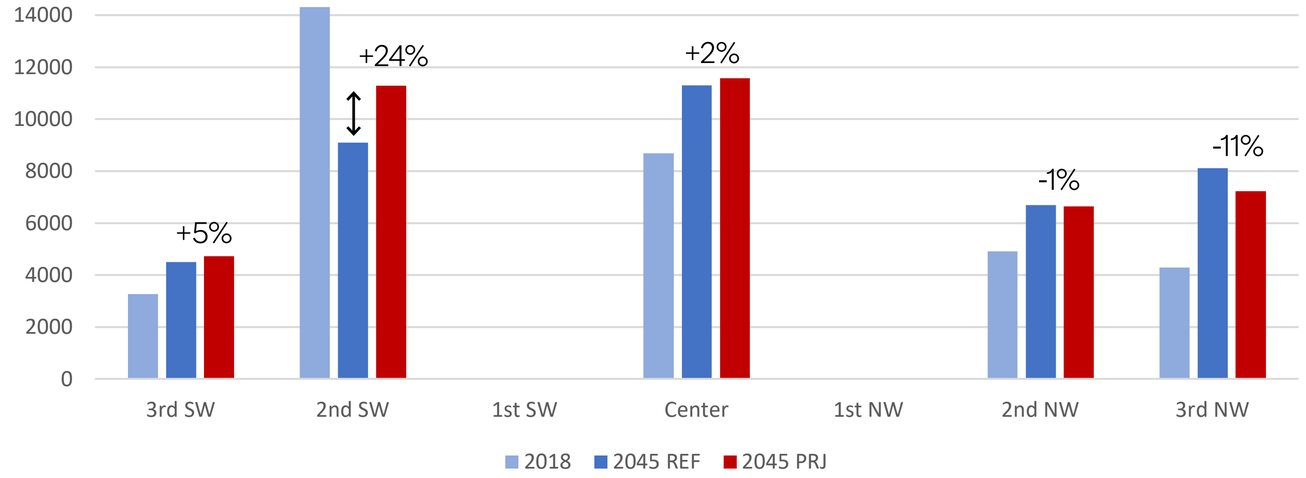


Absolute numbers show the daily traffic from cube model. Percentages represent the distribution on the different roads.

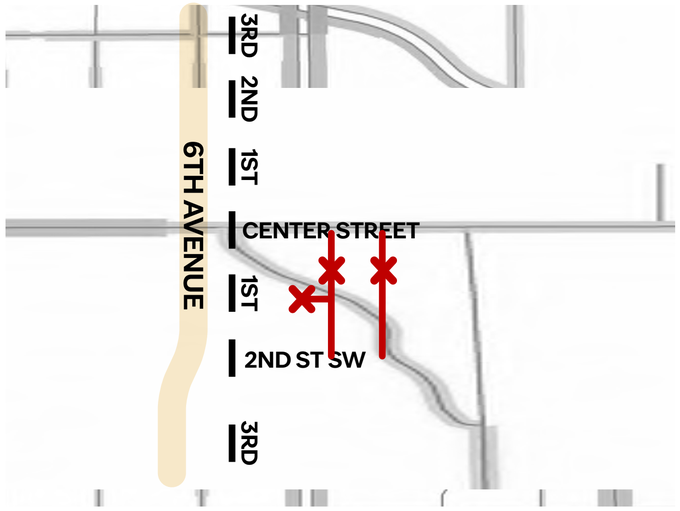
Impact of the Avenue Closure - E-W direction

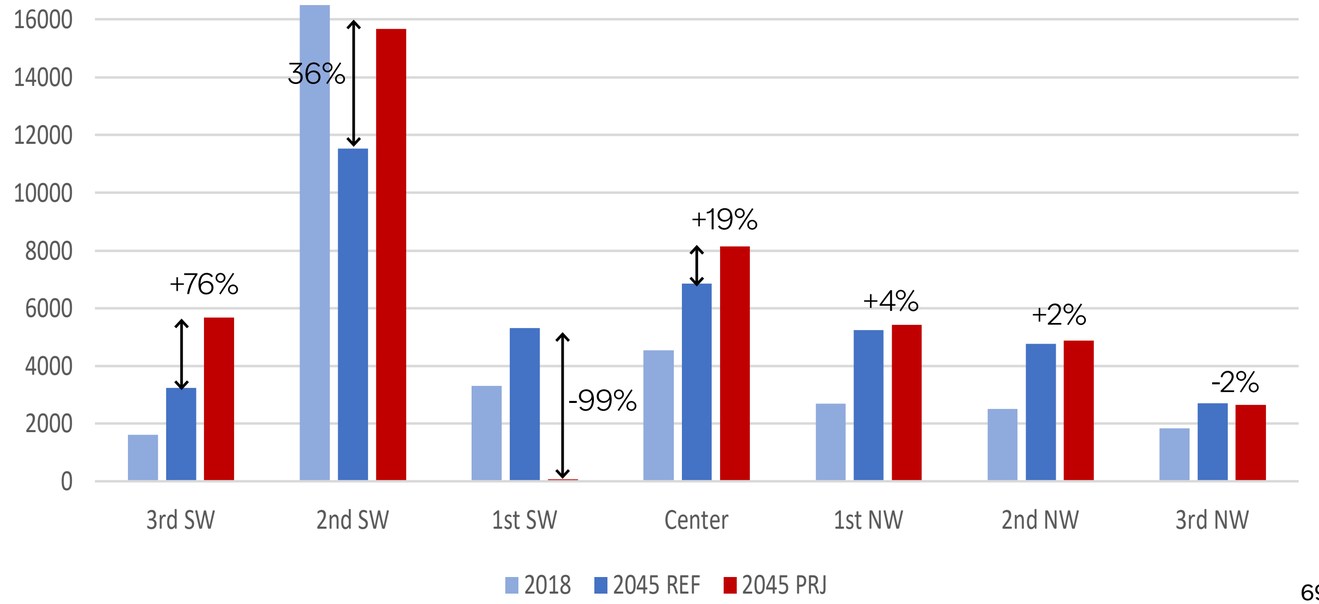
EAST
(Bidirectional flows on the Street west of the intersection with 1st Ave NW)





WEST
(Bidirectional flows on the Street east of the intersection with 6th Ave)





Impact of the Avenue Closure - East

2045 reference

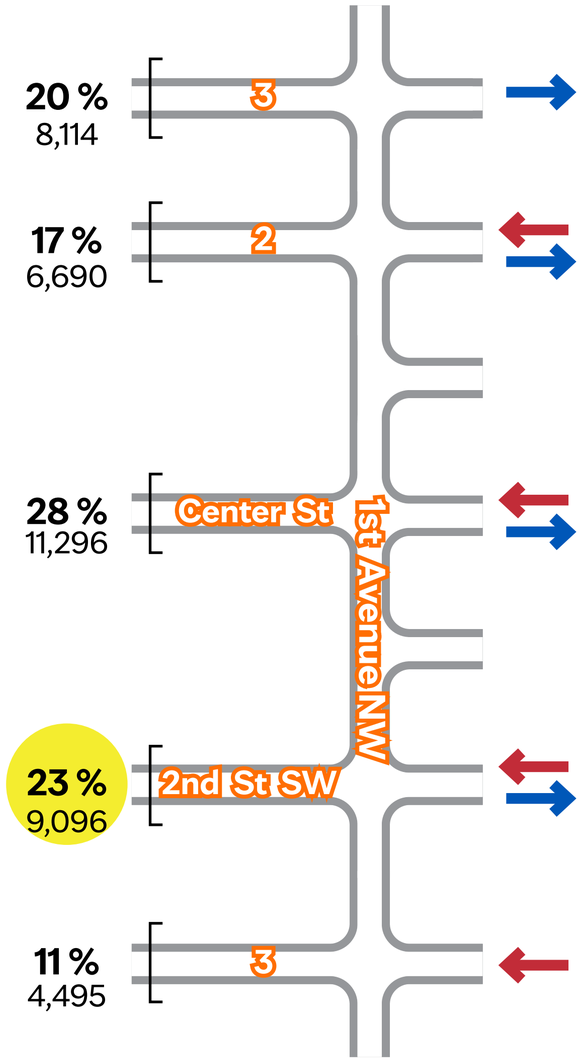
TOTAL DAILY TRAFFIC ON THE STREETS : **39,691 veh/day**
– 1st Ave SE and Broadway Ave S

The East-west traffic is not significantly impacted by the closure of the Avenues. Reference and project scenarios are very similar in terms of traffic flows and distribution. There is a small 4% increase of traffic on 2nd street SW and a slight reduction in the streets north of Center.

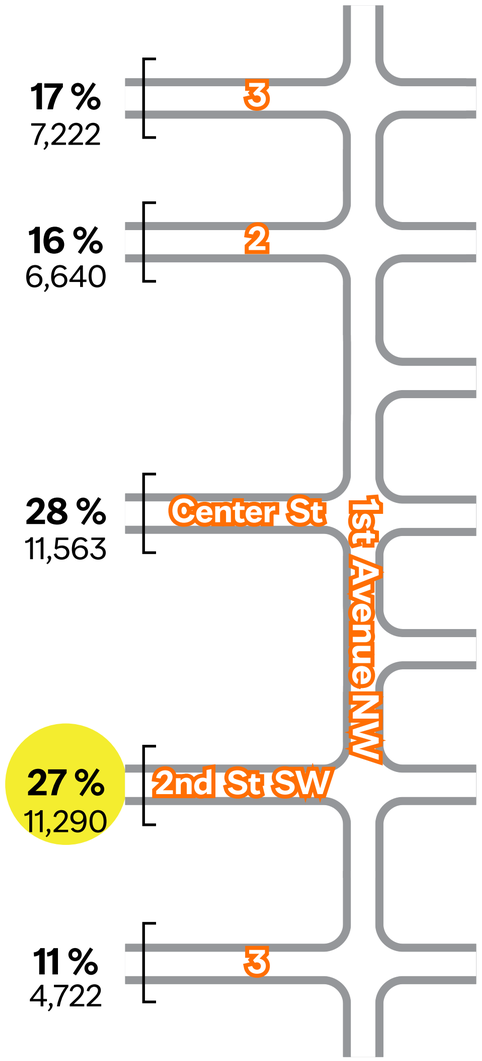
2045 project

TOTAL TRAFFIC ON THE STREETS : **41,437 veh/day**
– 1st Ave SE and Broadway Ave S

2045 reference



2045 project



Impact of the Avenue Closure - West

2045 reference

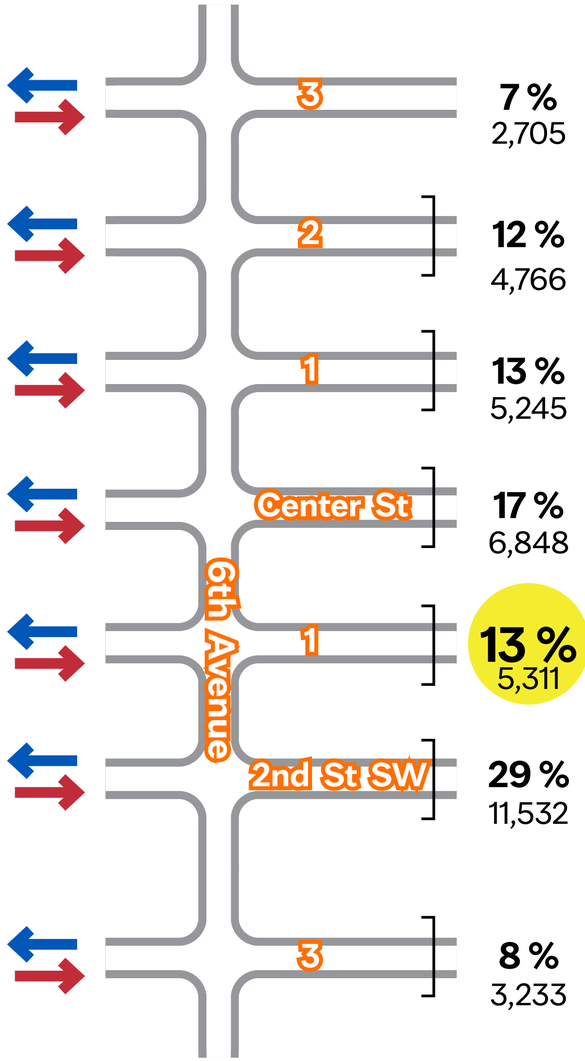
TOTAL DAILY TRAFFIC ON THE STREETS : **39,640 veh/day**
– 6th Ave and 5th Ave

The East-west traffic on the eastern side of the campus is affected by the closure of 1st Street and of the Avenues. The most notable increase in on 2nd Street SW. Despite the capacity reduction of this Street due to the LINK implementation, the simulations in the next pages will show that 2nd street does not present any alarming delay.

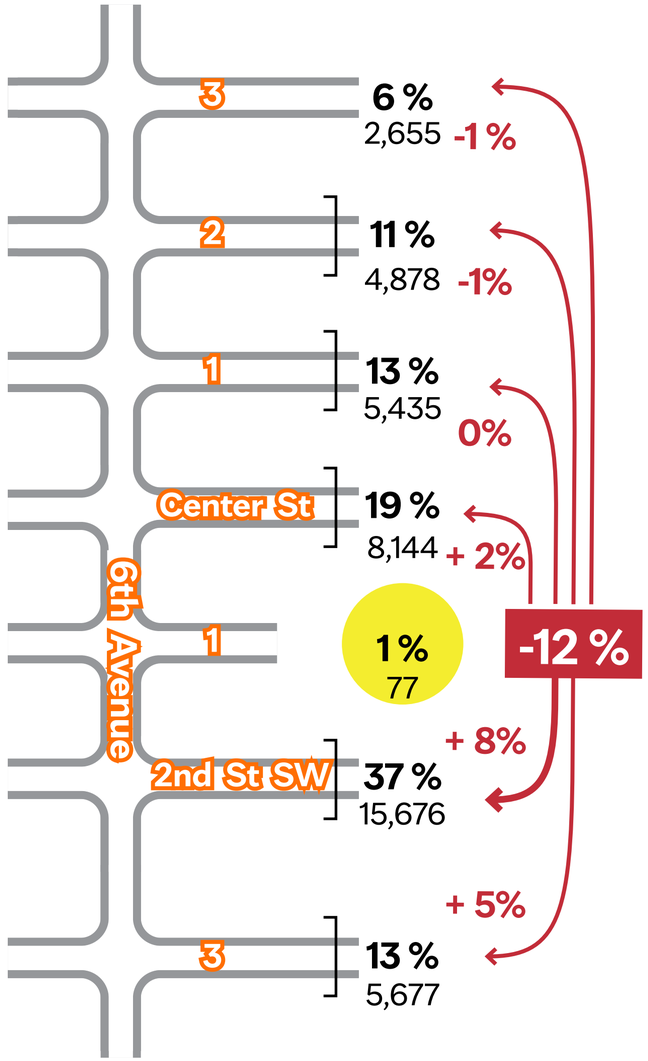
2045 project

TOTAL TRAFFIC ON THE STREETS : **42,542 veh/day**
– 6th Ave and 5th Ave

2045 reference



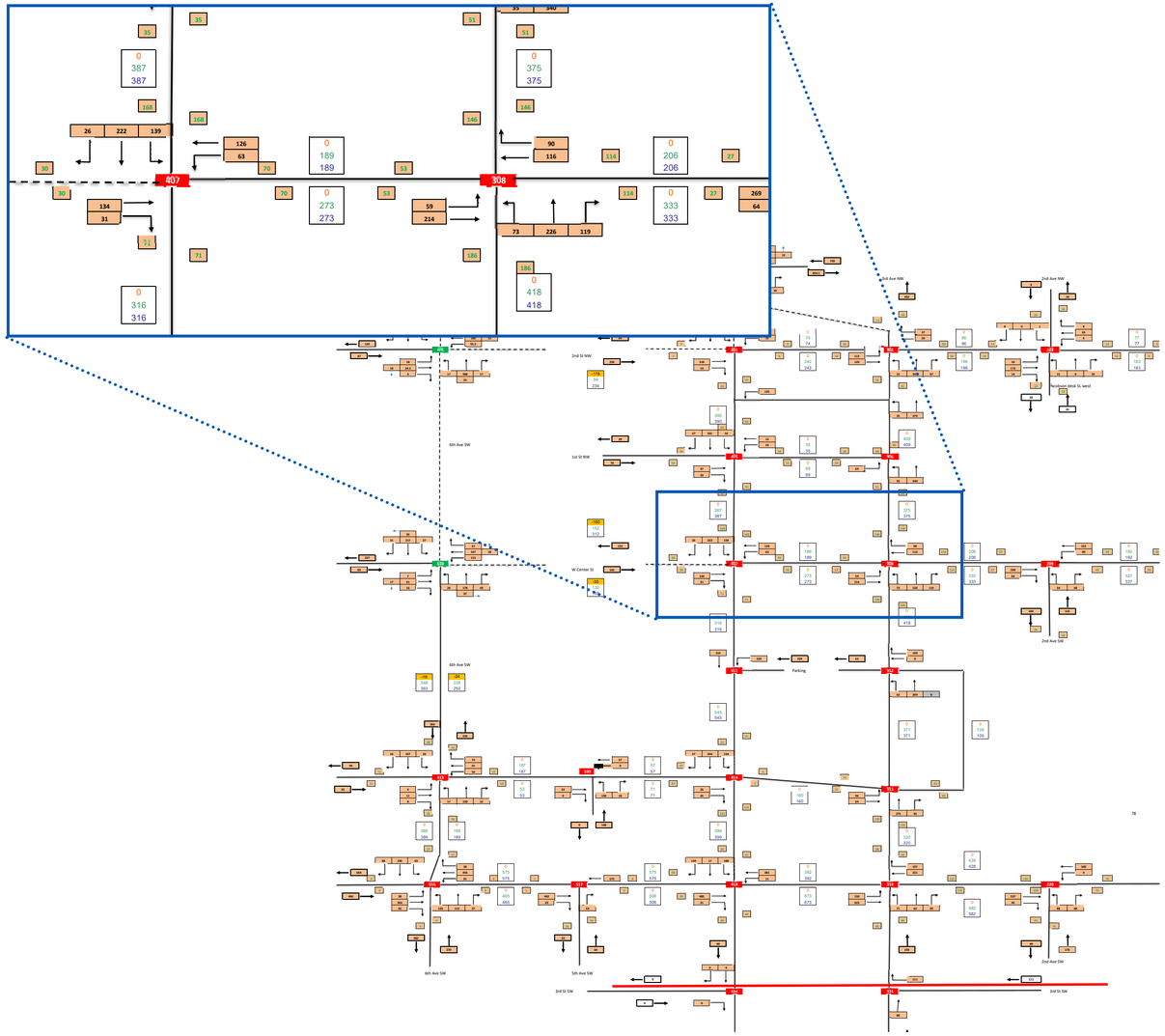
2045 project



7 Micro Scale Simulations - Vissim & Sidra

7.1 Micro Model Methodology - Vissim

Introduction



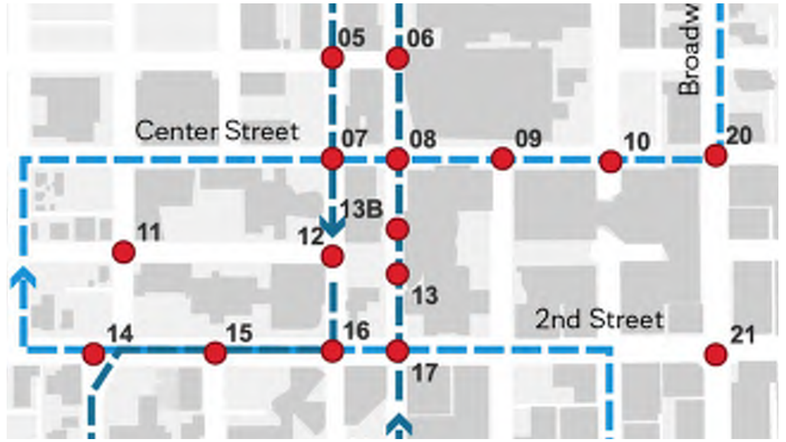
A traffic model is used to verify the impact of an urban intervention on traffic and to simulate different design scenarios.

For this project, the gathered data were interrelated in a complex spreadsheet that fed the model elaborated with PTV Vissim software.

The model will be used to test and compare several different scenarios: these will analyze the two peak hours comparing the existing traffic condition with the future scenario. Exisitng scenario is based on the 2022 traffic surveys, which superseed the 2018 base scenario of the macro scale model. In terms of additional demand, the project scenario takes into account the full-built condition of the 4 project blocks.

EXISTING SCENARIO AM	**PROJECT SCENARIO AM**
EXISTING SCENARIO PM	**PROJECT SCENARIO PM**
Existing surveyed demand	Full built demand

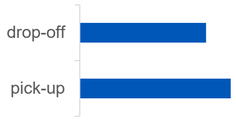
Data Incorporated Into the Model



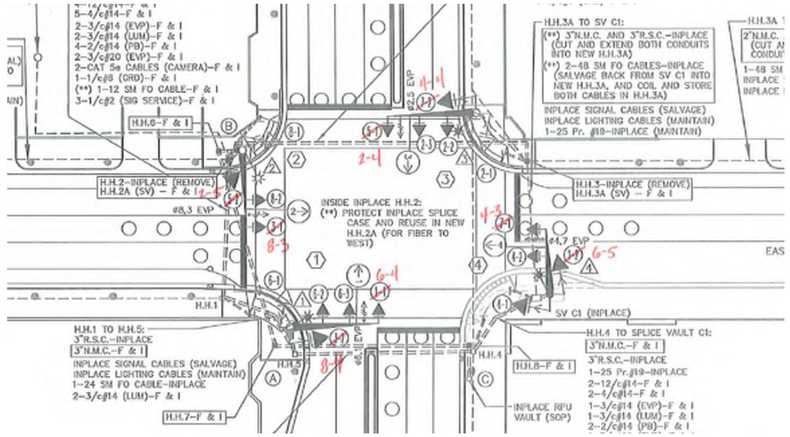
Traffic counts & travel time surveys

GENERAL DROP-OFF
(from when cars slows down to park to when they start moving to drive away)

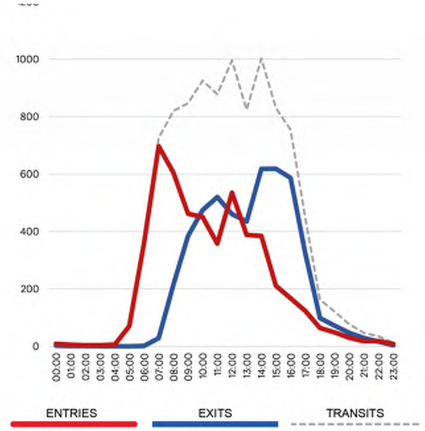
	AVG	MAX
drop-off time	46 sec	150 sec
pick-up time	55 sec	180 sec



Drop-off counts and timing



Signal phasing



Mayo visitors parking data

To be able to simulate the traffic of future scenarios, the model must aggregate as much information about reality as possible.

From the data gathered, the model of this project includes:

- Traffic counts of 19 intersections (10 signalized), considering all movements;
- Pedestrian counts for the same intersections;
- Signal phasing, also accounting for pedestrian crossings push buttons;
- Drop-off counts and timing, differentiating the user segments;
- Parking facilities entries and exits.

Software Application

VISSIM SIMULATION MODEL (PTV VISSIM)

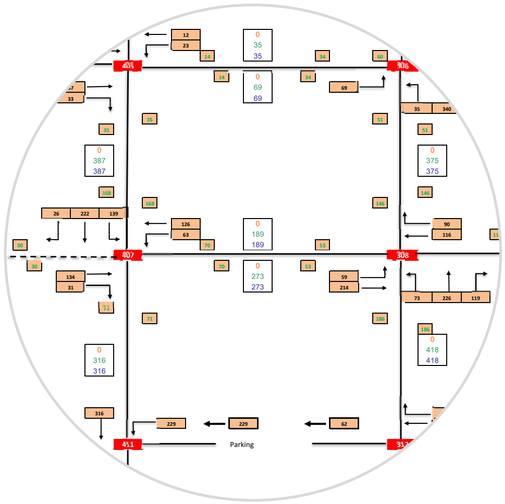
Simulation of the vehicular components includes:

Background traffic (traffic counts for the peak hours)

Visitors arriving by private car within the simulated hours

Public transportation lines & schedule

Pedestrians





Output:

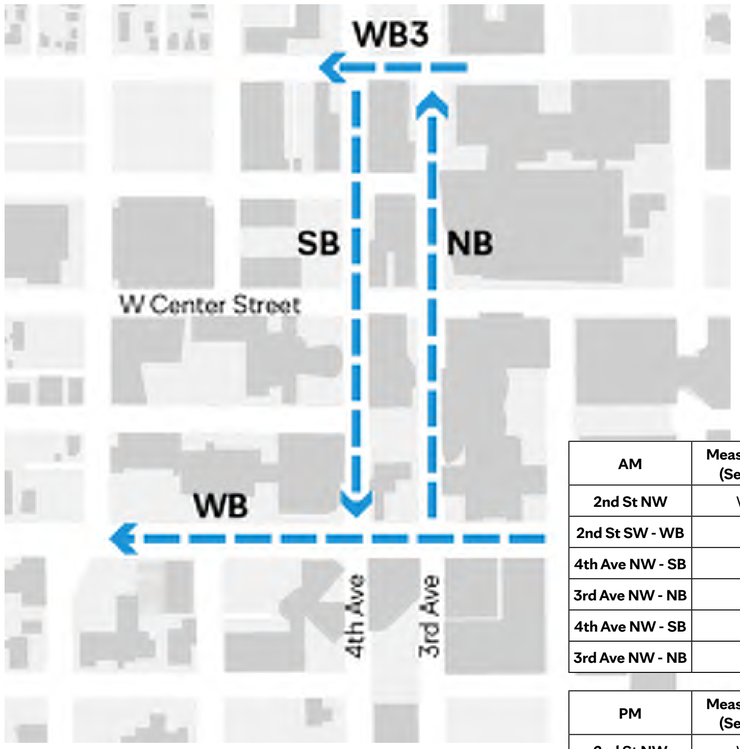
Multimodal simulation with interaction of vehicles, pedestrians, public transport

Traffic modelling exercise was performed using PTV Vissim, a microscopic simulation program for modelling multimodal transport operations and belongs to the Vision Traffic Suite software. Vissim is a microscopic, time step oriented, and behavior-based simulation tool for modelling urban and extra-urban traffic as well as pedestrian flows.

The traffic model included private transport as well as public transport and shuttle service, also considering the interaction with pedestrian flows. The traffic micro-simulation model produces two types of evaluation. The first kind relates to the entire network as a whole through the service performances of the network, the second provides precise information on the single intersections giving indications on the queues and on the delay. Service performance indicators can include average speed, travel time and distance travelled. it is also possible to have information on the levels of density for single lane.

The micro-simulation focuses on the more detailed analysis of the study area, allowing to better understand the impact of the future development on the adjacent network and including the main road elements that can influence on the vehicular, transit and pedestrian circulation in vicinity to the site.

Model Calibration



AM	Measurement (Seconds)	Model Average	Observed Average	Lower Limit	Upper Limit	Accept	Error (<15%)
2nd St NW	WB3	25	22	19	26	✓	9.7%
2nd St SW - WB	WB	61	66	56	76	✓	-8.2%
4th Ave NW - SB	SB	81	76	65	88	✓	5.5%
3rd Ave NW - NB	NB	80	71	60	82	✓	12.7%
4th Ave NW - SB	SB	81	76	65	88	✓	5.5%
3rd Ave NW - NB	NB	80	71	60	82	✓	12.7%

PM	Measurement (Seconds)	Model average	Observed average	Lowe limit	Upper limit	Accept	Error (<15%)
2nd St NW	WB3	33	34	29	39	✓	-3.0%
2nd St SW - WB	WB	61	54	46	62	✓	12.6%
4th Ave NW - SB	SB	128	125	107	144	✓	2.4%
3rd Ave NW - NB	NB	128	149	126	171	✓	-13.8%
4th Ave NW - SB	SB	81	76	65	88	✓	5.5%
3rd Ave NW - NB	NB	80	71	60	82	✓	12.7%

Calibration is the proposal of constants and other model parameters in estimated or asserted models in an effort to make the models replicate specific observed data, while validation is the application of the calibrated models and comparison of the results against observed data.

The simulated peak periods satisfied a set of chosen parameters, based on studied statistical limits, and demonstrated acceptable results. This means that the flows observed during the traffic counts campaign are replicated in the traffic model and represent a solid base for the future application of the modeling tool.

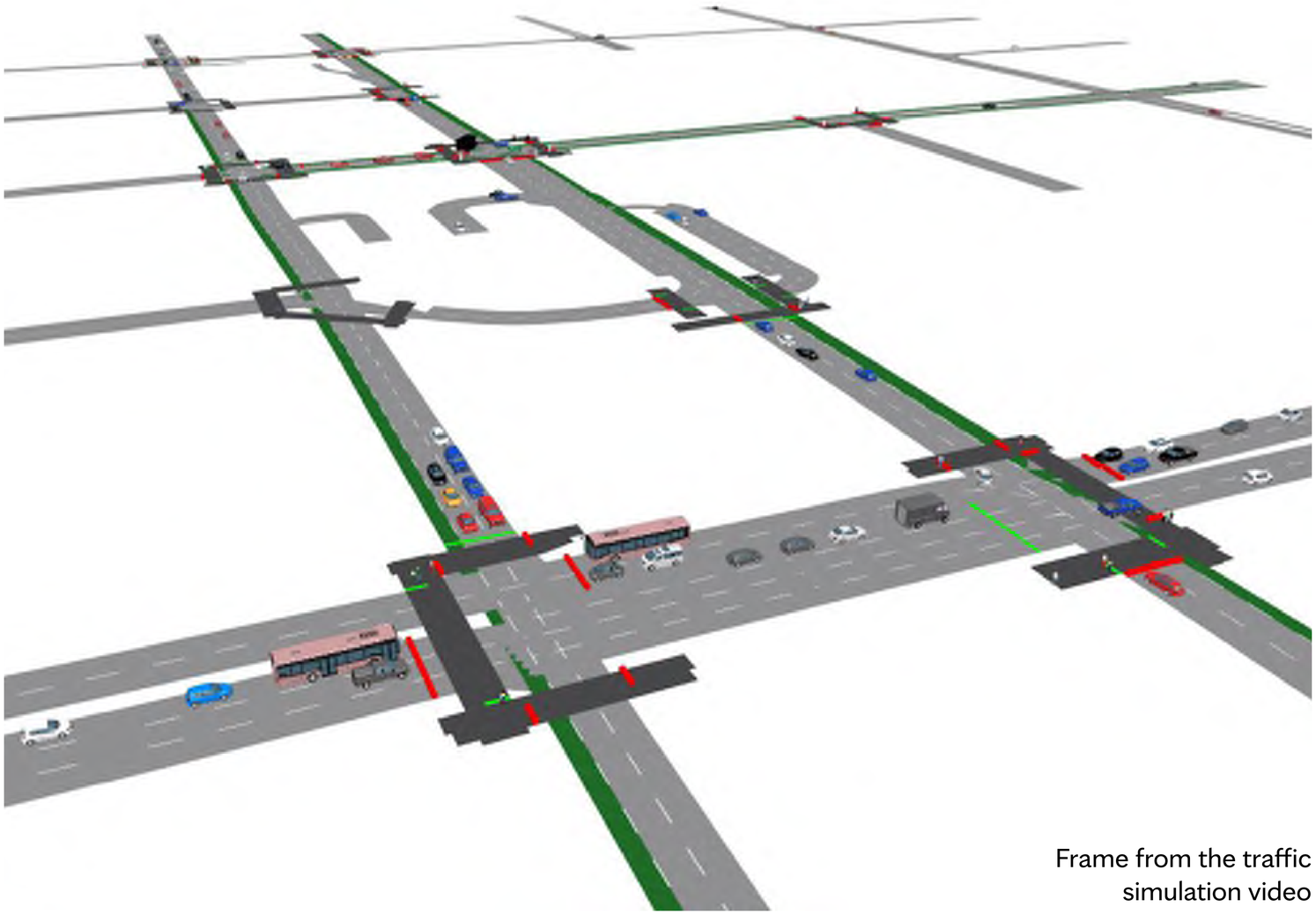
An additional validation parameter was the travel time records performed during the survey campaign. This helps replicate the existing delays or decelerations due to signal phasing, bottleneck phenomena, or other kinds of obstacles.

The observed travel times have been compared to the modeled travel times. All travel times have been weighted by the number of vehicles making the journey and an acceptance threshold of 15% was set for the comparison with the modeled average travel times.

The travel time routes and their parameters are shown in the map and table on this page.

7.2 Existing Scenario

Introduction



Frame from the traffic simulation video

In order to be able to test future scenarios, the model must be set and calibrated for the existing condition. This configuration is also used to compare the performance of the proposals and understand how the traffic system would be flowing.

From the existing condition model, some information can be extracted in map format, for example:

1. Traffic volumes for each street segment;
2. The level of service (LOS) of each intersection
3. The length of traffic queuing in each intersection (which will count for the LOS)

Another important output to visualize and analyze the model is the 3D videos generated by the software, as shown in the picture on this page, which allow to better grasp the level of congestion or specific issues occurring in the network.

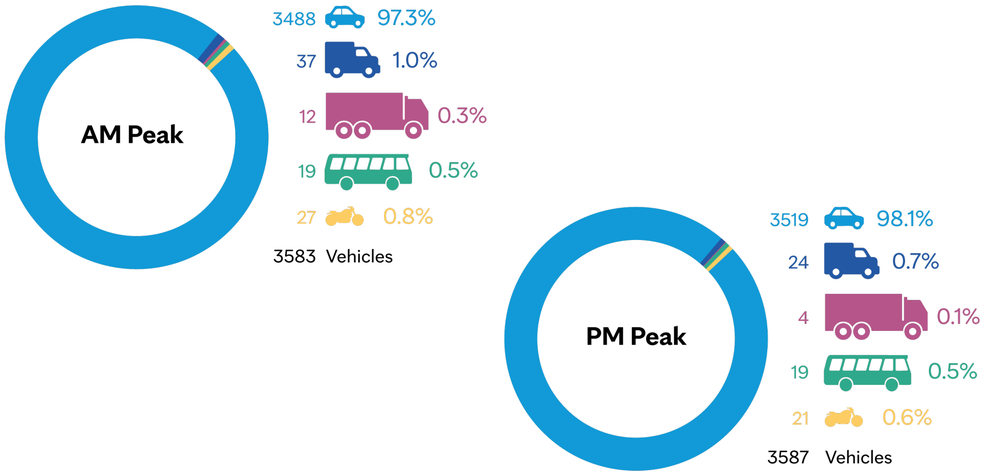
Traffic Flows and Vehicle Composition

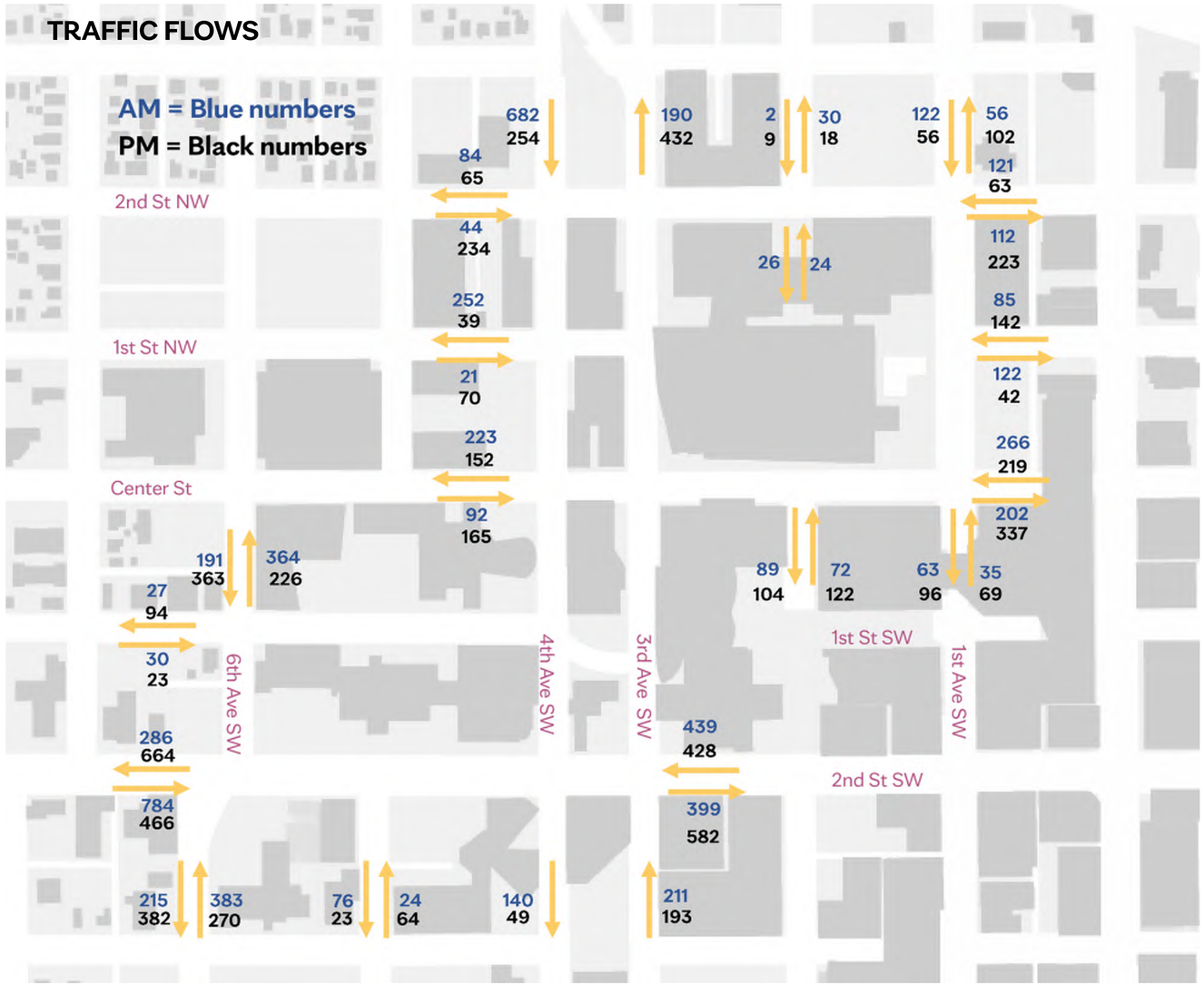
Along with the values corresponding to traffic flows, the vehicular composition was also surveyed. The composition of the traffic flow represents the participation of different classes of vehicles that are characterized by different dimensions, driving behaviour, and possible restrictions.

Most of the vehicles are private cars representing about 98% and 99% in the AM and PM peaks respectively.

The map on the right represents the traffic flows in the two peak hours on all the streets surveyed.

VEHICLE COMPOSITION

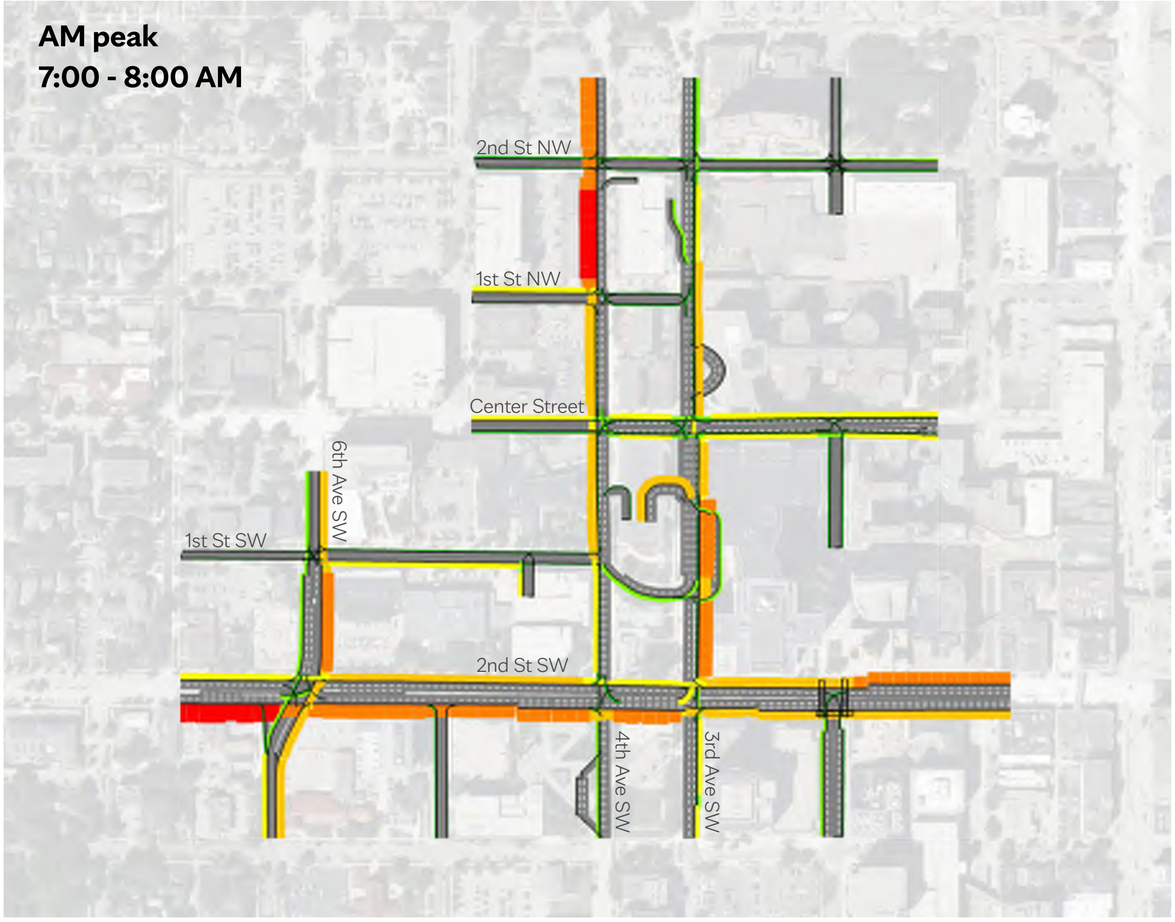


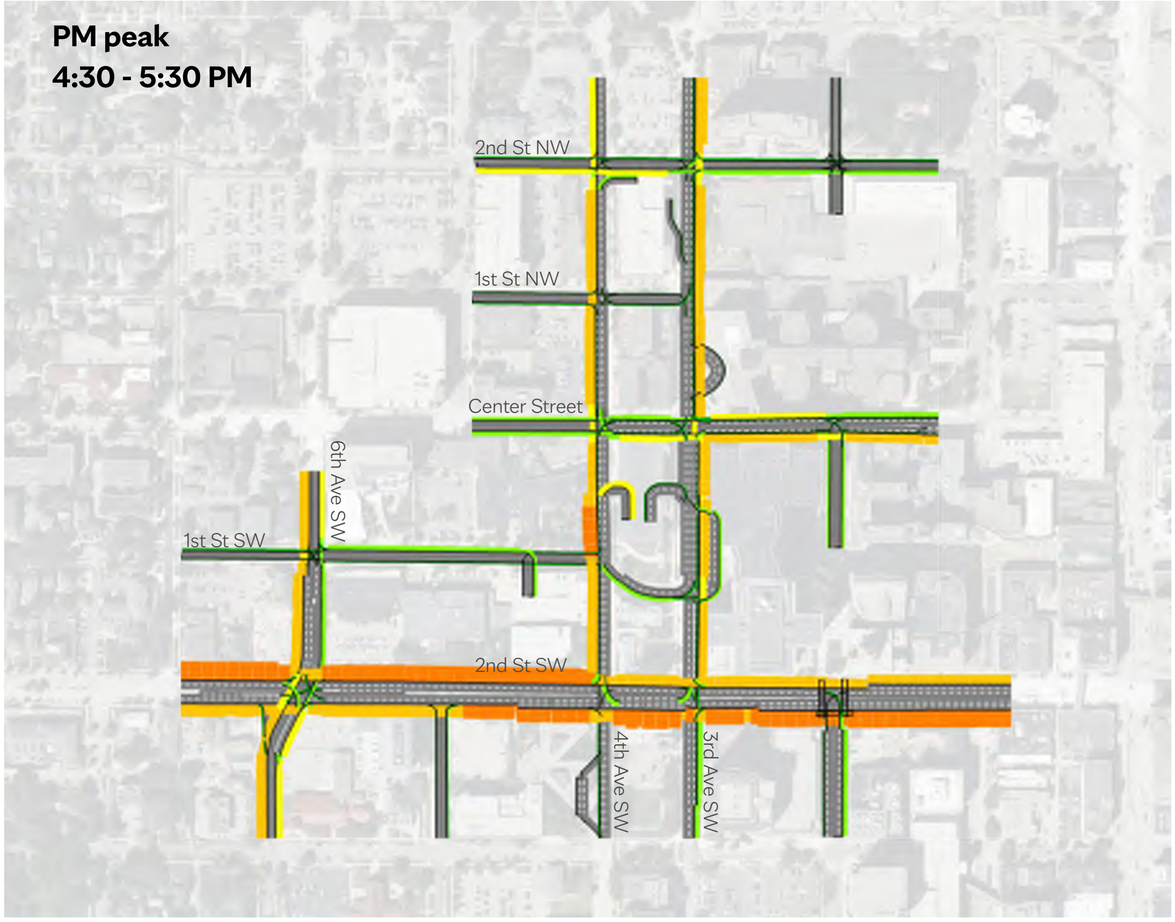


Traffic Volumes - Existing Condition

Traffic flows in the two scenarios are similar regarding quantities but differently distributed. PM is more intense on 2nd Street in both directions, while in the morning it is asymmetrically distributed in the two directions.

Traffic volume
Average vehicle/hour
- < 100
- < 200
- < 300
- < 500
- < 700
- < 900
- > 900





Highway Capacity Manual - Levels of Service

Level of Service (LOS) is a way of characterizing the performance of portions of the transportation system – e.g., freeways, signalized intersections, and rural highways. Different ways of calculating LOS exist, but the US Highway Capacity Manual (HCM 7th edition - 2022) is the most commonly accepted.

In this study, intersections were evaluated in terms of service levels. The criteria used depend on whether or not they are signalized.

- Signalized intersection level of service (LOS) is defined in terms of the average total vehicle delay of all movements through an intersection. Vehicle delay is a method of quantifying several intangible factors, including driver discomfort, frustration, and lost travel time. Vehicle delay is a complex measure based on many variables, including signal phasing, signal cycle length, and traffic volumes concerning intersection capacity.

- Unsignalized intersection LOS criteria can be further reduced into two intersection types: all-way stop-controlled and two-way stop-controlled. All-way, stop-controlled intersection LOS is expressed in terms of the average vehicle delay of all of the movements. Two-way, stop-controlled intersection LOS is defined in terms of the average vehicle delay of an individual movements, because the performance of this kind of intersection is more closely reflected in terms of its individual movements, rather than the overall performance.

Table 1. Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (sec/veh)	General Description (Signalized Intersections)
A	≤10	Free Flow
B	>10 - 20	Stable Flow (slight delays)
C	>20 - 35	Stable flow (acceptable delays)
D	>35 - 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 - 80	Unstable flow (intolerable delay)
F	>80	Forced flow (jammed)

Table 2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (sec/veh)
A	0 - 10
B	>10 - 15
C	>15 - 25
D	>25 - 35
E	>35 - 50
F	>50

A — FREE FLOW
Low volumes and no delay.

B — STABLE FLOW
Speeds restricted by travel conditions, minor delays.

C — STABLE FLOW
Speeds closely controlled because of higher volumes.

D — APPROACHING UNSTABLE FLOW
High density traffic restrictions maneuverability. Volume near capacity

E — UNSTABLE FLOW
Low speeds, considerable delay, volume at or slightly over capacity.

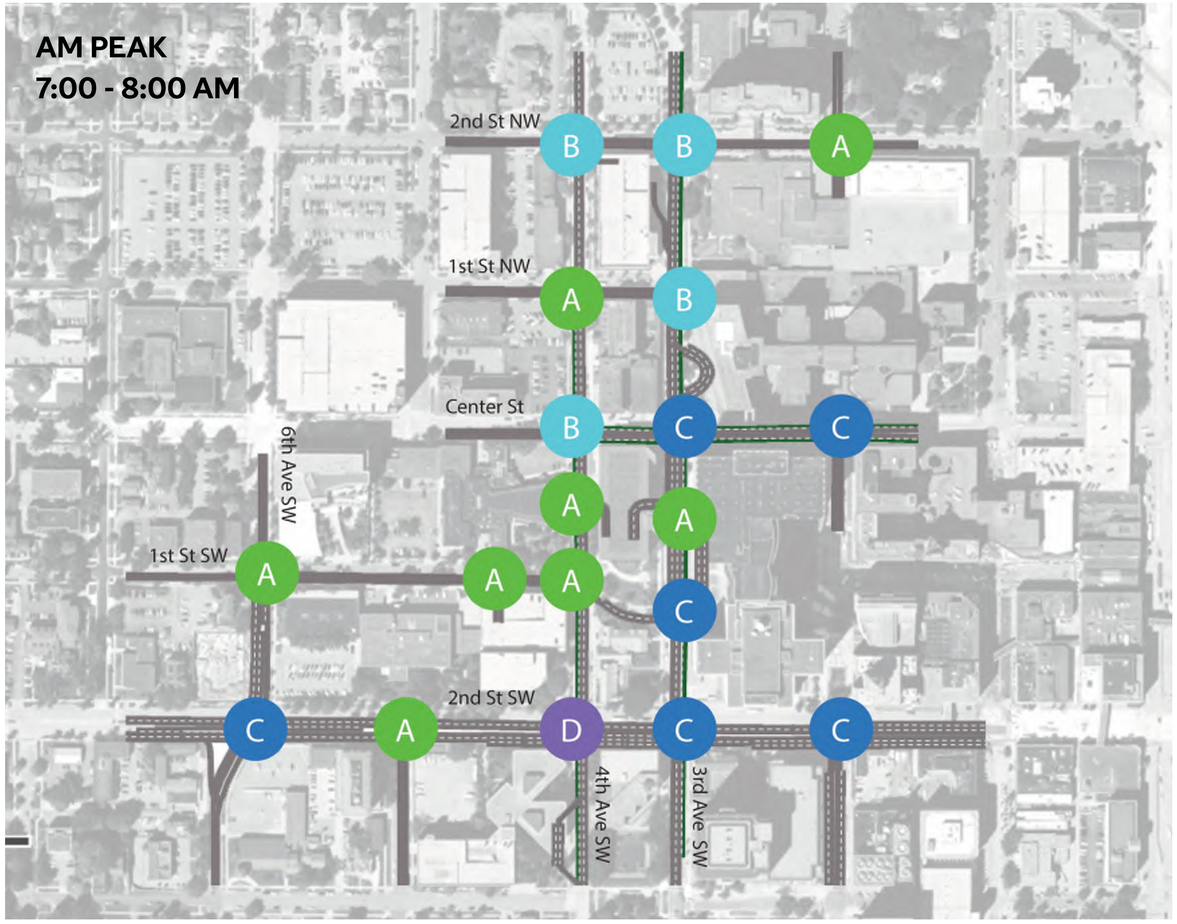
F — FORCED FLOW
Very low speeds, volumes exceed capacity, long delays with stop-and-go traffic

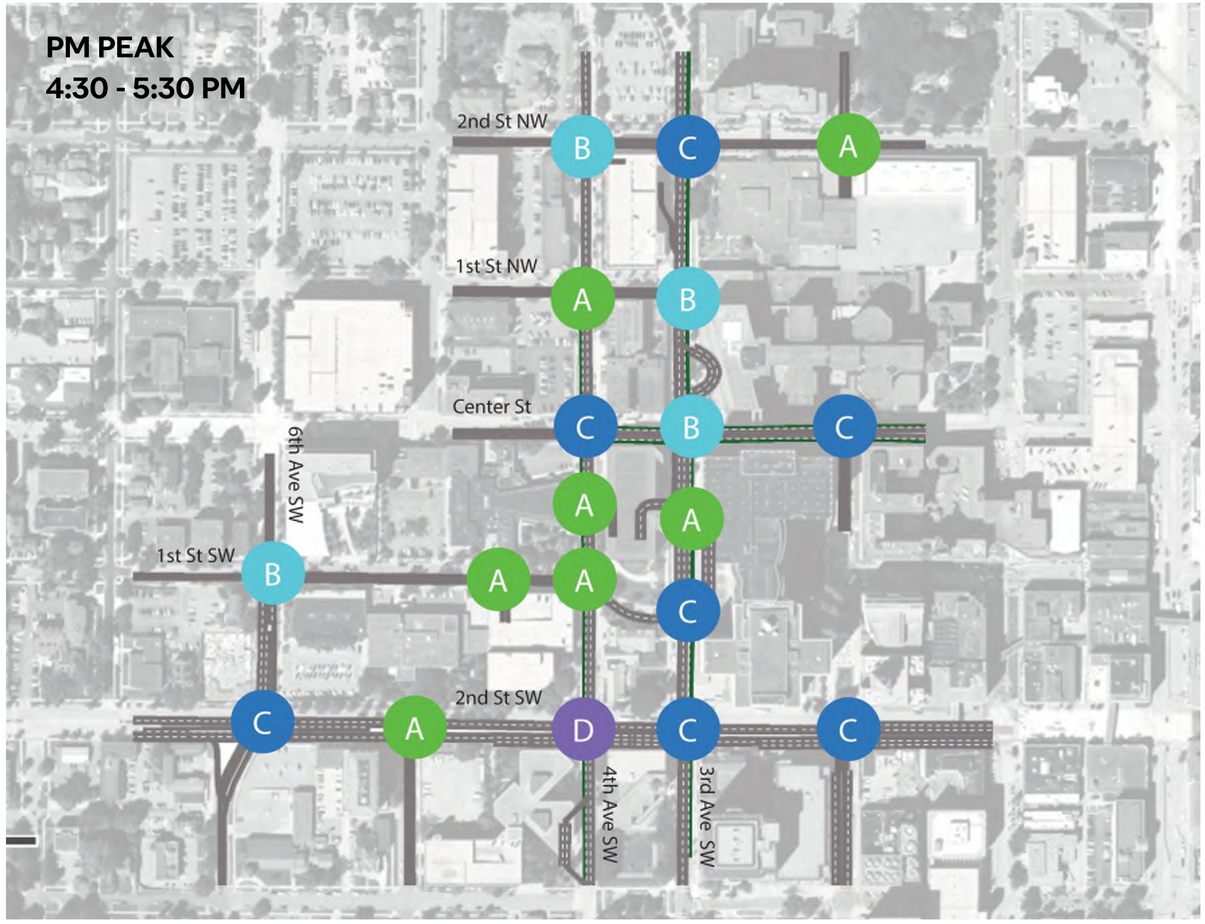
Level of Service - Existing Condition

LEVELS OF SERVICE

A B C D E F

In the existing condition, the traffic works well, with levels of service varying mostly from A to C. This means that traffic is stable, flowing without major problems. Some delays in the afternoon can be seen on 4th Avenue and 2nd street.





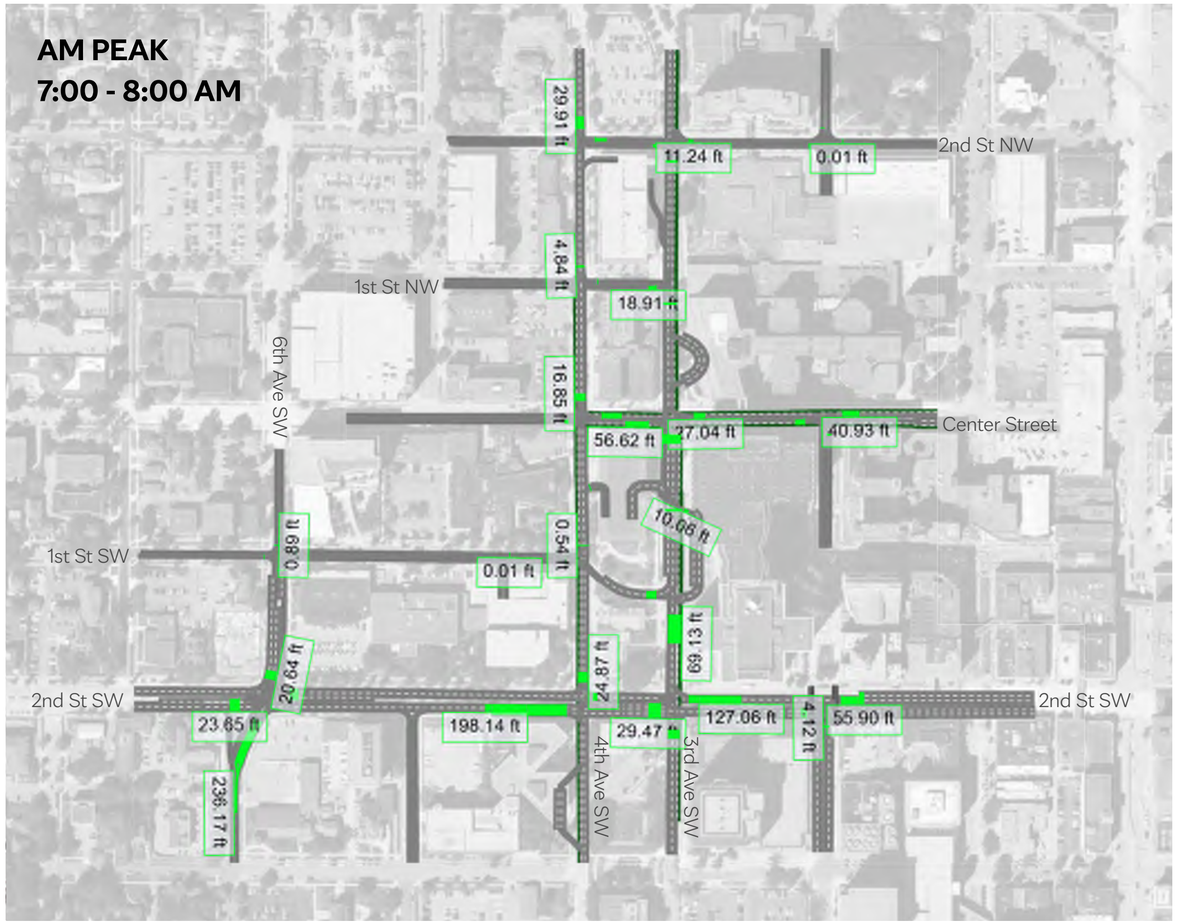
Average Queuing - Existing Condition

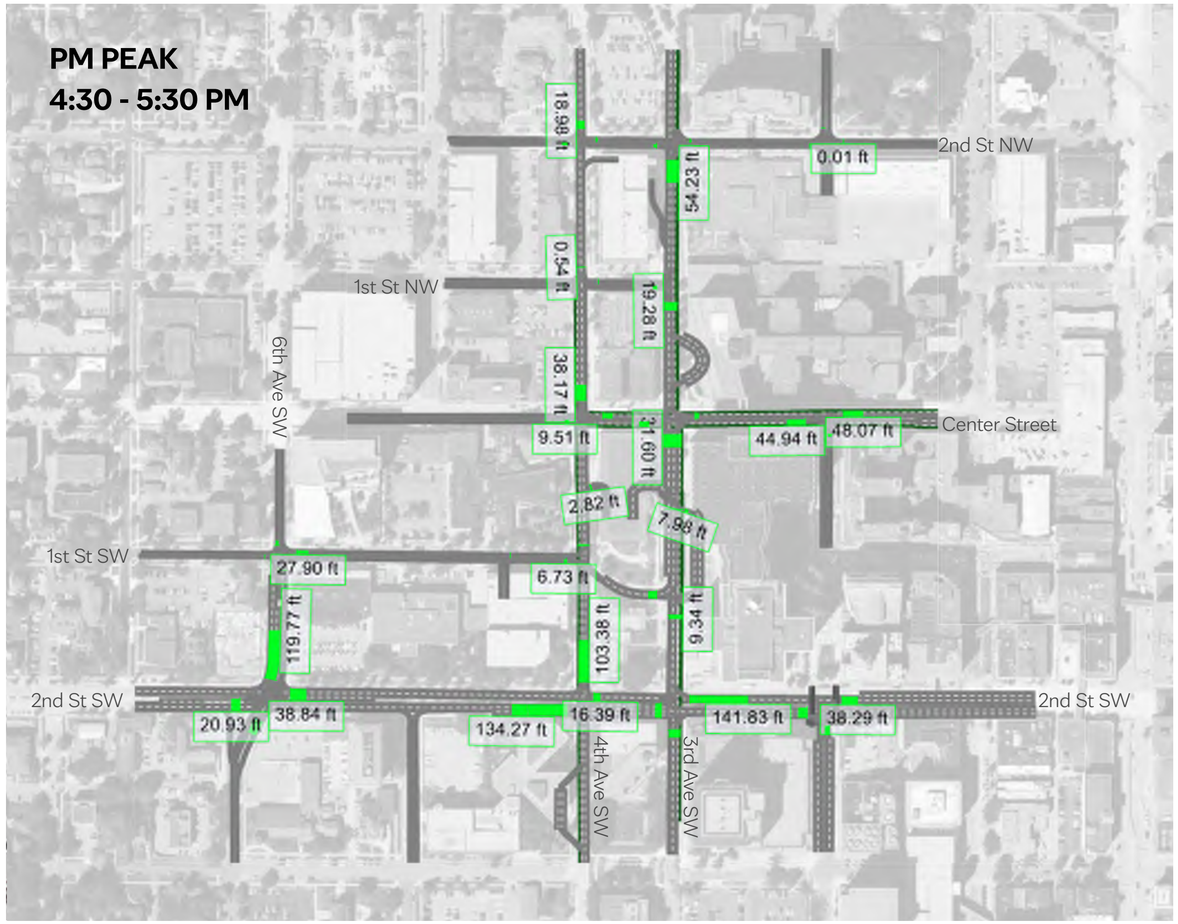
Current average queuing does not present any particular issue or criticality on the network.

The longest average queue is witnessed on 6th Avenue and 2nd Street where about 10 vehicles are queuing (46m - 150ft).

Queue

Bike lane



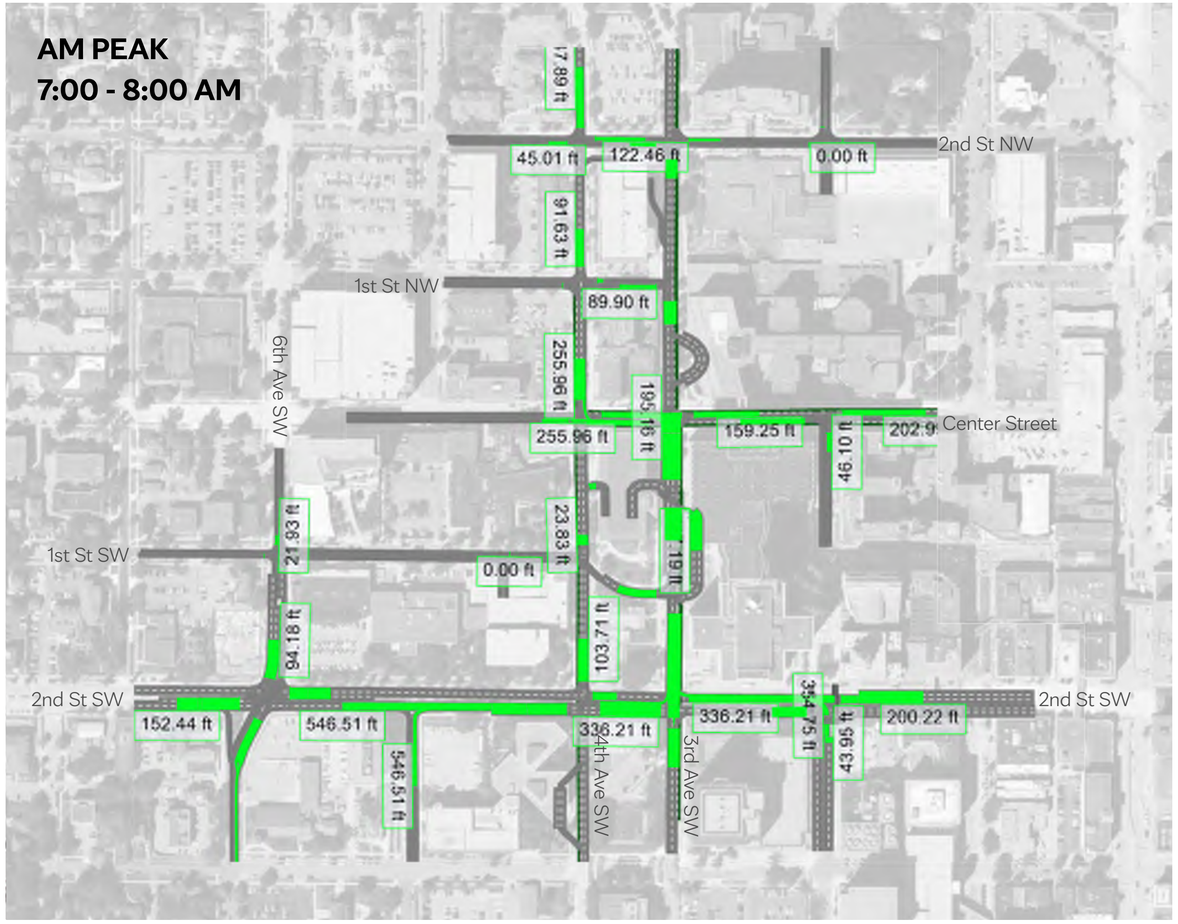


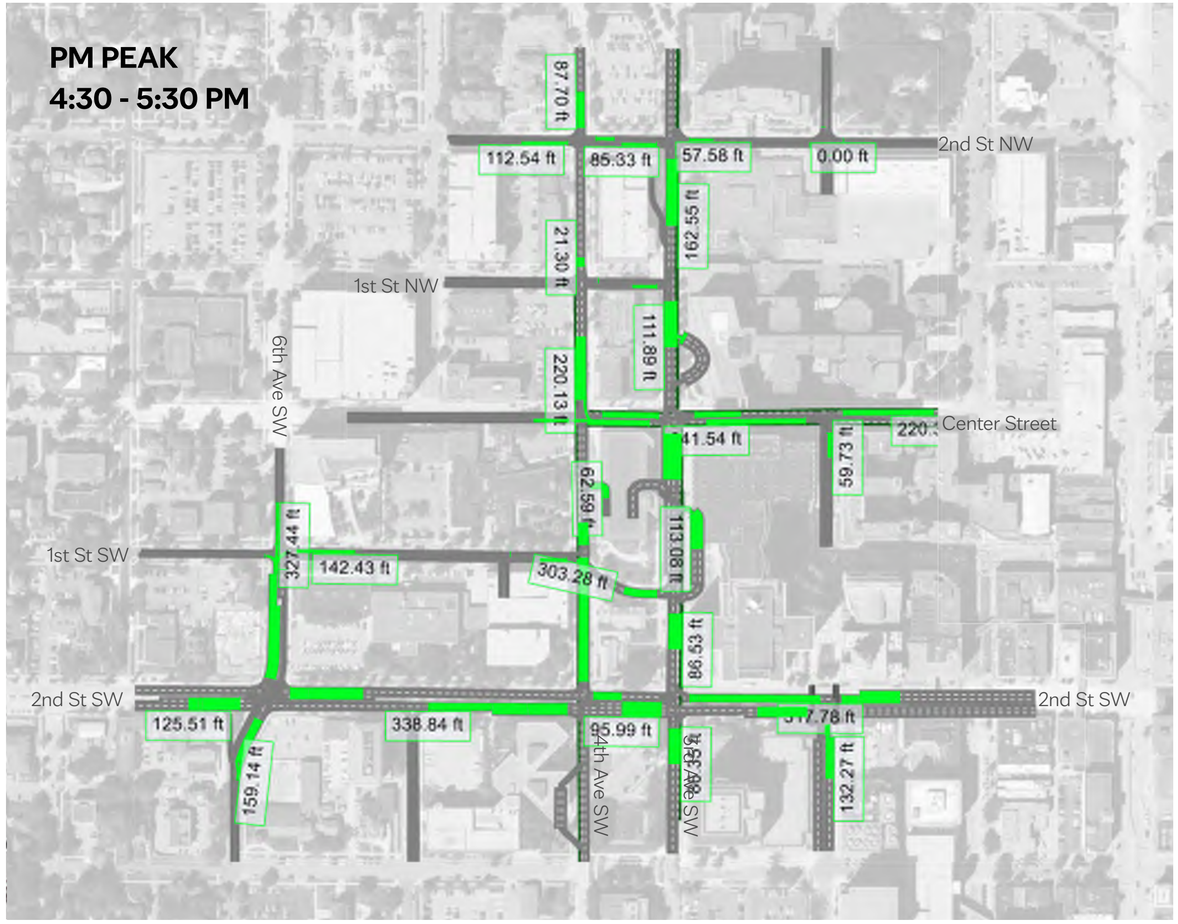
95th Percentile Queuing - Existing Condition

The map highlights 95th percentile queuing in the simulations of the existing condition. The longest queues are in both directions of the two horizontal Streets (Center and 2nd) and on 3rd and 4th avenues around the Mayo and Methodist budilings.

Queue

Bike lane



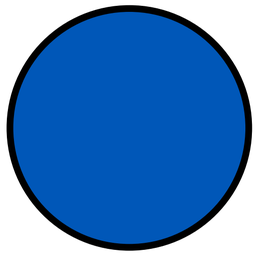


7.3 Project Scenario

Mayo Destination Traffic

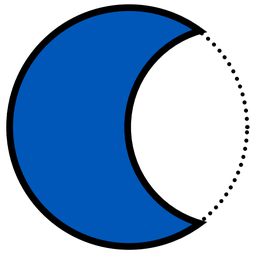
It is essential to identify the portion of traffic that is related to the project sites (Mayo, Gonda, Damon, Ozmun) and separate it from the background traffic which includes all the remaining traffic (which also includes other Mayo plots that are not the focus of this study). The “destination traffic” of the project blocks has been increased based on the growth factors explained in the trip generation chapter.

The background traffic instead, has been increased applying the delta derived by the Cube model, as explained in the “Traffic Study Methodology” chapter.



CURRENT TOTAL TRAFFIC
AM: 3,837 VEH/H
PM: 3,839 VEH/H

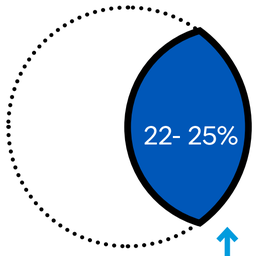
All the traffic surveyed within the boundary of the survey campaign.



BACKGROUND TRAFFIC
AM: 2,865 VEH/H
PM: 2,971 VEH/H

The background traffic is the component that is not attracted

or generated by the 4 blocks of the study area (for example this includes Methodist, Baldwin, Hilton and other Mayo facilities). Staff flows are included in the background traffic.



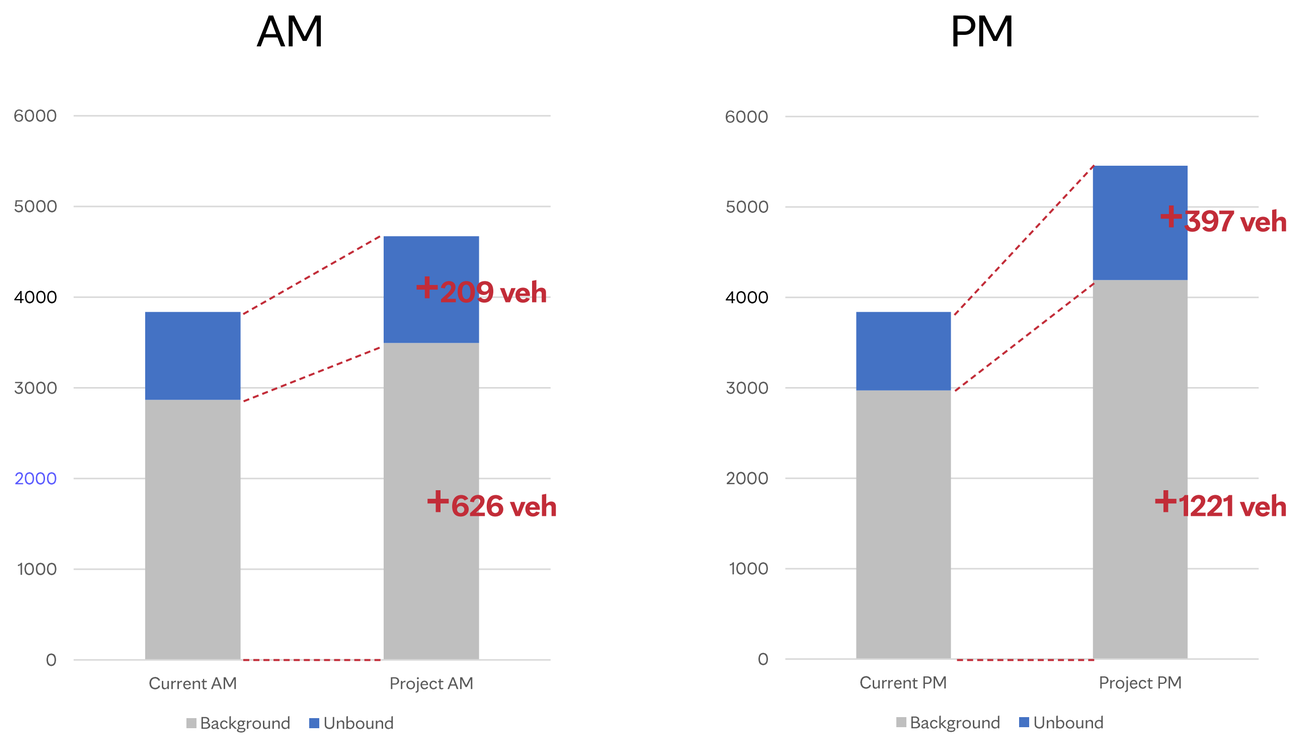
DESTINATION TRAFFIC
AM: 972 VEH/H
PM: 868 VEH/H

The destination traffic that is composed of the visitors flows that are directly attracted or generated by the 4 blocks of the study area (Mayo, Gonda, Damon, Ozmun) and relative parking ramps.

We need to extract this traffic component to be able to increase it in the future project scenarios

Total Traffic Growth

TOTAL TRAFFIC IN THE MICROSIMULATION SCENARIOS - PEAK HOURS



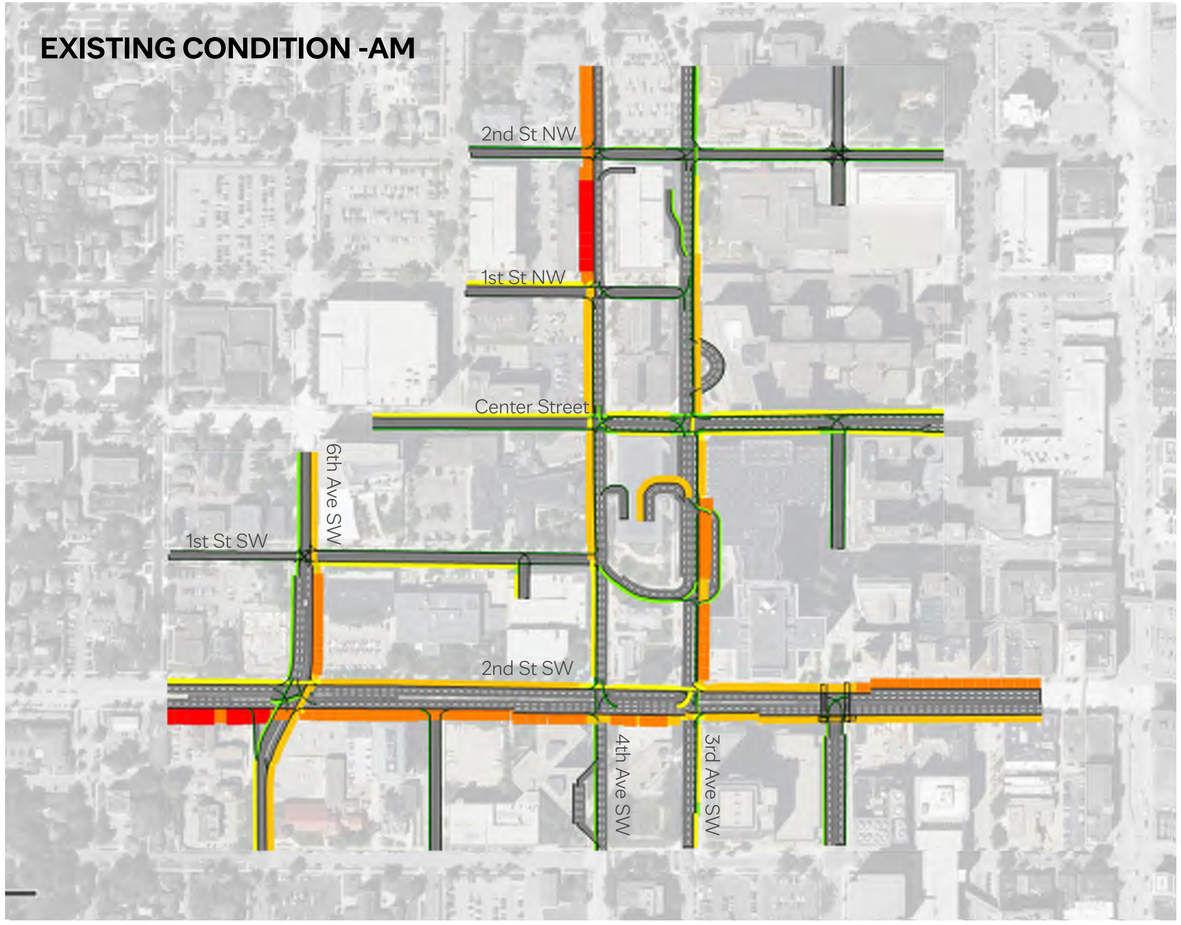
The charts above show that the overall traffic growth is mostly due to the background traffic (new developments related to other projects unrelated to Unbound).
The additional traffic of the Unbound project (Mayo, Gonda, Damon, Ozmun) is smaller.

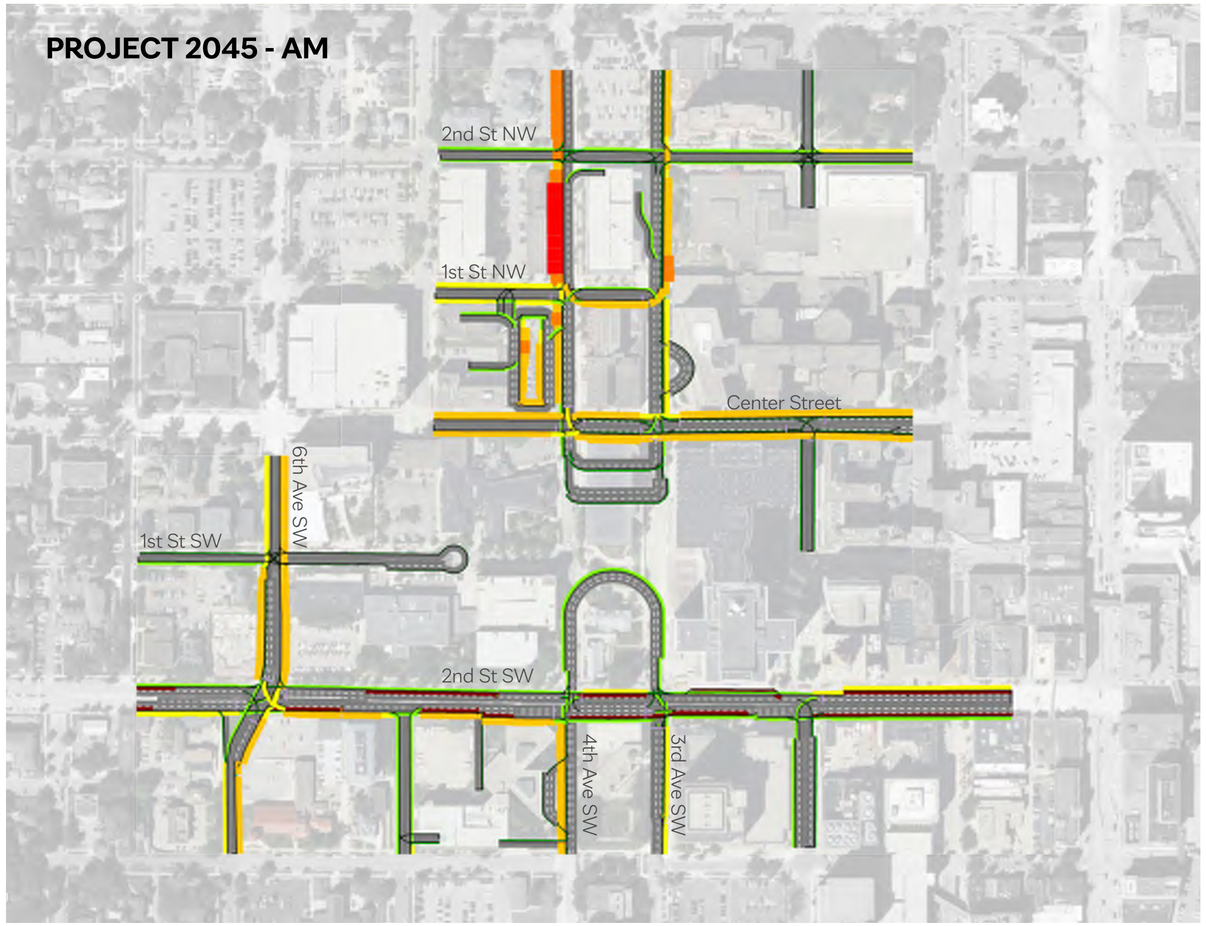
Traffic Volume Comparison - AM (7:00 - 8:00 AM)

There is a higher pressure on the North portion of the network, due to the closure of the avenues and the new concentrated visitor parking provision.

Traffic on 2nd St is lower in the Project scenario due to the presence of BRT lanes.

Traffic volume
Average vehicle/hour
< 100
< 200
< 300
< 500
< 700
< 900
> 900



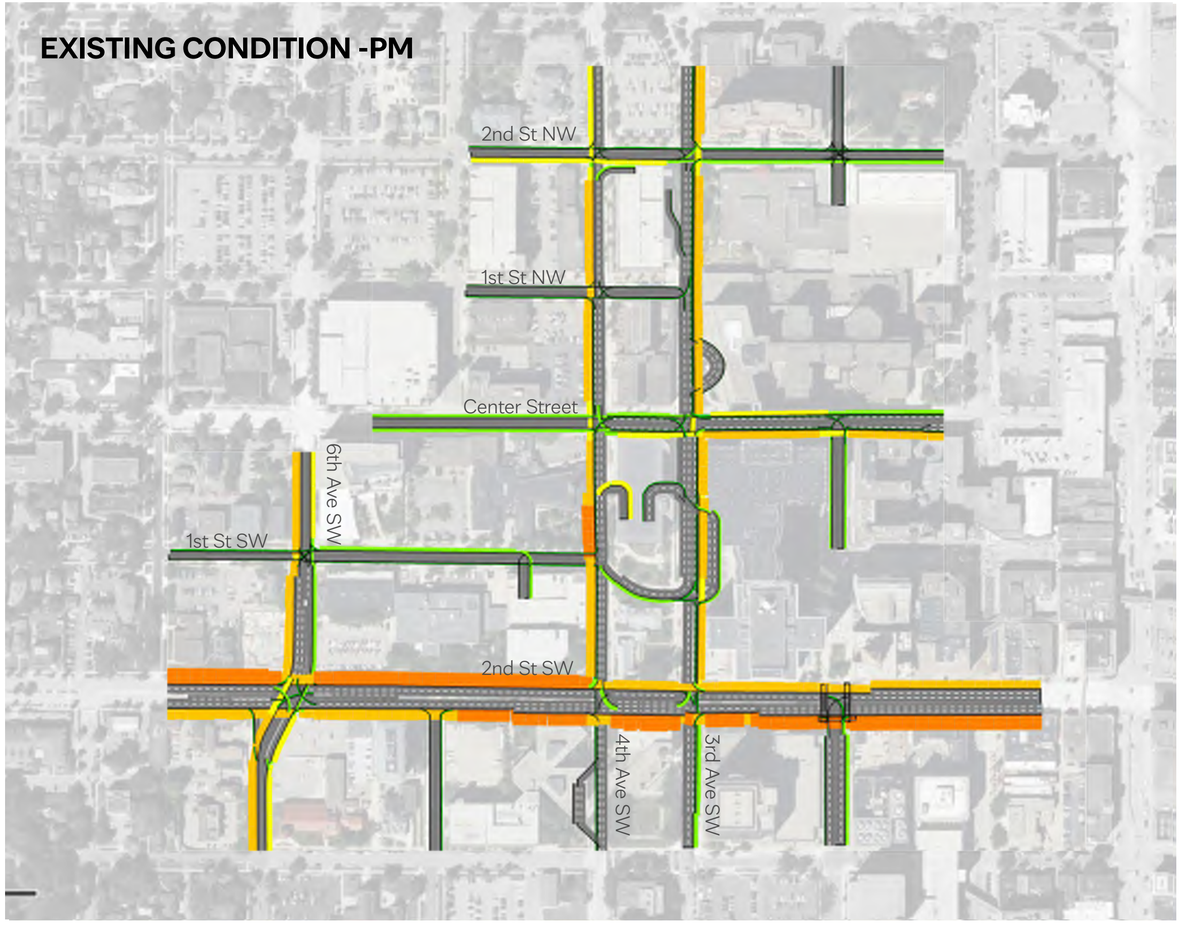


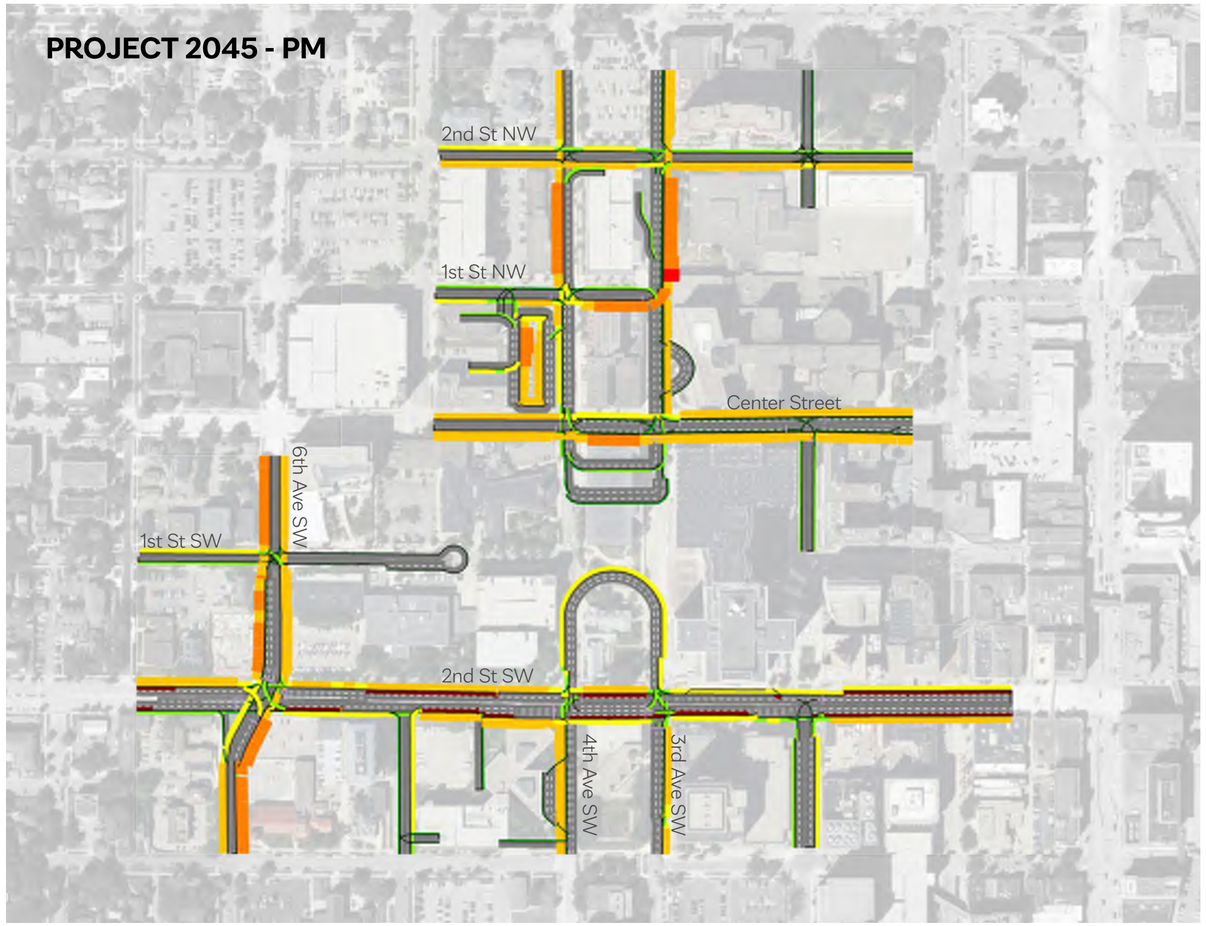
Traffic Volume Comparison - PM (4:30 - 5:30 PM)

There is a higher pressure on the North portion of the network, due to the closure of the avenues and the new concentrated visitor parking provision.

Traffic on 2nd St is lower in the Project scenario due to the presence of BRT lanes.

Traffic volume
Average vehicle/hour
< 100
< 200
< 300
< 500
< 700
< 900
> 900





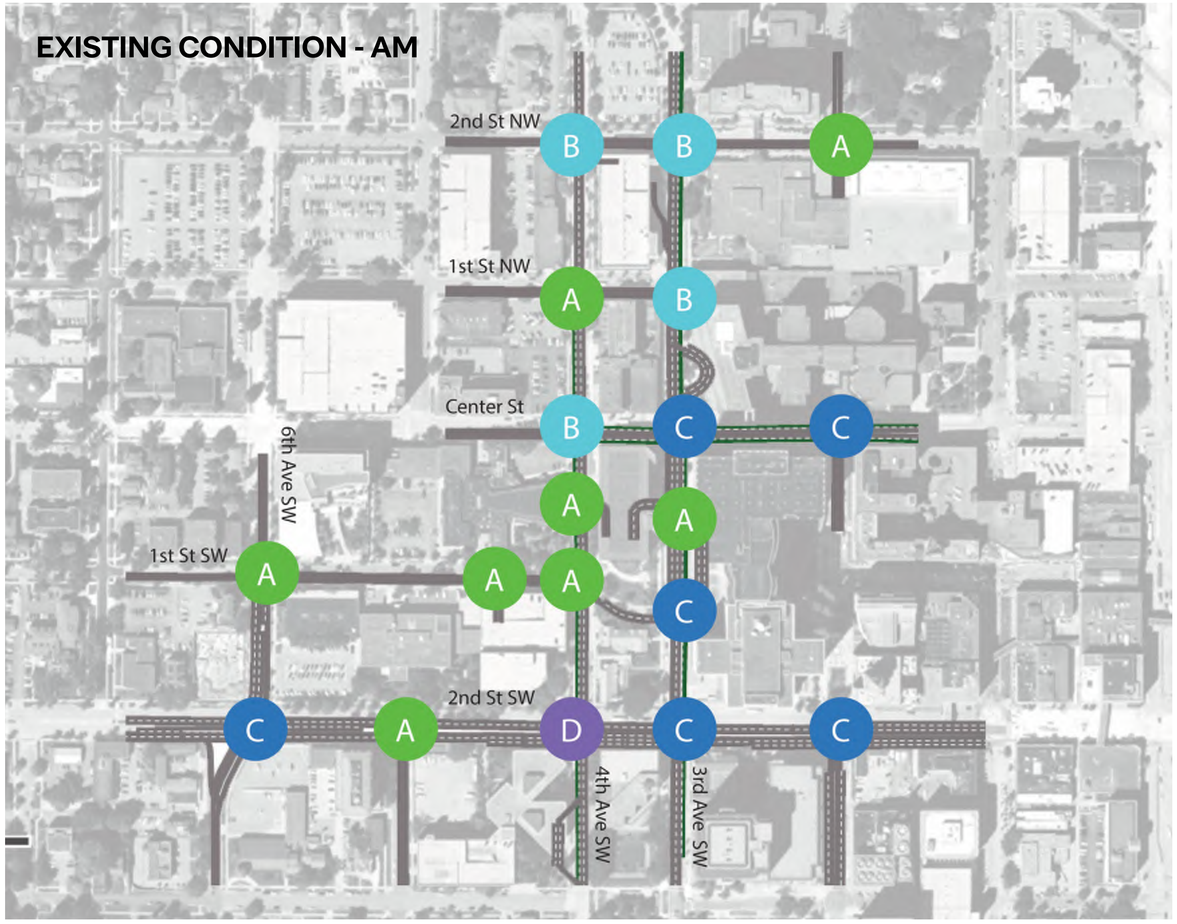
Level of Service Comparison - AM (7:00 - 8:00 AM)

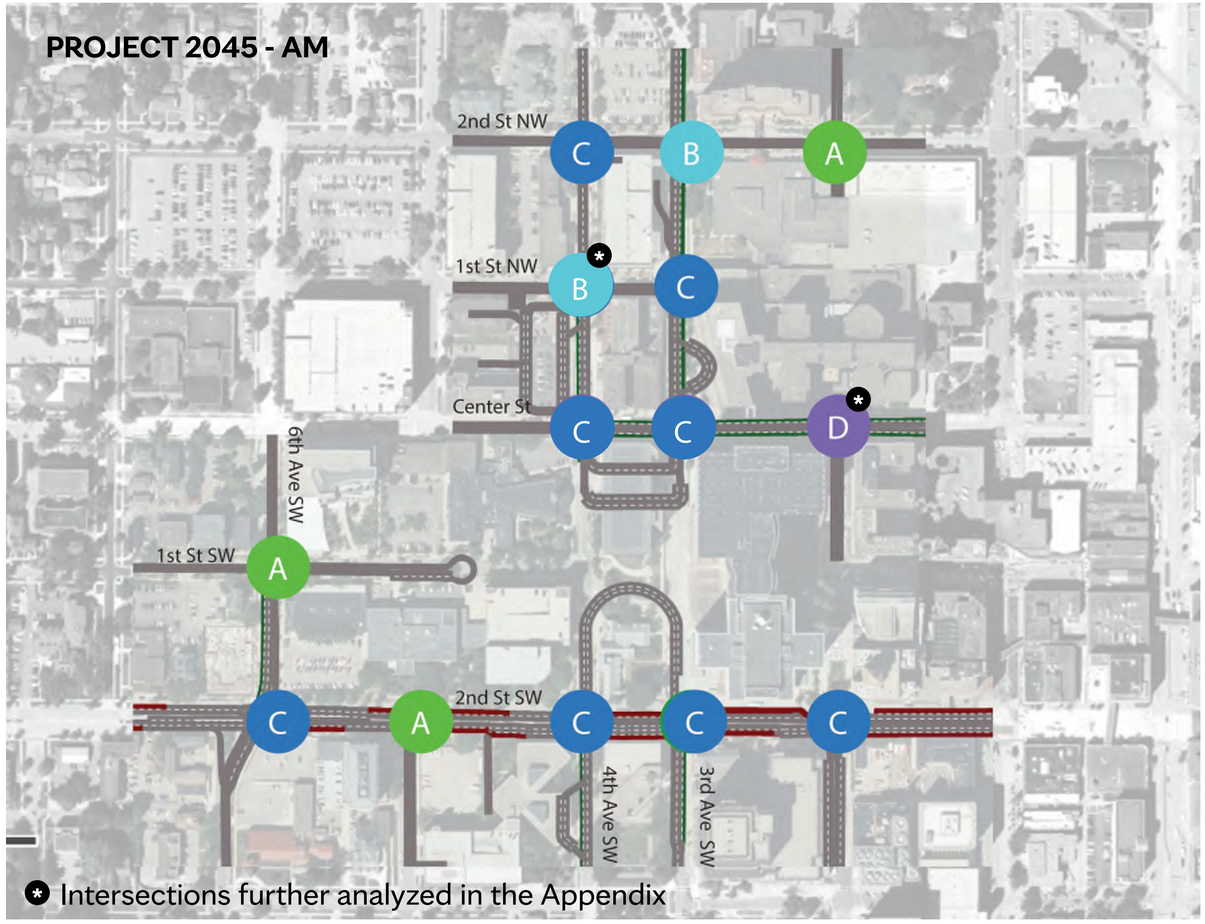
LEVELS OF SERVICE

A B C D E F

All the analyzed intersections in the Project scenario are within the level of service D, which is the threshold deemed acceptable by the City.

The street with the highest traffic pressure is Center St.





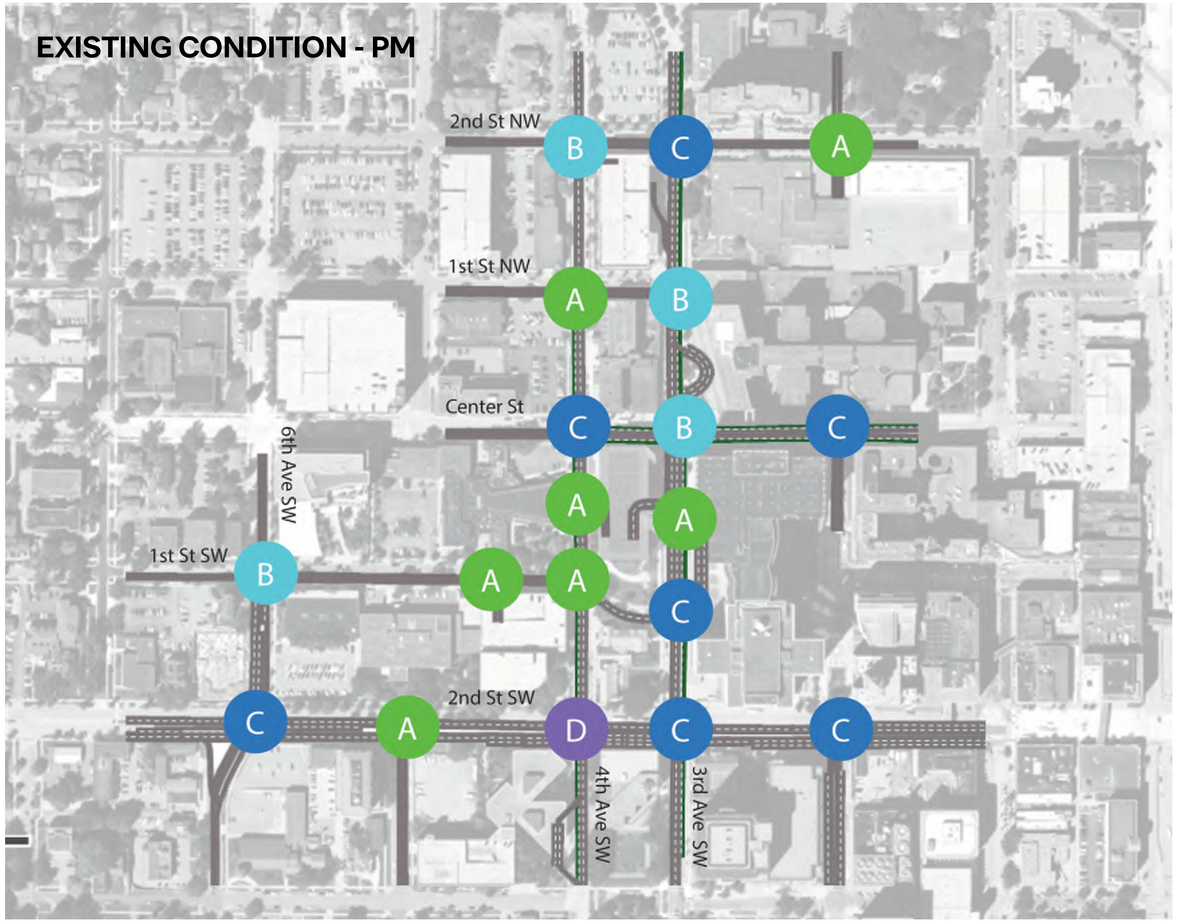
Level of Service Comparison - PM (4:30 - 5:30 PM)

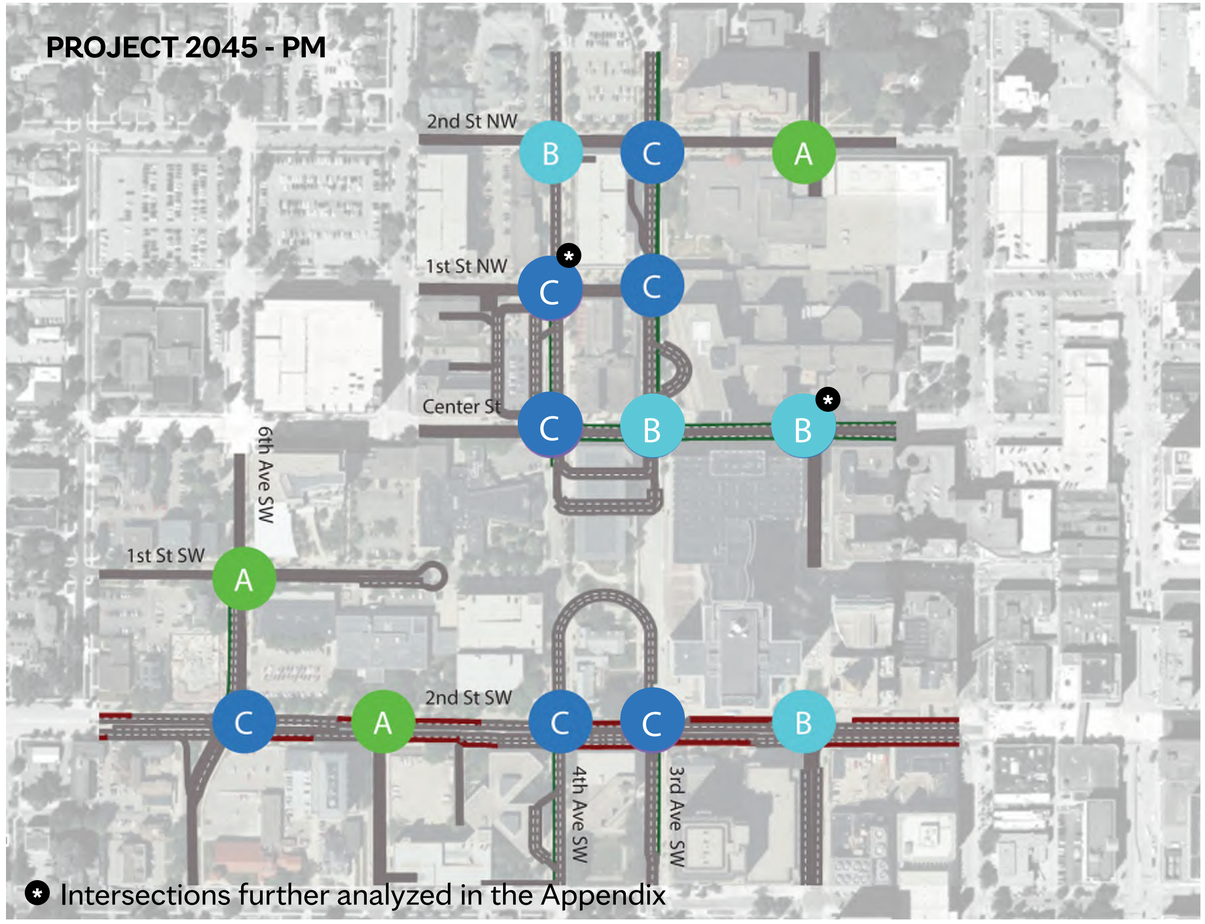
LEVELS OF SERVICE

A B C D E F

All the analyzed intersections in the Project scenario are within the level of service D, which is the threshold deemed acceptable by the City.

Center St. is less critical in the PM, while the busiest intersections are on 4th Ave, due to the presence of the new parking structure.

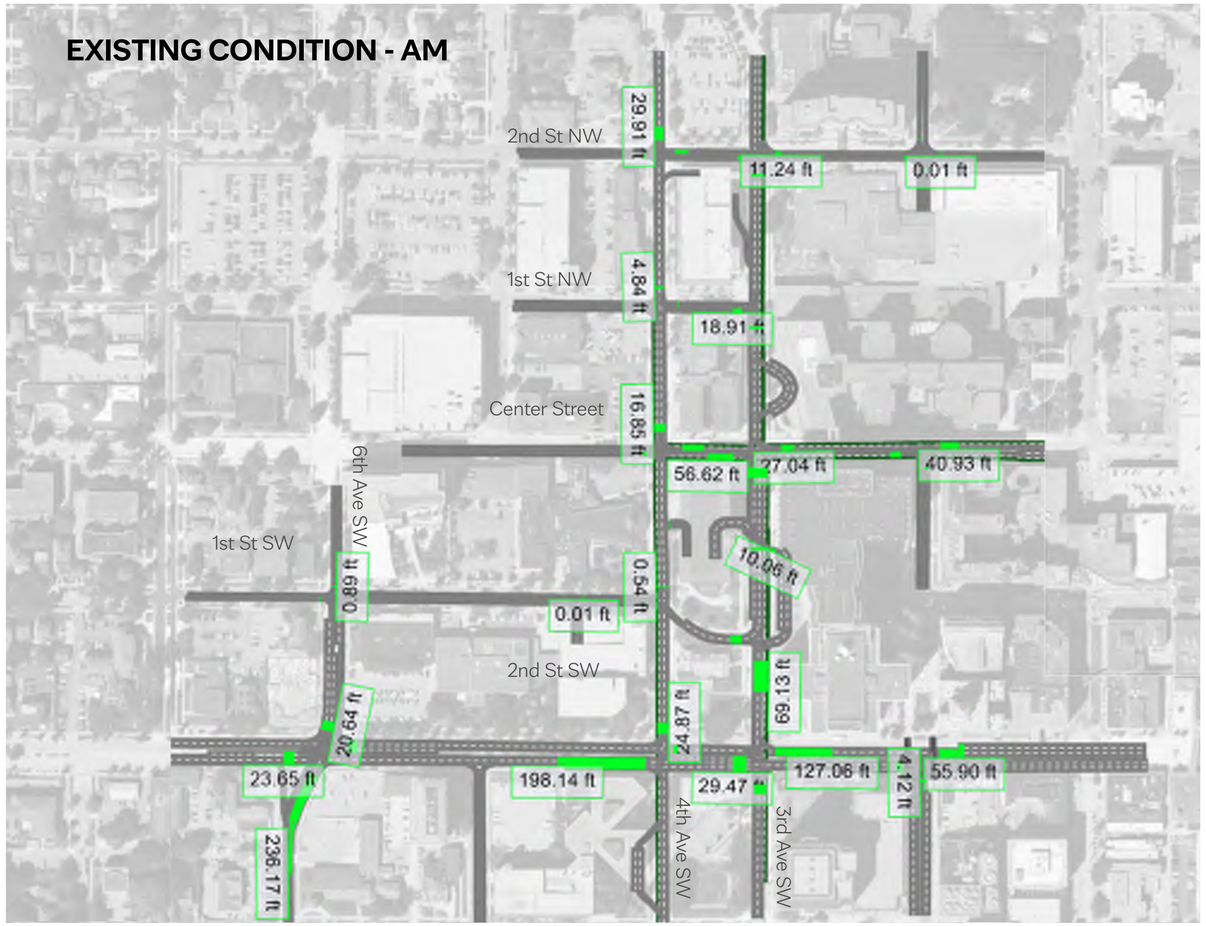


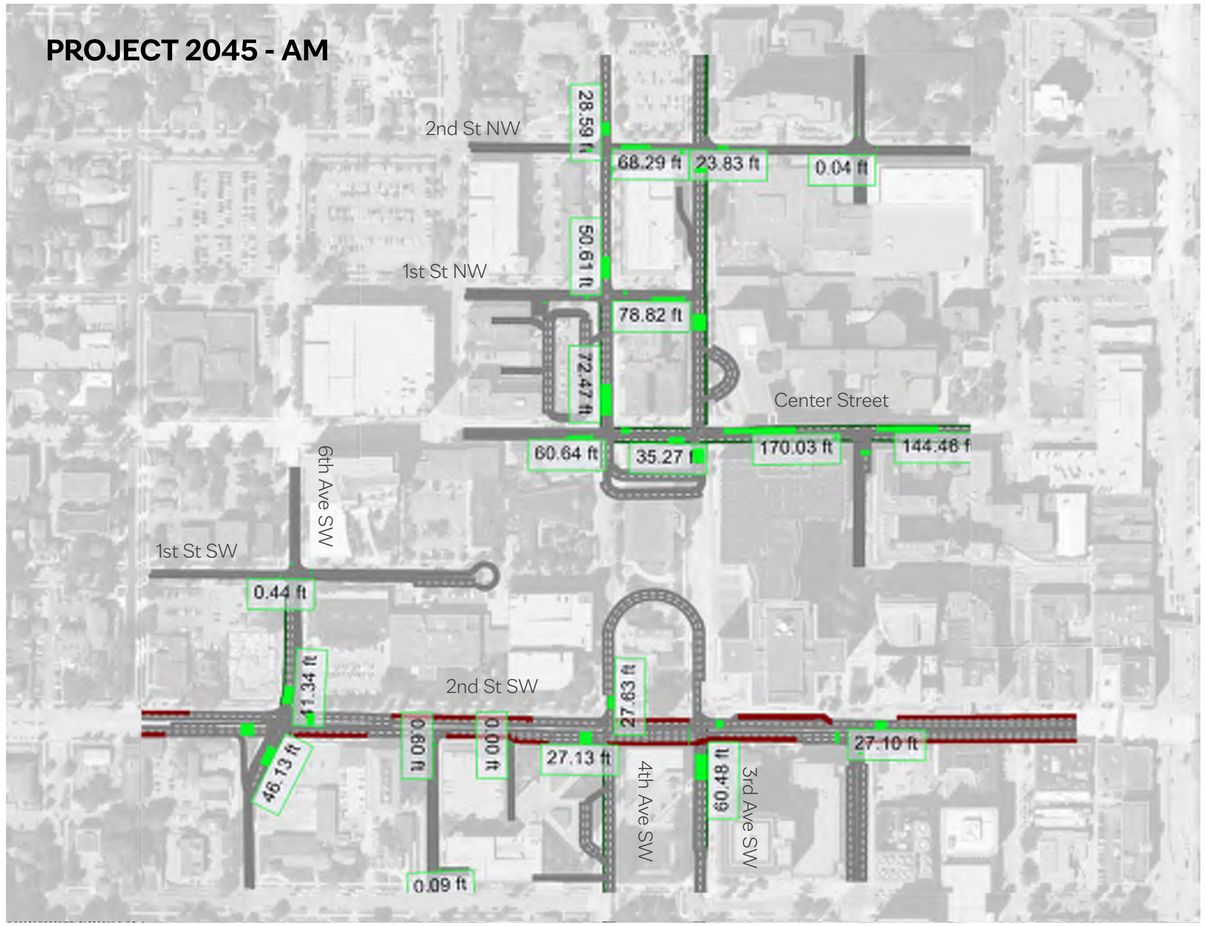


Average Queues Comparison - AM (7:00 - 8:00 AM)

As mentioned in previous slides, the longest average queue is in the northern portion of the network, specifically on Center St. While in the south queues are very limited and are enhanced in the Project scenario compared to the Current.

Queue
BRT
Bike lane



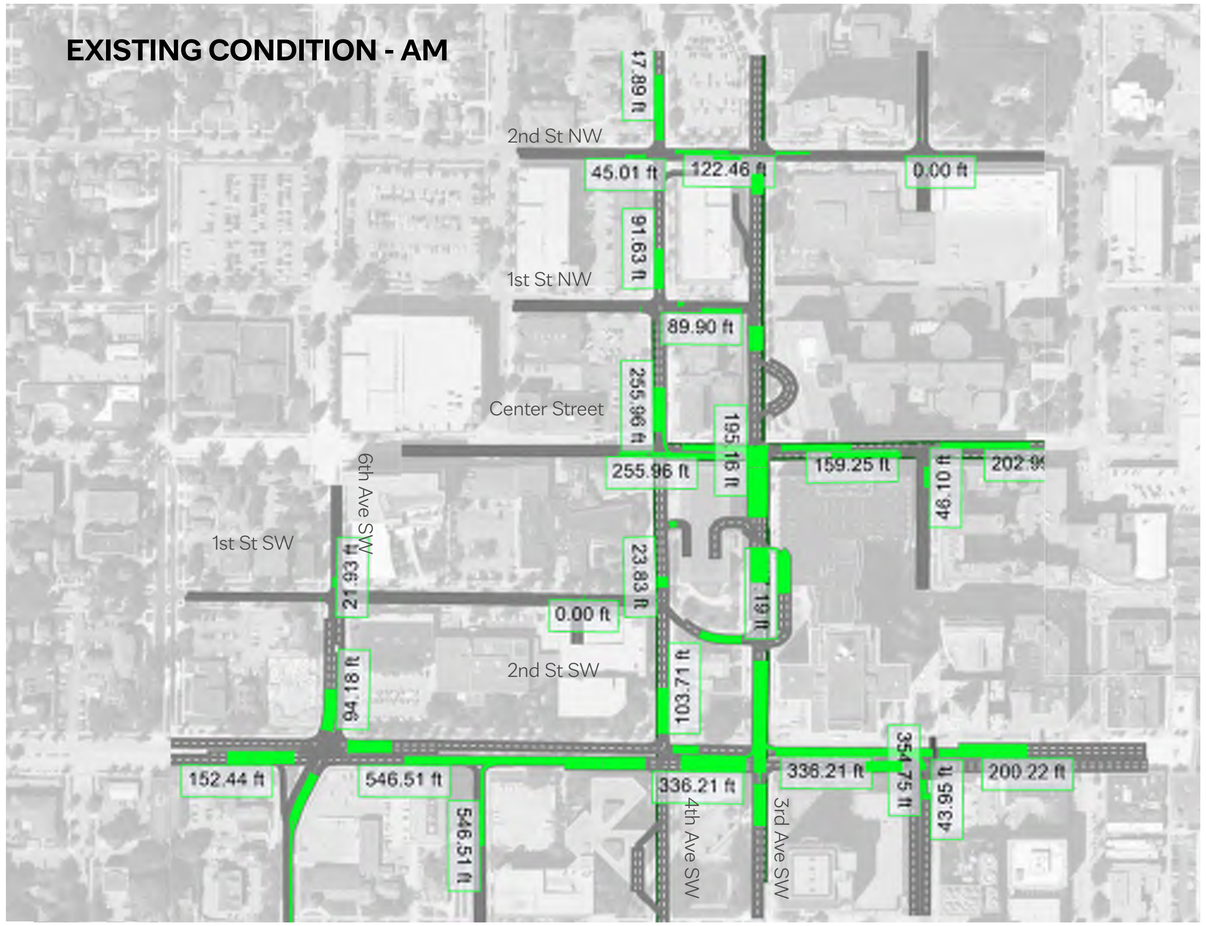


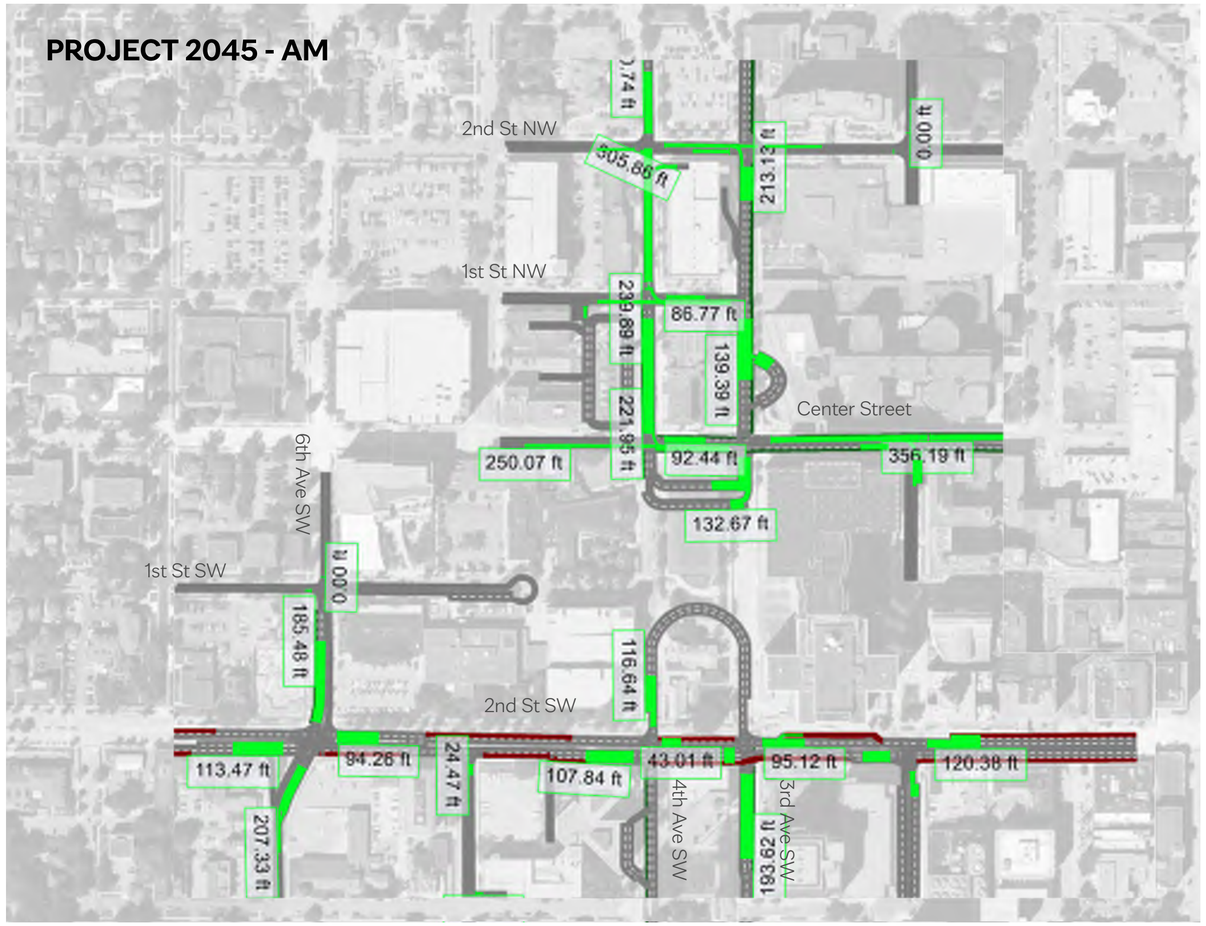
95th Percentile Queuing Comparison - AM (7:00 - 8:00 AM)

The simulation shows that the longest maximum queues are mostly concentrated in the northern part of the network where the concentration of flows is higher, especially on Center Street. In some cases the queue spills back into adjacent intersections.

It should be noted that this condition reflects a worst case condition that might have occurred only once in all the simulations, the average delay and level of service provide a more accurate and comprehensive parameter.

Queue
BRT
Bike lane

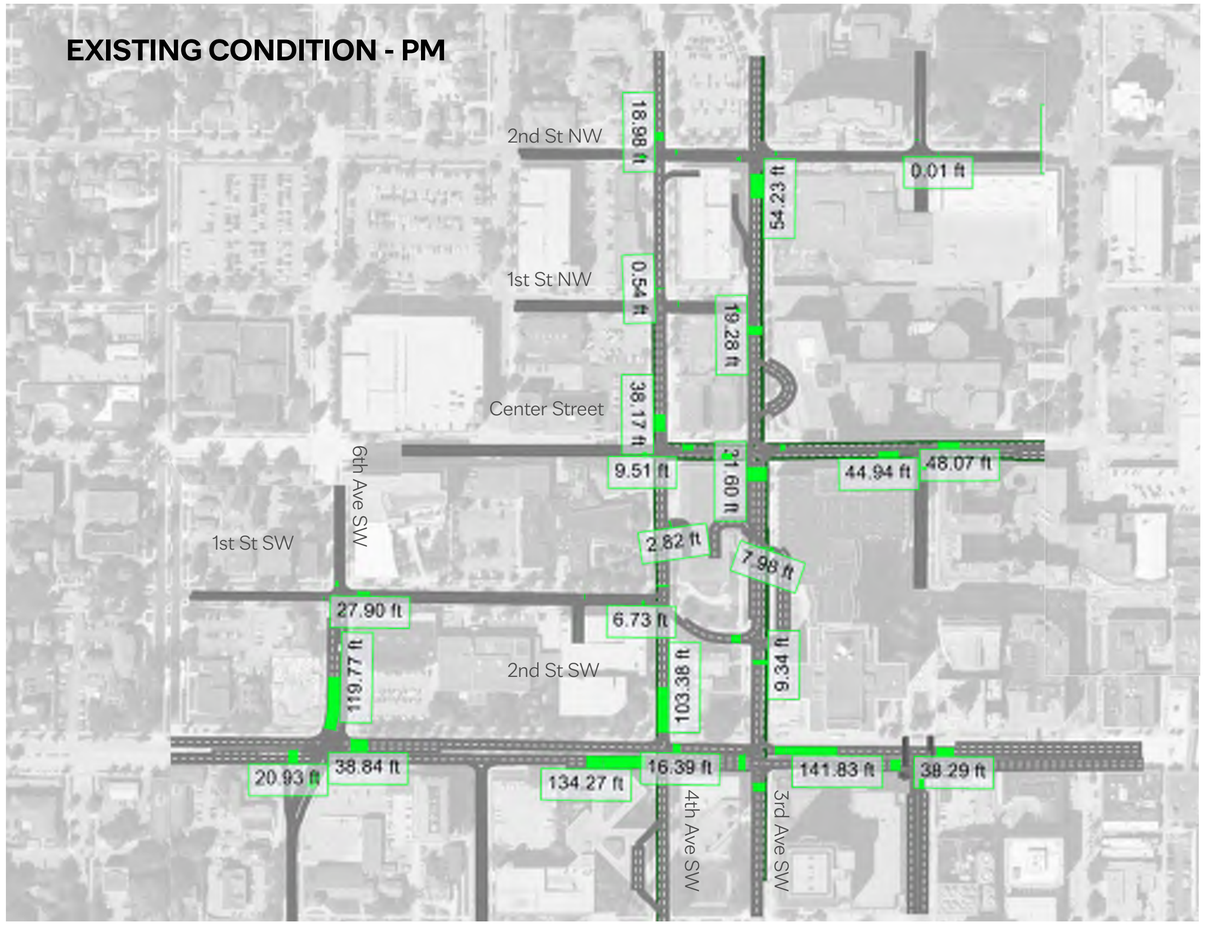


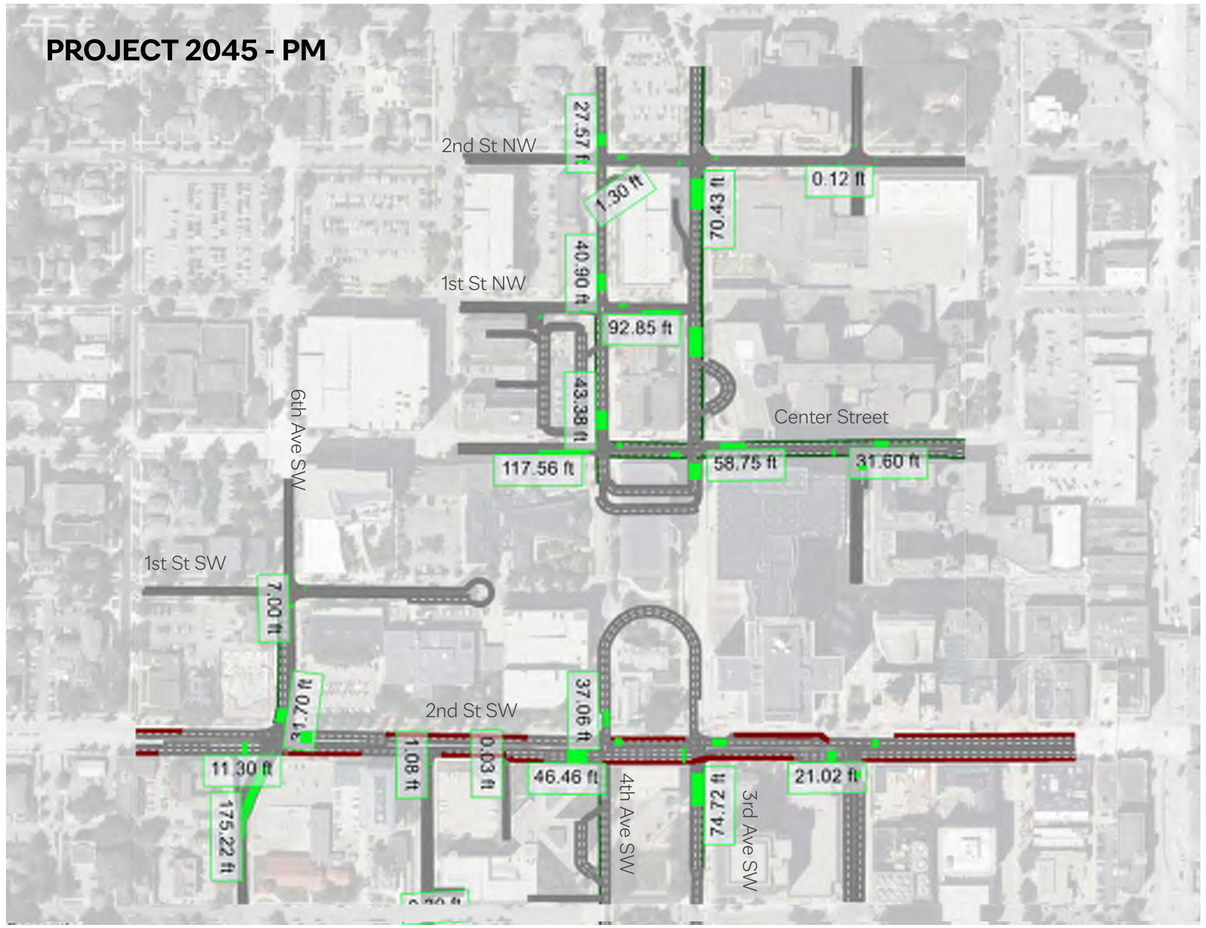


Average Queues Comparison - PM (4:30 - 5:30 PM)

Average queues are less critical in the PM compared to the AM. Slightly longer queues can be seen in the southern portions of 4th and 6th Ave.

Queue
BRT
Bike lane





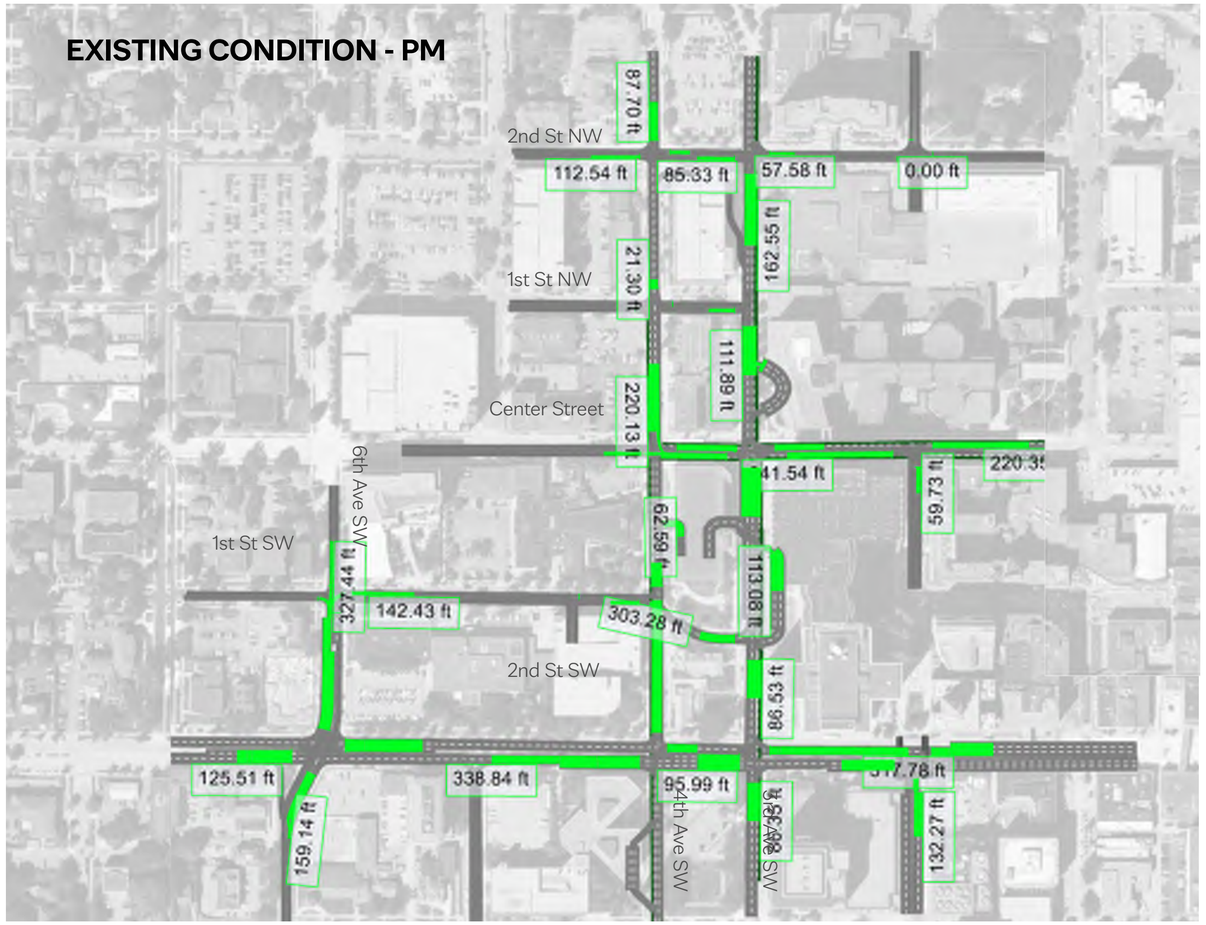
95th Percentile Queuing Comparison - PM (4:30 - 5:30 PM)

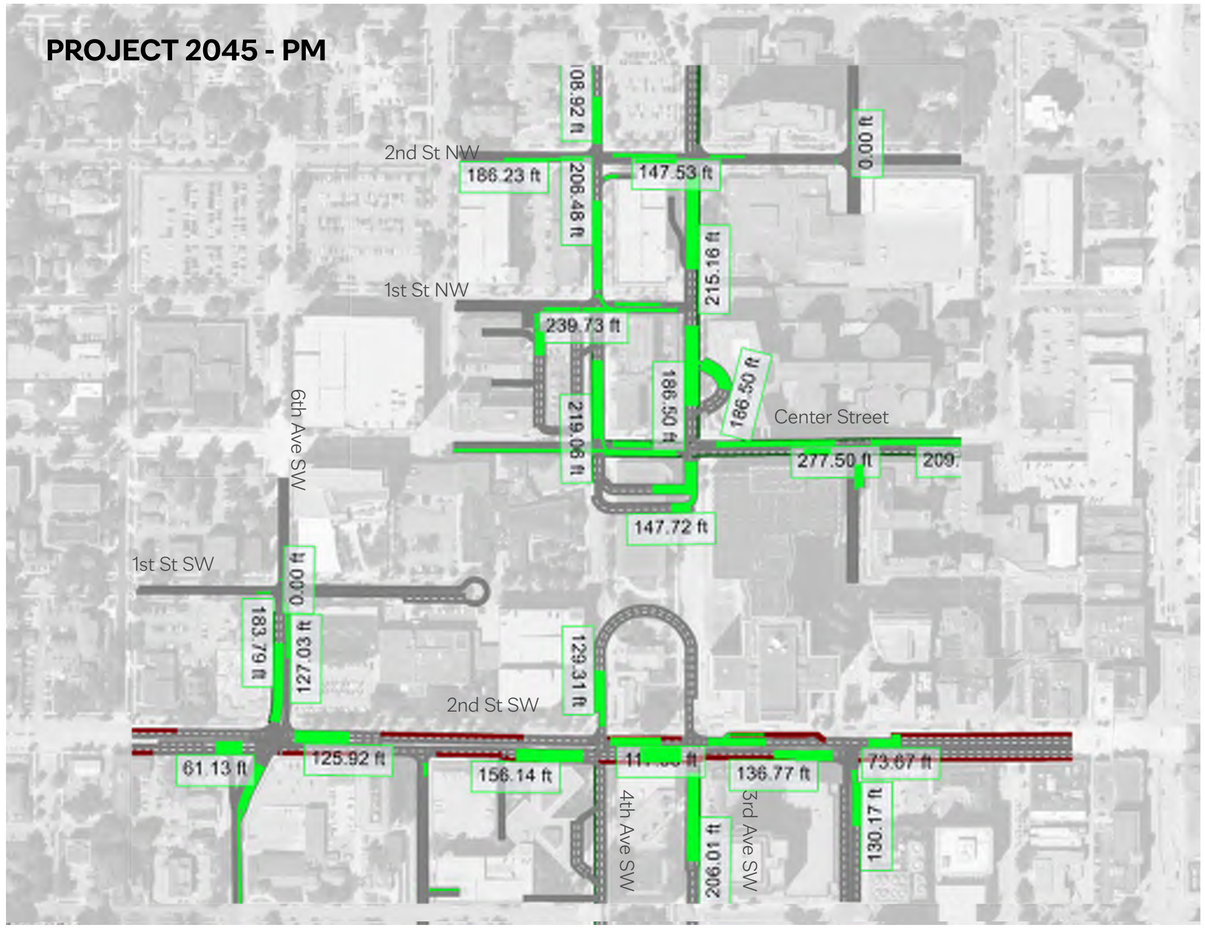
The simulation shows that the longest maximum queues are mostly concentrated in the northern part of the network where the concentration of flows is higher, especially on Center Street. In some cases the queue spills back into adjacent intersections.

Queue

BRT

Bike lane





Average Queues Comparison - Project Scenario

As previously mentioned, the average queues show some queuing on Center St., especially on the westbound lane. This is due to the traffic flows reaching downtown during the morning.

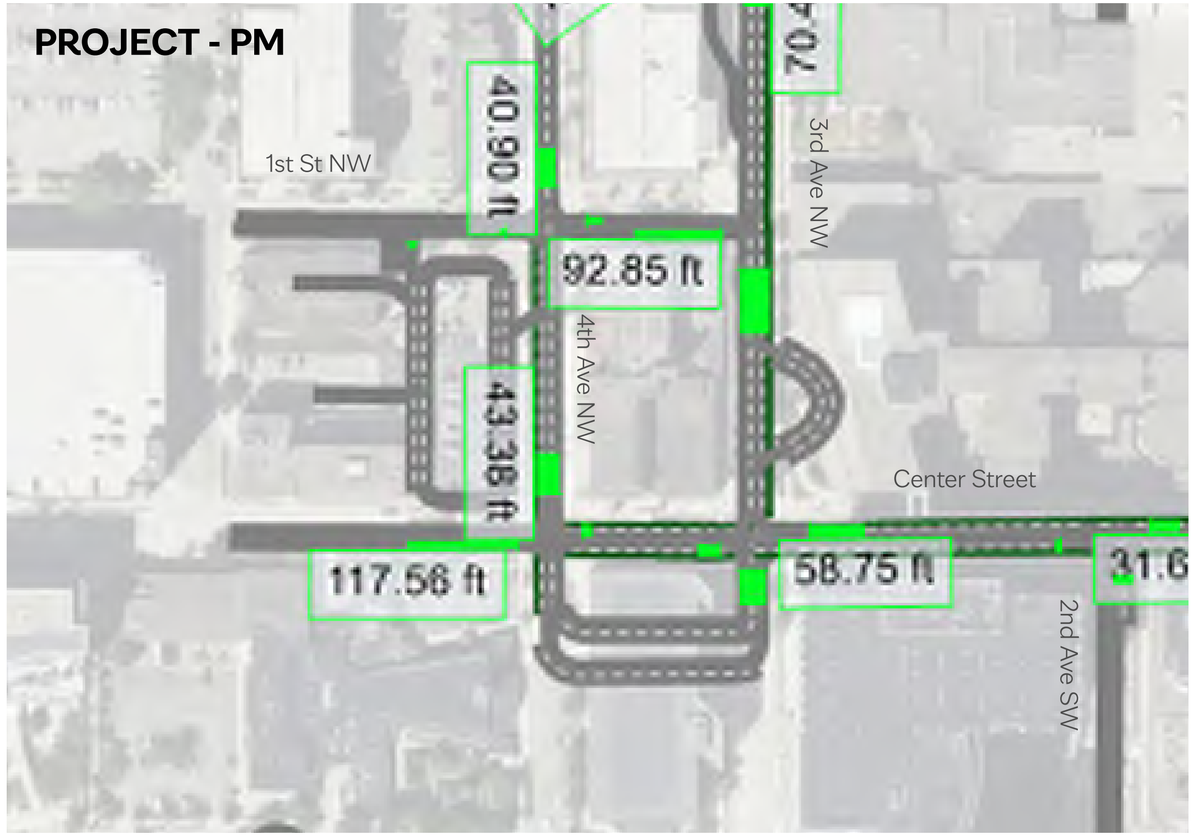
The queuing inside the drop-off is always very limited ensuring a high level of service and smooth flows.

Queue

BRT

Bike lane





95th Percentile Queuing Comparison - Project Scenario

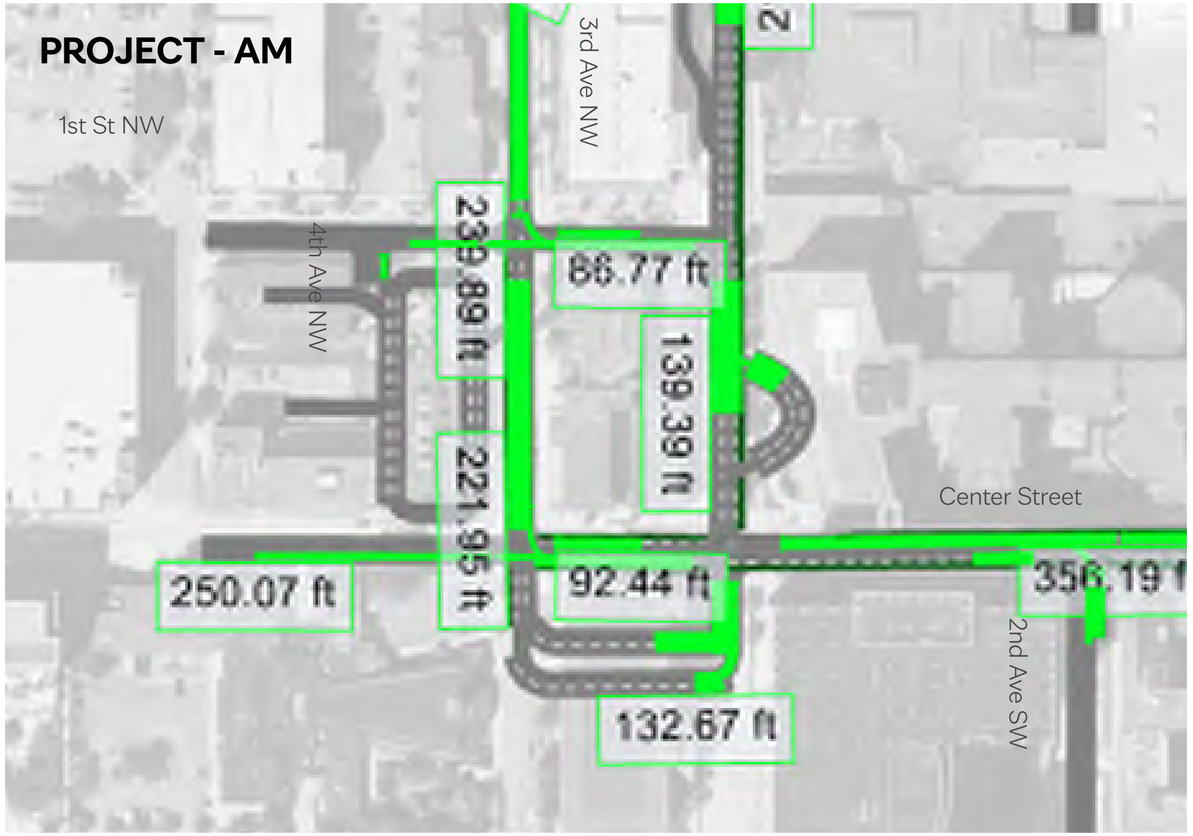
As seen in previous slides, the intersections around center street are the most critical.

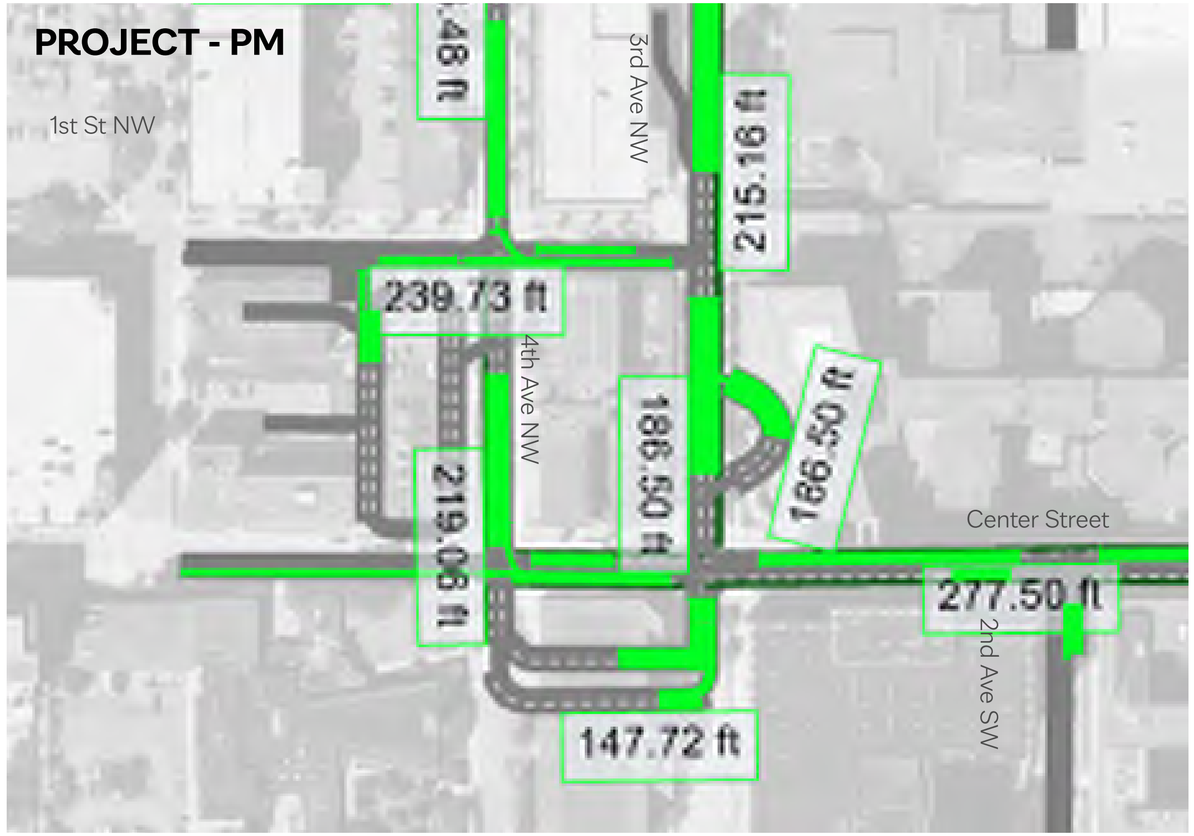
Some queuing is seen also inside the drop offs but it never spills back into the external network.

Queue

BRT

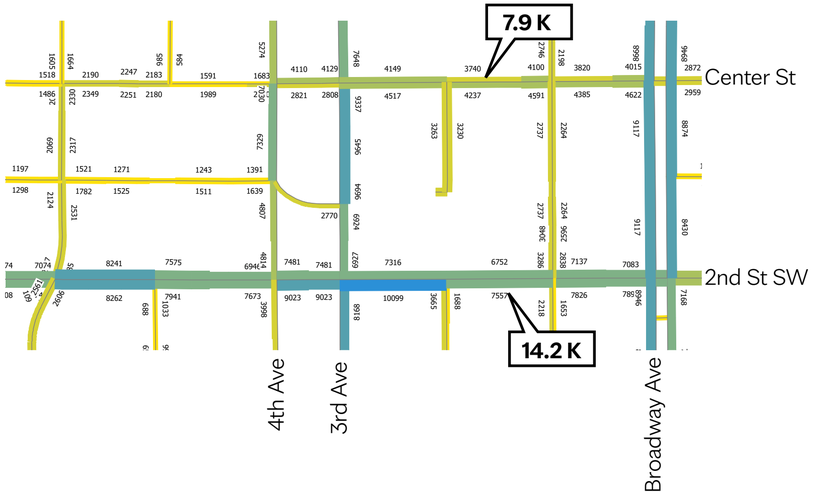
Bike lane



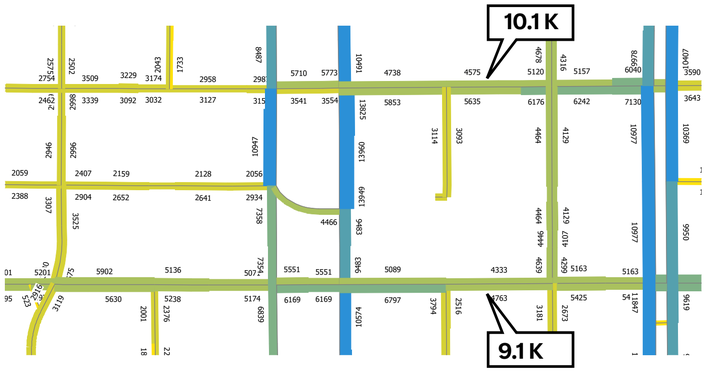


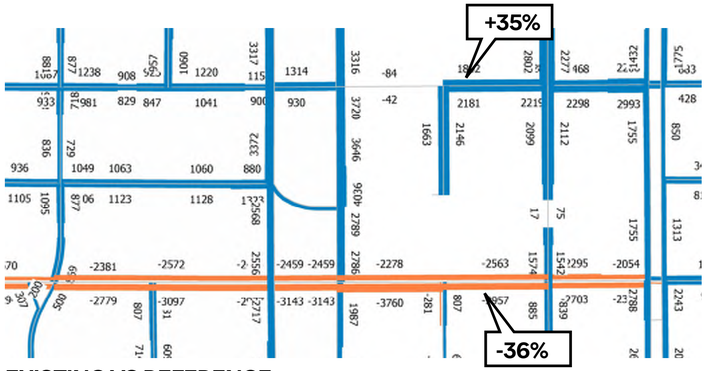
Center Street Traffic

2018 EXISTING



2045 REFERENCE



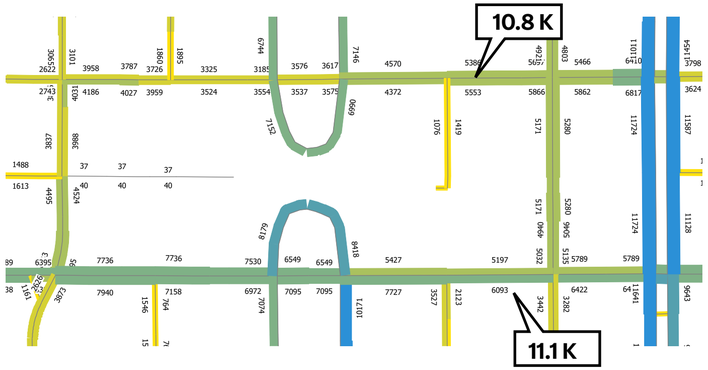


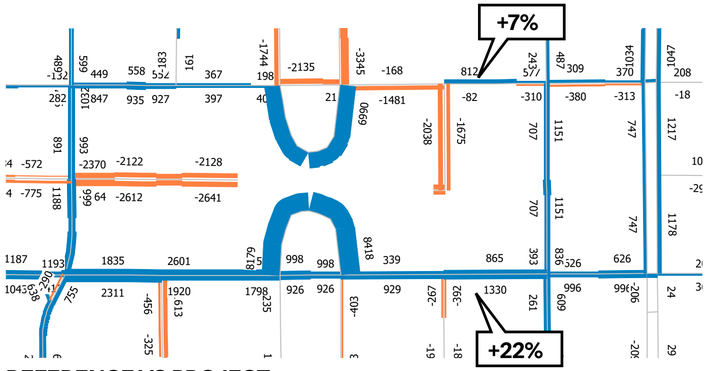
EXISTING VS REFERENCE

The 2045 reference scenario shows an overall traffic growth in the downtown area, due to the increased demand brought by the DMC projects. As can be seen in the map below, the traffic increase is evenly spread, except for 2nd street due to the capacity reduction related to the BRT:

- 2nd St from 14.2k to 9.1k veh/day (-36%)
- Center St from 7.9k to 10.1k veh/day (+35%)

2045 PROJECT





REFERENCE VS PROJECT

Between the reference and project scenario there will not be a major difference in terms of traffic quantity. However with the Mayo Unbound project in place and closure of the two roads, the through traffic that used to go through the Avenues will be redistrubuted among streets between 2nd St NW and Center St:

- 2nd St from 9.1k to 11.1k veh/day (+22%)
- Center St from 10.1k to 10.8k veh/day (+7%)

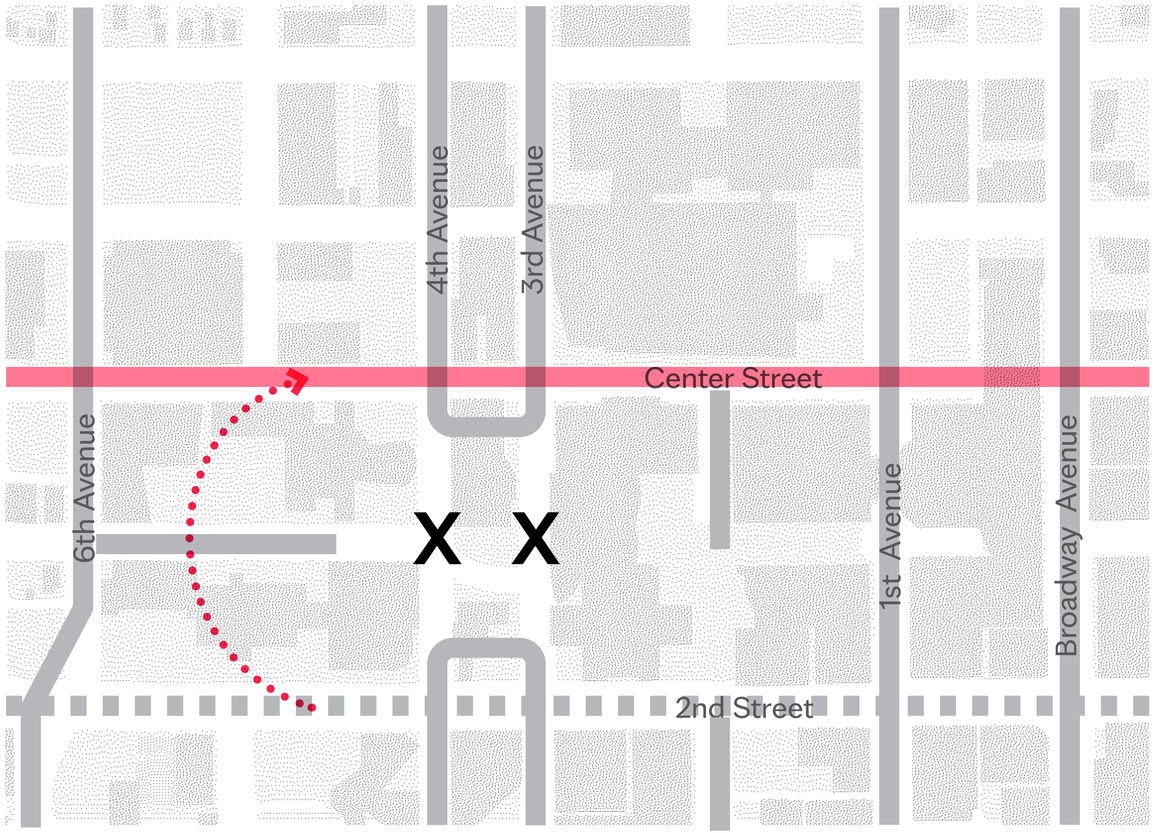
DAILY TRAFFIC FLOWS - veh/day

- <2000
- 2000 - 4000
- 4000 - 6000
- 6000 - 8000
- 8000 - 10000
- 10000 - 15000
- > 15000

DIFFERENCE

- Traffic increase
- Traffic decrease

Center Street Traffic



The simulations show that the intersections along Center Street are the most critical points due to the following reasons:

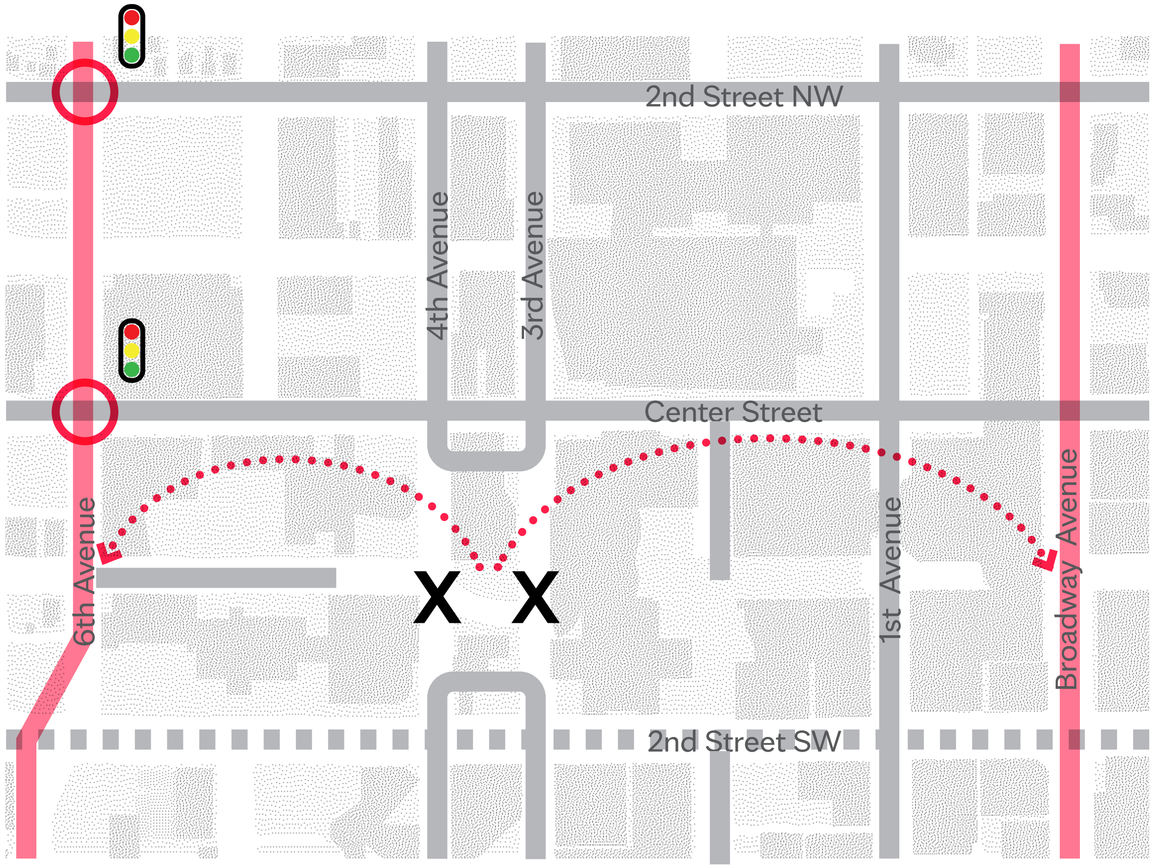
1. The new BRT line on 2nd Street reduces the road capacity for cars while providing dedicated lanes for buses. This means that a large portion of traffic uses Center Street as an alternative.

2. Center Street has a limited right of way that can only host one lane per direction and a bike lane. In some stretches, there is no space to introduce turn lanes.

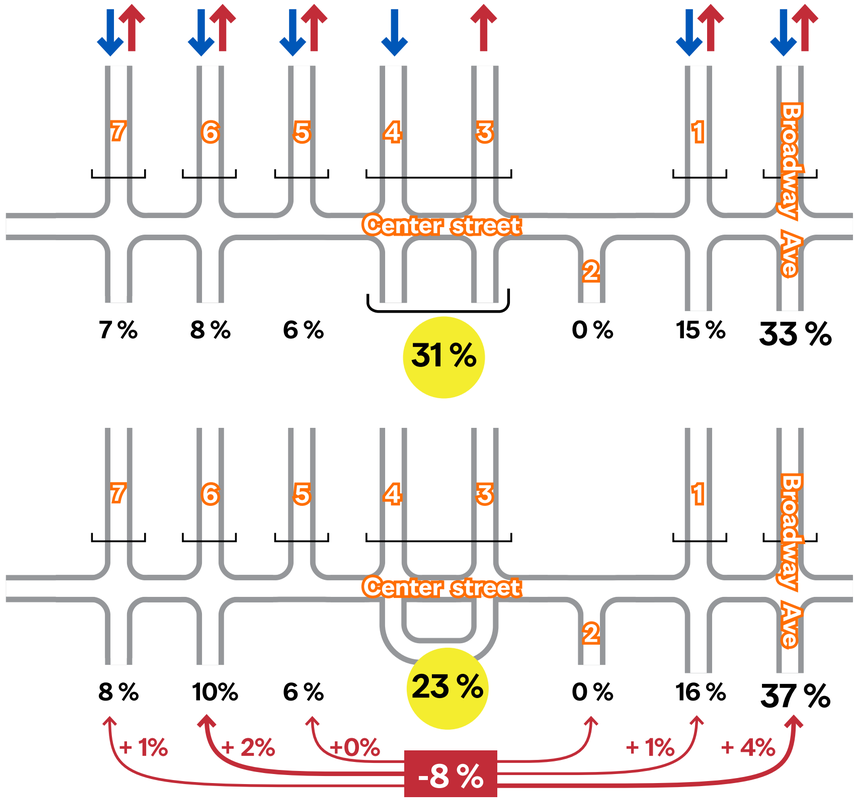
3. The level of service of all the analyzed intersections is within an acceptable range, however, we can notice some queuing on the westbound lane of Center Street. Traffic in the simulation may appear worse than it is: Traffic from the west is currently loaded on the network without any mitigation, while we expect that the signal at 1st Avenue and Center Street would help to platoon traffic and therefore reduce queuing.

This intersection has not been included in the model since we don't have reliable counts: during the traffic survey the north stretch of 1st Avenue was closed and the intersection had only 3 legs open.

6th Avenue Traffic



Signals were implemented on the two intersections of 6th Ave, with 2nd St NW and with Center St. This upgrade will allow us to cope with traffic redistribution from the two closed roads (3rd and 4th Ave), since 6th Ave will become more important.



3rd and 4th Avenues closure results impact mostly in traffic increase in the N-S direction, in particular on the 6th Avenues and Broadway Avenue, while the E-W direction is less significant.

7.4 Micro Model Methodology - Sidra

Sidra Introduction

In agreement with the City, the 5 additional intersections are not to be included in the Vissim model as they are too far from the campus. A Vissim model of the entire downtown area would not have been necessary for the purpose of the study.

The model simulation assessment was produced using the micro-modeling analytical software SIDRA as a tool. SIDRA Intersection is a software package used for evaluating the operation of road intersections and determining network capacity. Specifically, it allows you to identify the level of service (LOS) of each road that enters the analyzed nodes, and a detailed analysis of the performance and parameters that regulate the signal intersections and the timing of the network. It is a traffic assessment tool at a micro-analytical level that uses lane-by-lane or pre-established route analysis models. It can be used to compare different infrastructural choices both about individual intersections and to entire networks made up of signal intersections (fixed-time/pre-timed and actuated), roundabouts without signals, partially or fully signalized roundabouts, intersections controlled by both stop and priority on one or more legs, marked and unsigned intermediate crossings for pedestrians. Sidra Intersection allows the modeling of different vehicle classes (light vehicles, heavy vehicles, buses, bicycles, large trucks, light rail/tram) with different characteristics for each vehicle. These movements can be assigned to different lanes, lane segments, and signal phases; for example, to model public transport priority lanes and signs.

The method of performance analysis used by Sidra Intersection is strongly based on the use of the roadway, focusing in fact on the identification of exclusive lanes, the diversified use of the lane, changing lanes, on the possibility of modeling short lanes (bays lanes, upstream parking lanes), on lane blocking in shared lanes, including lanes containing reverse turns, slip lane movements (bypass), and turns in red. Intersections and networks can be modeled in detail using this method and signal timings can be determined accordingly with advantages over lane group and approach-based methods. Sidra Intersection provides a large number of assessments for each intersection and as many indications for network performance. It allows you to view the results using a series of alternative service level methods (LOS): HCM 2010 speed efficiency, HCM 6 speed efficiency, and some methods patented by SIDRA itself such as SIDRA speed efficiency. In the case of the present study HCM 2010 method is applied. Standard performance measures such as delay, queue length, and number of stops are provided, as well as measures used to assess environmental impacts and economic analyzes.



Sidra Introduction

As part of the development of the calibrated base intersection models, video surveys were undertaken in 2022 and 2023 for the estimation of traffic demand. The video footage was also used to assist in deriving the queue length used for the intersection model validation.
The intersections analyzed are:

- W Center Street - N Broadway Avenue, surveyed in June 2022,
- Civic Center Drive NW - 4th Avenue NW, surveyed in April 2023,
- Civic Center Drive NW - 6th Avenue NW, surveyed in April 2023,
- 2nd Street NW - 6th Avenue NW, surveyed in April 2023,
- W Center Street -6th Avenue, surveyed in April 2023.

The evaluation periods for the footage and model peak periods are defined as follows:

- Morning peak: 07:00 - 08:00
- Evening peak: 16:30 - 17:30.

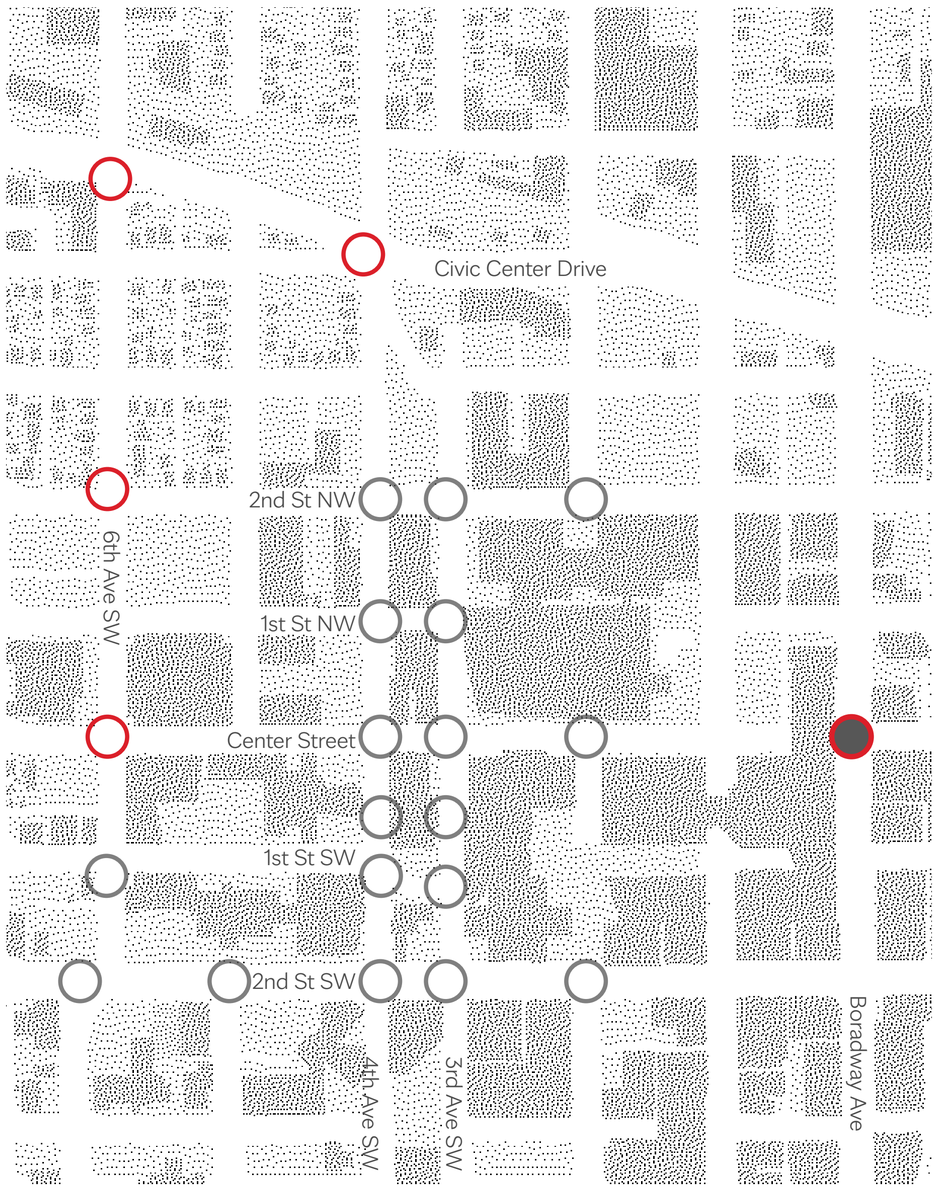
Traffic counts have been classified and input into the model as two main categories: light and heavy vehicles.

Validation is the process of comparing model outputs against measured data: in this case, the base model has been validated against the surveyed queue lengths estimated from the available survey footage.

The SIDRA outputs reported in the next pages included Degree of Saturation (DoS) and Level of Service (LOS). These items are defined as follows:

- Degree of Saturation: the ratio of the arrival traffic flow to the capacity of the approach during the same period. A DoS value greater than 1 indicates a clear oversaturated condition where the demand is greater than the actual capacity and critical conditions might be experienced;
- Level of Service: depends on the average of all travel time delays for vehicles through the intersection and is represented by six classes, designated from A to F as described in previous chapters. The LoS are presented in the next pages for each leg and for the overall intersection.

Intersection Location | W Center Street - Broadway Ave



TESTED SCENARIOS	COMPLIANCE WITH CITY ENGINEERING STANDARDS
EXISTING SCENARIO	YES
PROJECT SCENARIO	YES

Analysed Intersection

Intersections modeled in Sidra

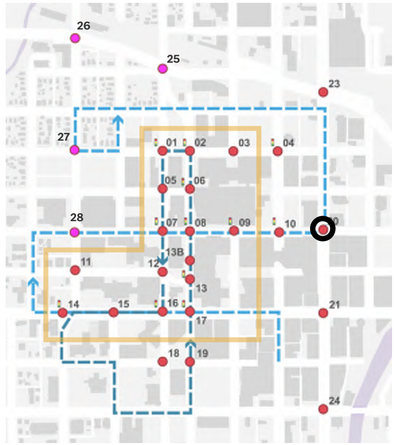
Intersections modeled in Vissim

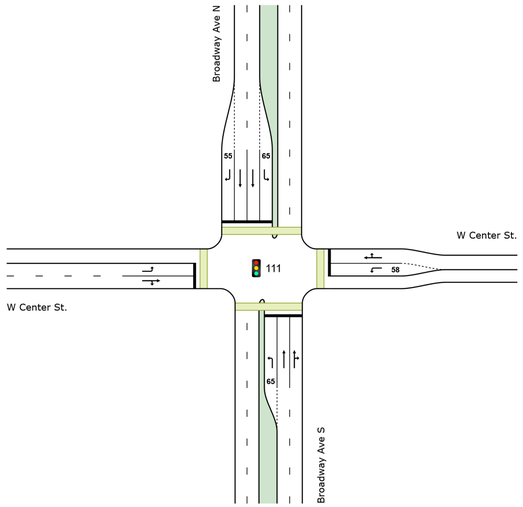
W Center Street - Broadway Ave | Existing Condition

The signalized intersection is currently characterized by an average delay of 19 seconds in the AM peak (LoS B) and 25 in the PM (LoS C).

Broadway Avenue, in both peaks, shows a level of service B with a degree of saturation lower than 25%.

All legs are showing an undersaturated condition.

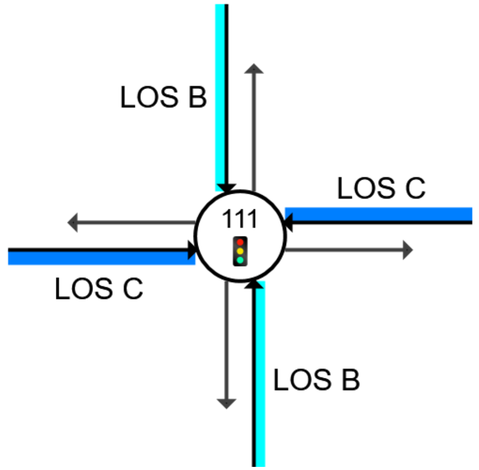




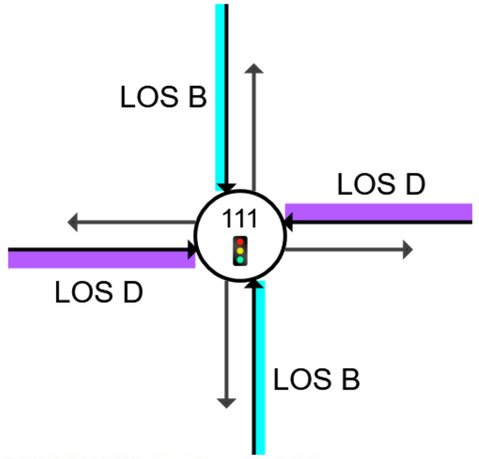
LOS and Saturation Degree is shown within the maximum range

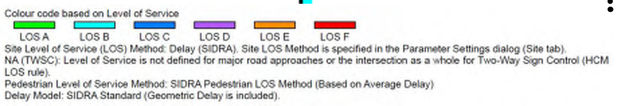


LOS - AM

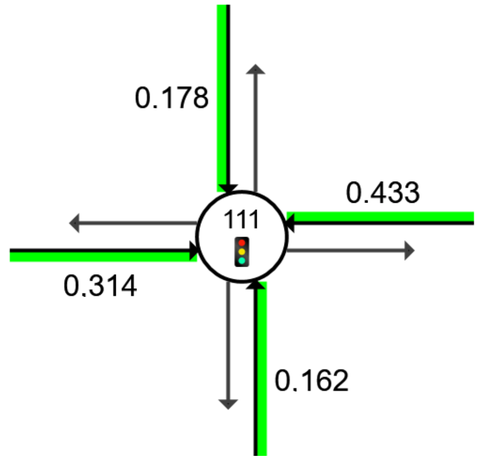


LOS - PM

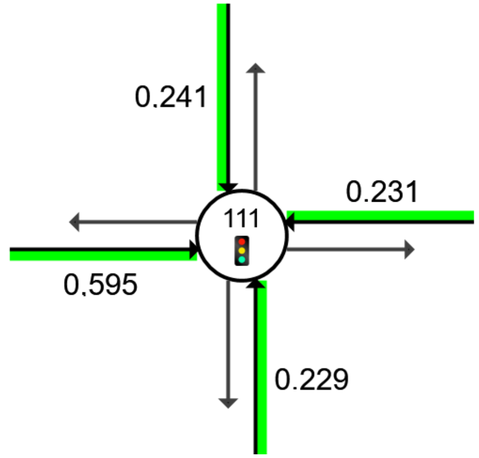




Degree of Saturation - AM



Degree of Saturation - PM



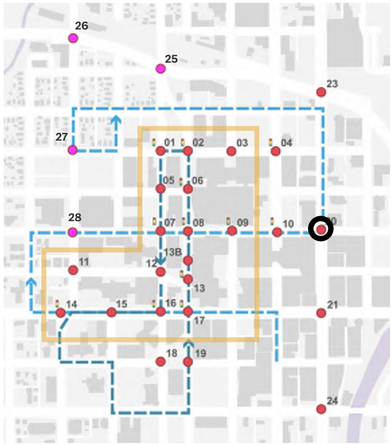


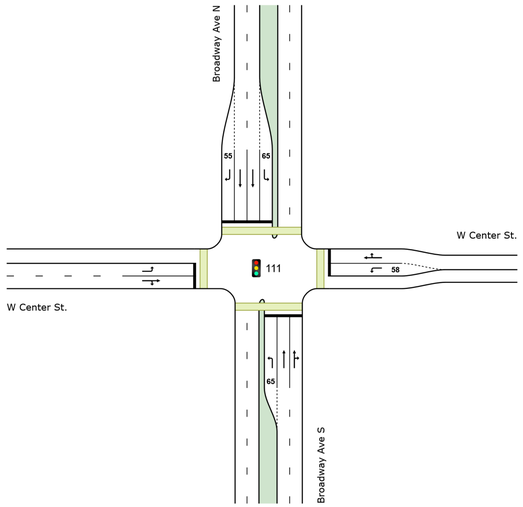
W Center Street - Broadway Ave | Project Scenario

At the intersection, following the implementation of the project, a review of signal timings was undertaken to cope with changes in traffic.

The model suggests, for the project scenario, an average intersection delay of 17 seconds in the AM and 22 seconds in the PM.

LoS remains in the project scenario as in the existing condition, B in the morning and C in the evening peak.





LOS and Saturation Degree is shown within the maximum range

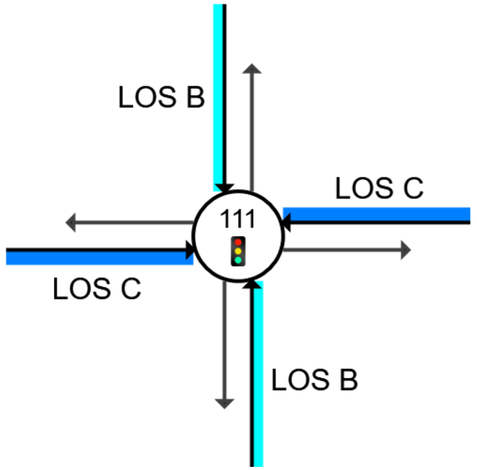
AM



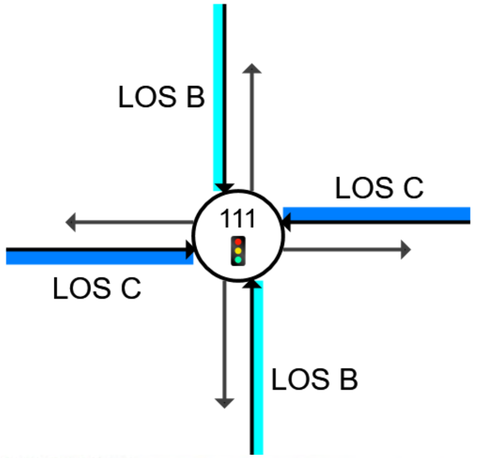
PM



LOS - AM



LOS - PM

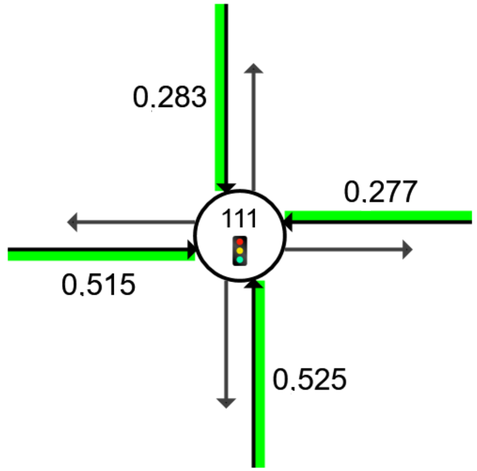


Colour code based on Level of Service

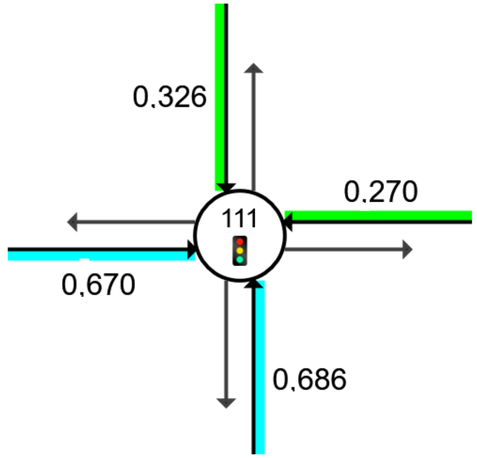
LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Pedestrian Level of Service Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Delay Model: SIDRA Standard (Geometric Delay is included).

Degree of Saturation - AM



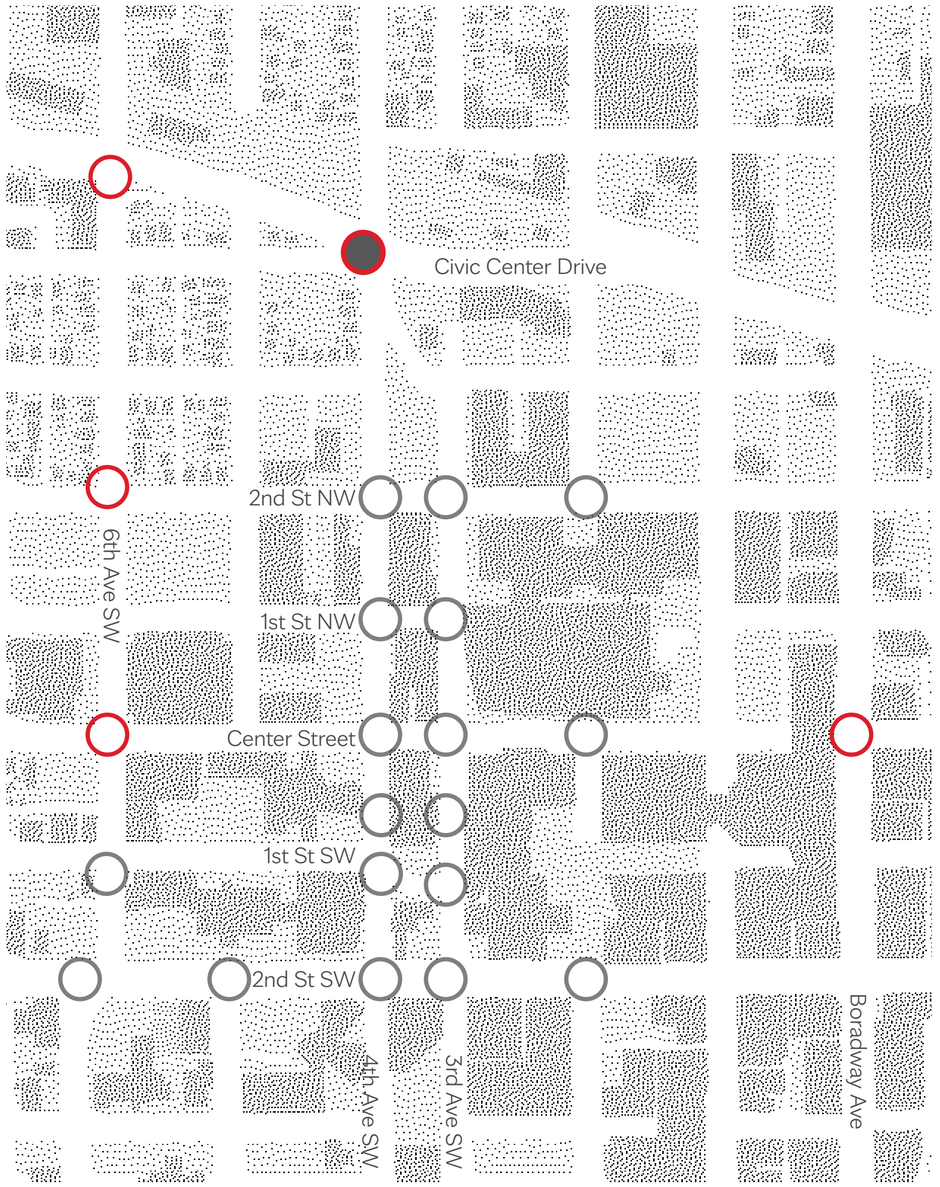
Degree of Saturation - PM



Colour code based on Degree of Saturation

[< 0.6] | [0.6 – 0.7] | [0.7 – 0.8] | [0.8 – 0.9] | [0.9 – 1.0] | [> 1.0]

Intersection Location | Civic Center Dr NW - 4th Ave NW



TESTED SCENARIOS	COMPLIANCE WITH CITY ENGINEERING STANDARDS
EXISTING SCENARIO	YES
PROJECT SCENARIO	YES

Analysed Intersection

Intersections modeled in Sidra

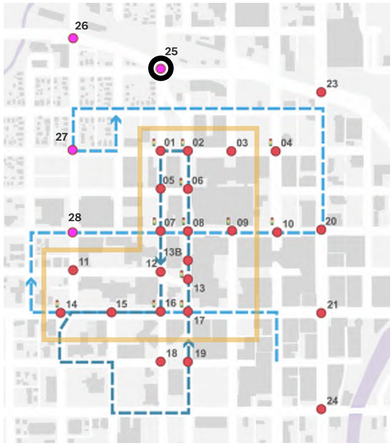
Intersections modeled in Vissim

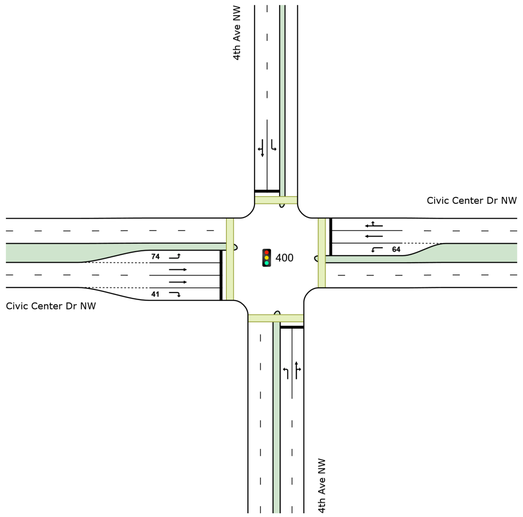
Civic Center Dr NW - 4th Ave NW | Existing Condition

The signalized intersection is currently characterized by an average delay of 18 seconds in the AM peak (LoS B) and 32 in the PM (LoS C).

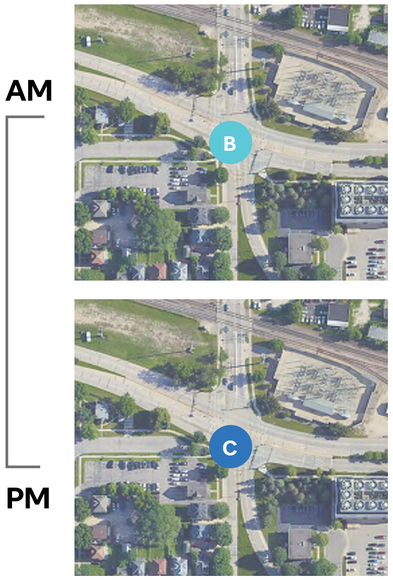
In the PM peak, the south leg of 4th Avenue NW is showing a Saturation of 64 %. All the other legs, in both peaks are lower than 50%.

Overall, all legs are showing an undersaturated condition.

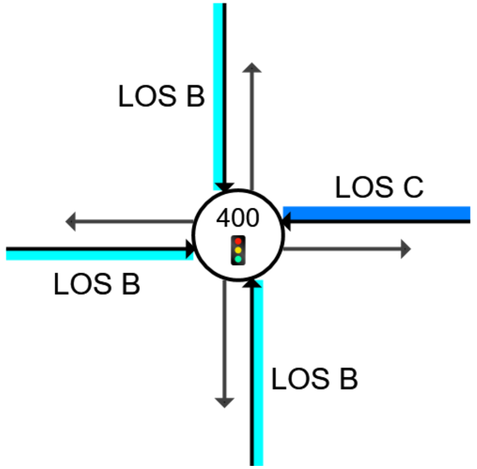




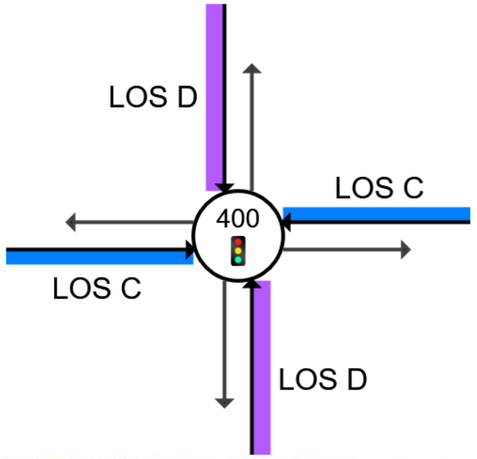
LOS and Saturation Degree is shown within the maximum range

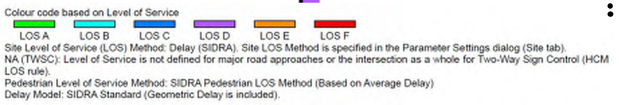


LOS - AM

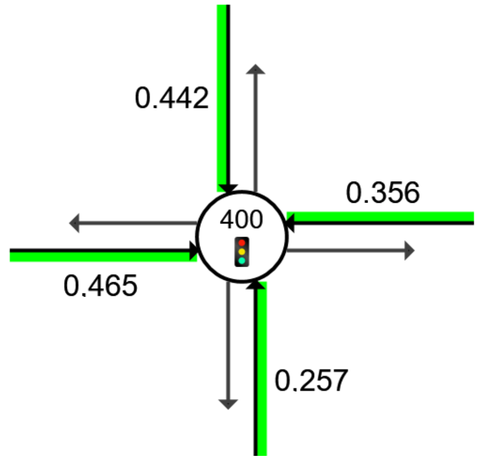


LOS - PM

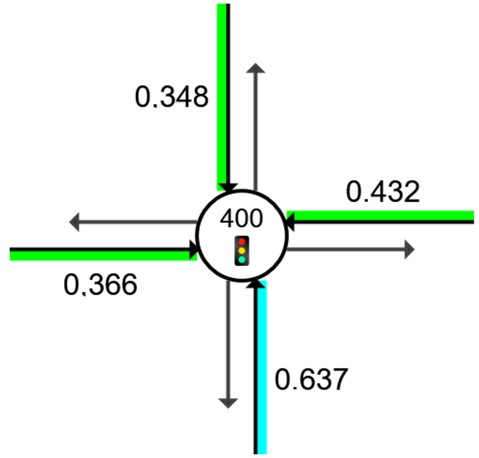




Degree of Saturation - AM



Degree of Saturation - PM



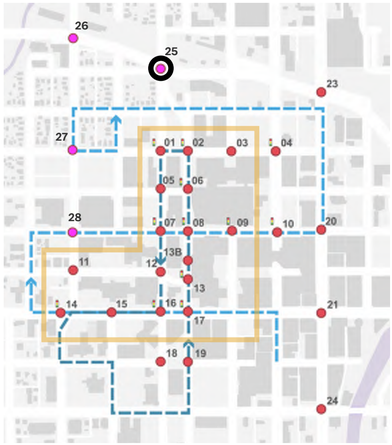


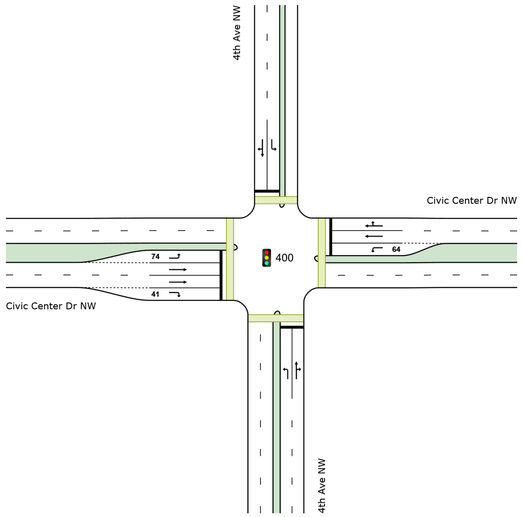
Civic Center Dr NW - 4th Ave NW | Project Scenario

At the intersection, following the implementation of the project, a review of signal timings was undertaken to cope with changes in traffic.

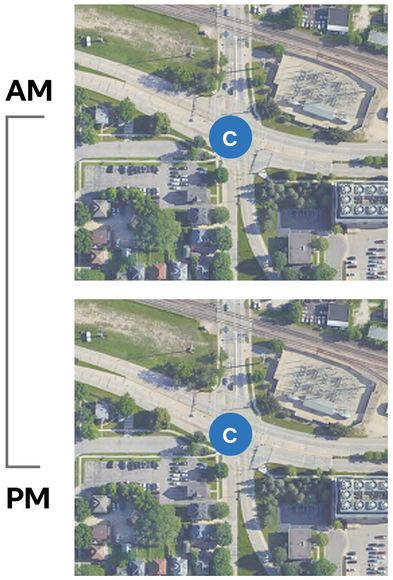
The model suggests, for the project scenario, an average intersection delay of 34s in the AM and 30s in the PM.

LoS, in the project scenario, changes to C for both peaks.

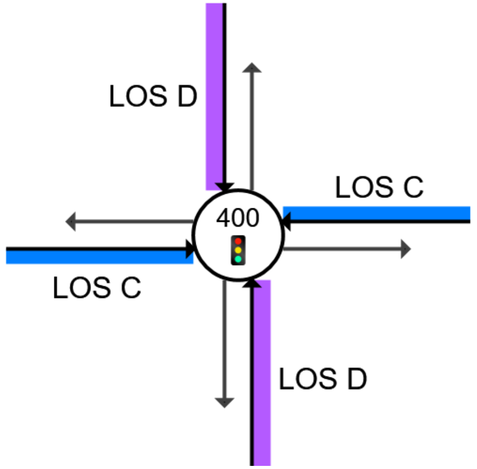




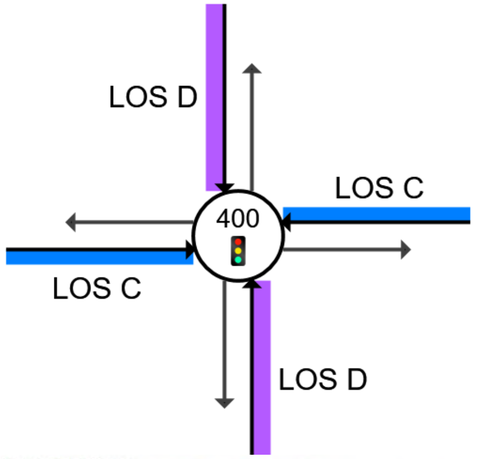
LOS and Saturation Degree is shown within the maximum range



LOS - AM



LOS - PM

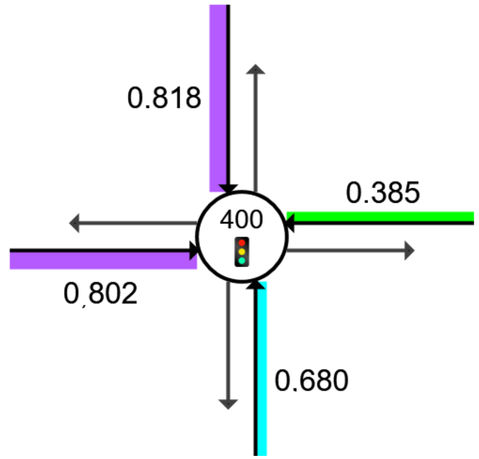


Colour code based on Level of Service

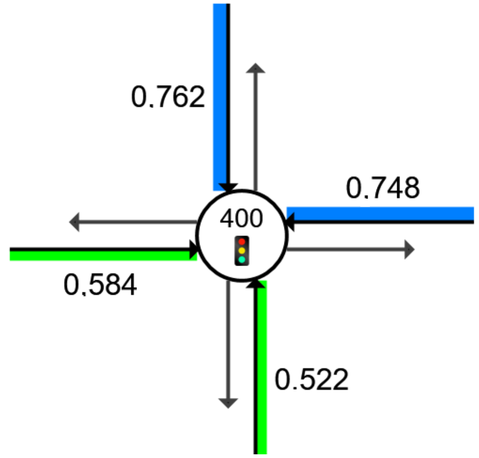
LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Pedestrian Level of Service Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Delay Model: SIDRA Standard (Geometric Delay is included).

Degree of Saturation - AM



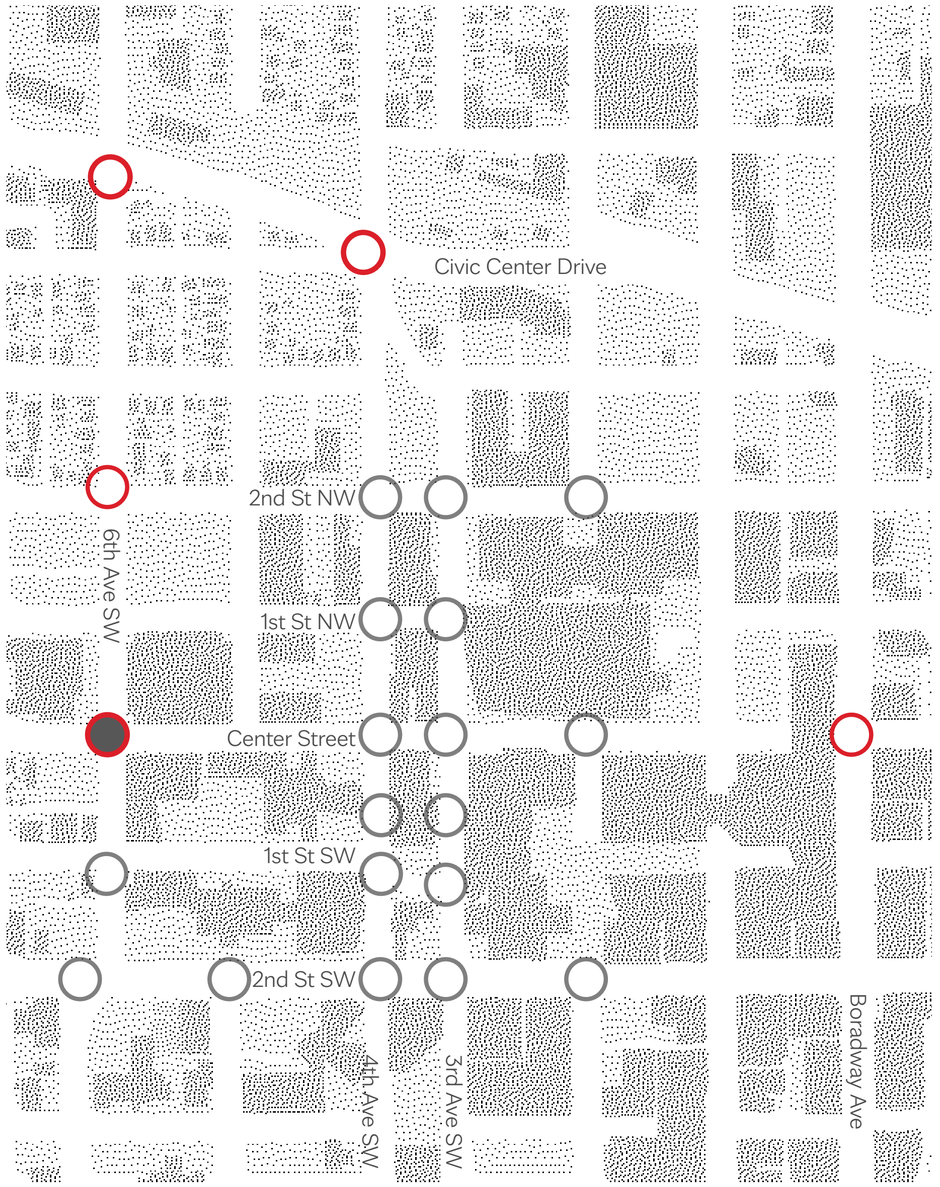
Degree of Saturation - PM



Colour code based on Degree of Saturation

[< 0.6] | [0.6 – 0.7] | [0.7 – 0.8] | [0.8 – 0.9] | [0.9 – 1.0] | [> 1.0]

Intersection Location | W Center St - 6th Ave



TESTED SCENARIOS	COMPLIANCE WITH CITY ENGINEERING STANDARDS
EXISTING SCENARIO	YES
REFERENCE SCENARIO	YES
PROJECT SCENARIO (UNIMITIGATED)	NO
PROJECT SCENARIO (MITIGATED	YES

Analysed Intersection

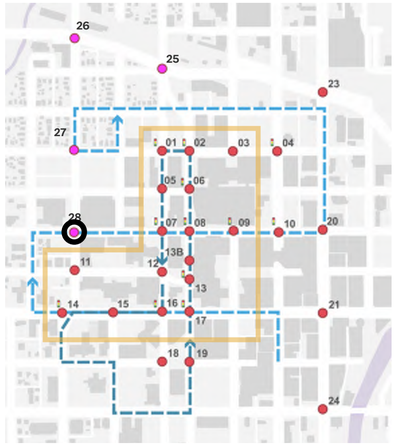
Intersections modeled in Sidra

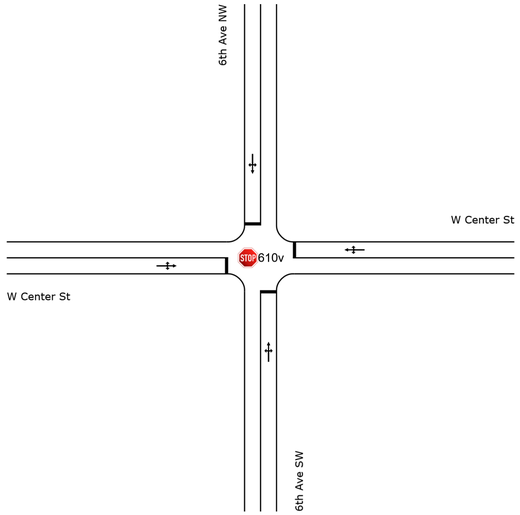
Intersections modeled in Vissim

W Center St - 6th Ave | Existing Condition

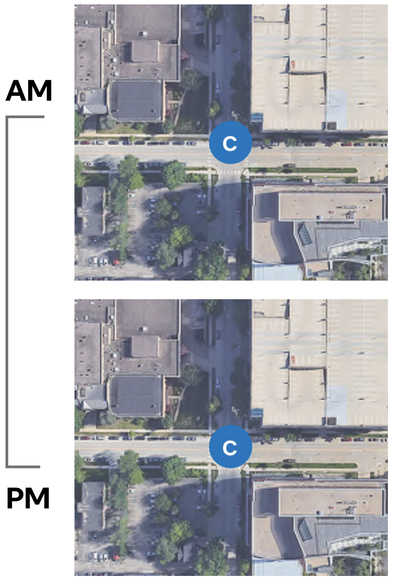
This intersection is currently all-way stop controlled with one lane per direction in all legs.

The intersection is currently characterized by an average delay of 21 seconds in the AM peak (LoS C) and 19 in the PM (LoS C).

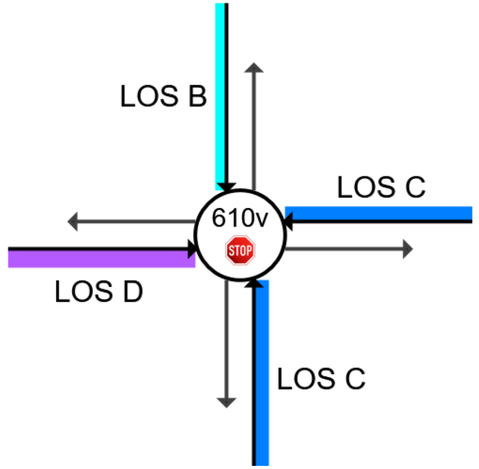




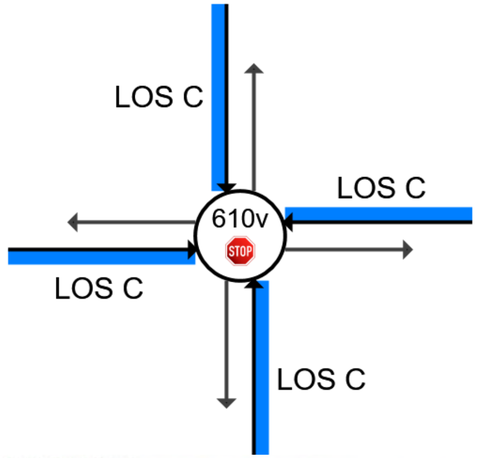
LOS and Saturation Degree is shown within the maximum range



LOS - AM



LOS - PM

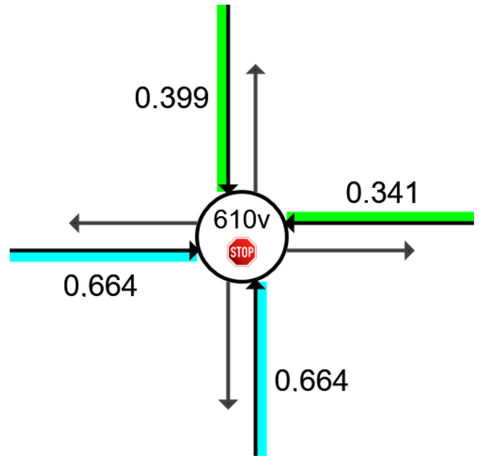


Colour code based on Level of Service

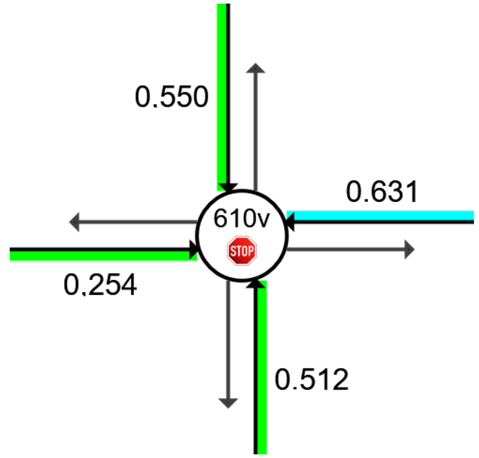
LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Pedestrian Level of Service Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Delay Model: SIDRA Standard (Geometric Delay is included).

Degree of Saturation - AM



Degree of Saturation - PM

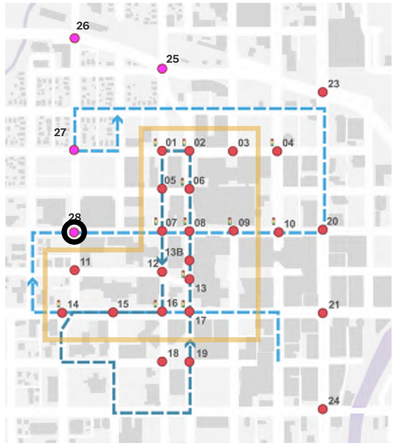


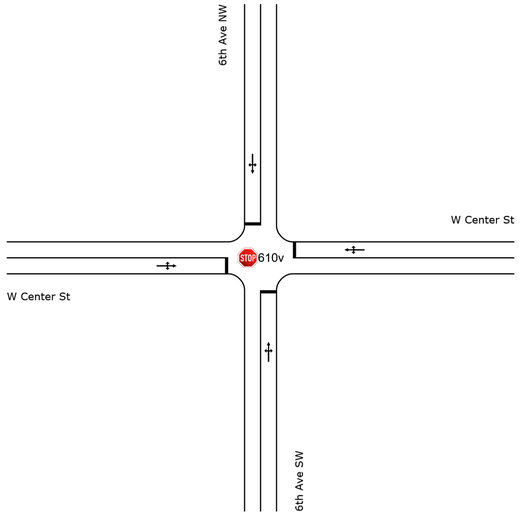
Colour code based on Degree of Saturation

[< 0.6] | [0.6 – 0.7] | [0.7 – 0.8] | [0.8 – 0.9] | [0.9 – 1.0] | [> 1.0]

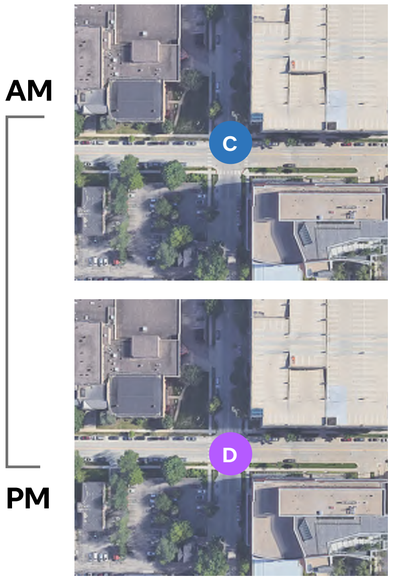
W Center St - 6th Ave | Reference Scenario

In the reference scenario, despite the traffic growth, the intersection keeps working well in its original configuration and does not require any upgrade.

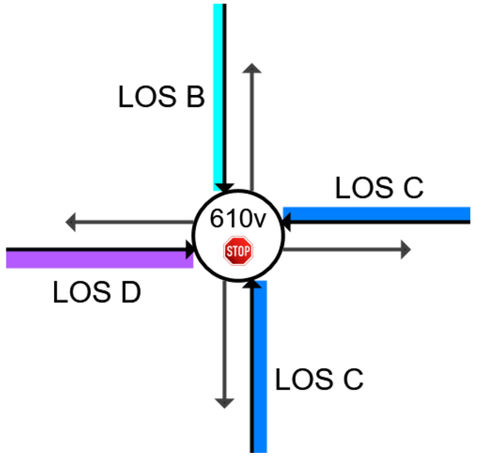




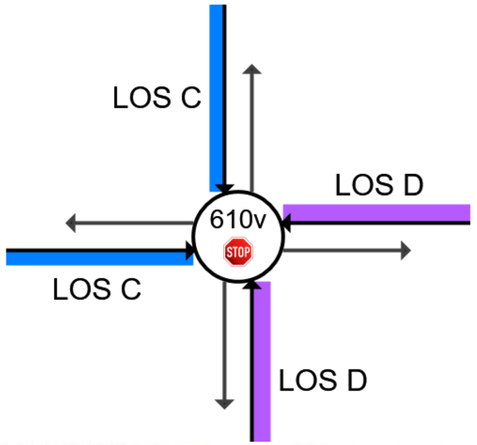
LOS and Saturation Degree is shown within the maximum range

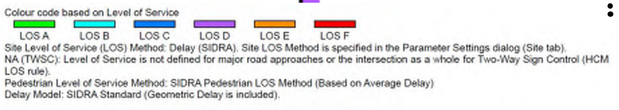


LOS - AM

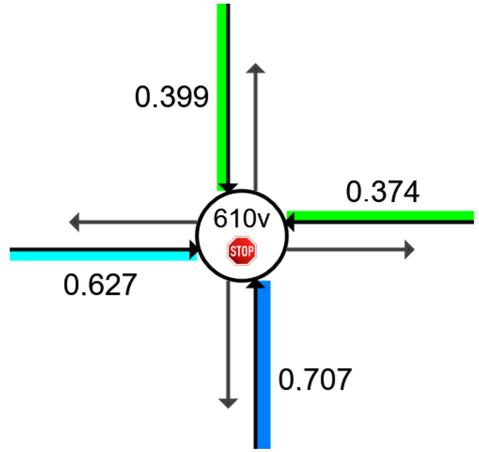


LOS - PM

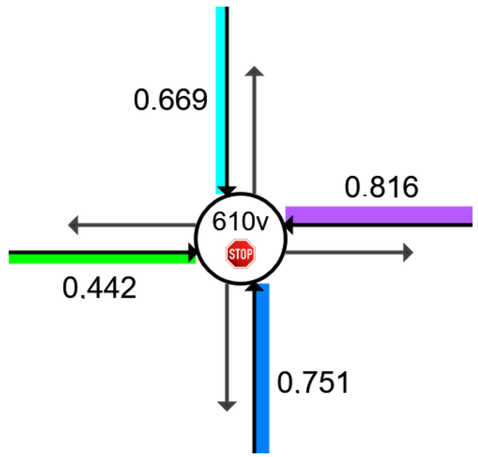




Degree of Saturation - AM



Degree of Saturation - PM

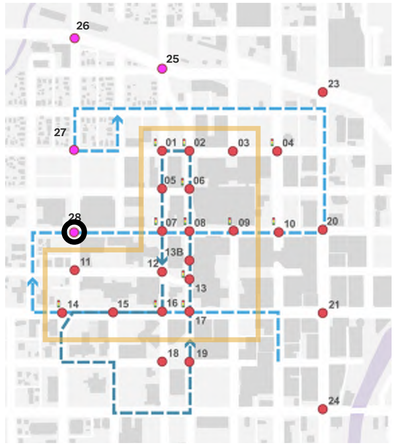


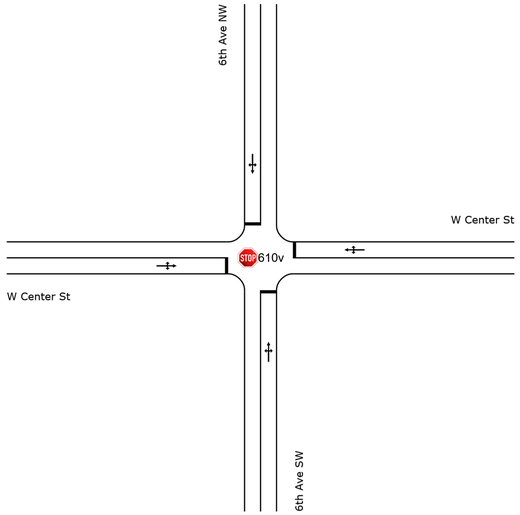


W Center St - 6th Ave | Project Scenario - Unmitigated

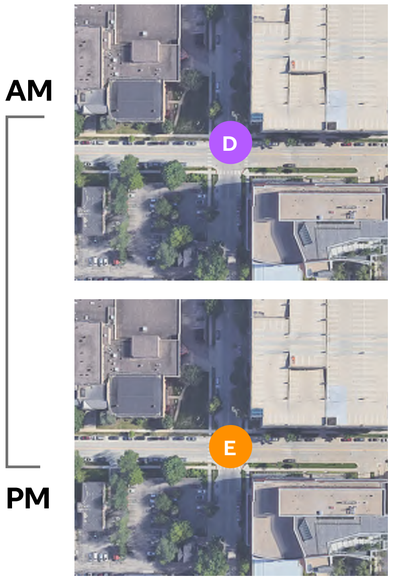
The closure fo the Avenues will have an impact on Center strret and this is visible in the results of the unmitigated project scenario.

The intersection reaches high level of saturation and significant delay.

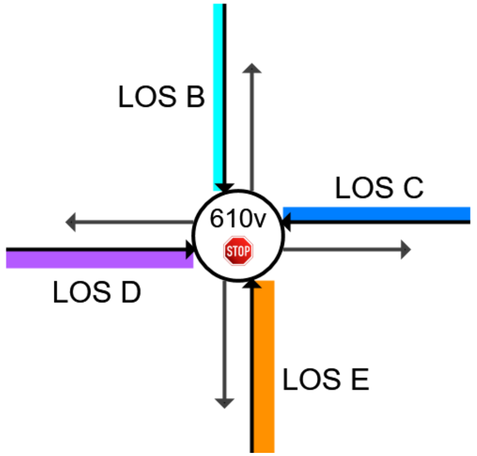




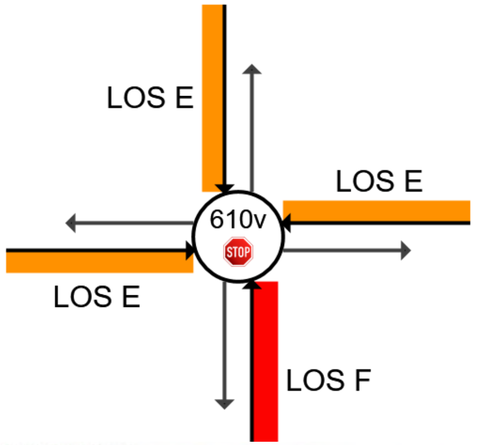
LOS and Saturation Degree is shown within the maximum range

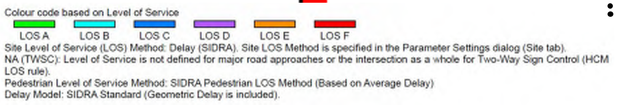


LOS - AM

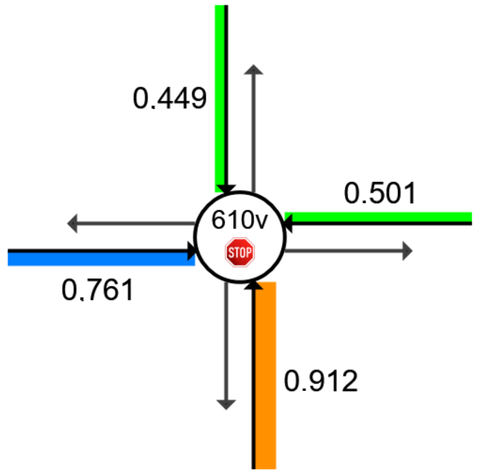


LOS - PM

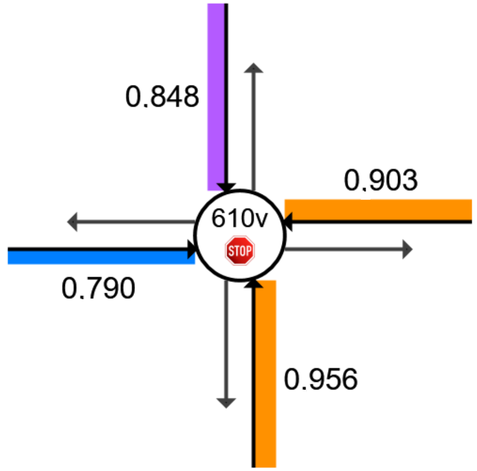




Degree of Saturation - AM



Degree of Saturation - PM

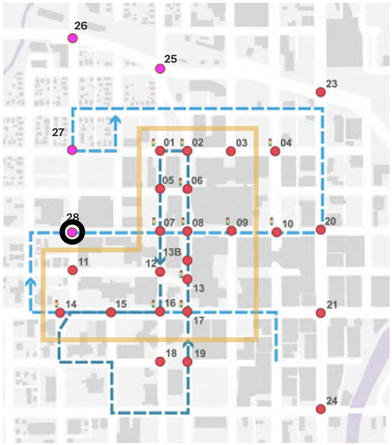


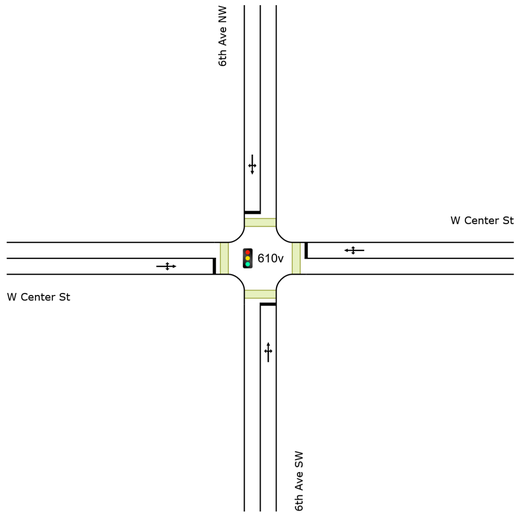


W Center St - 6th Ave | Project Scenario - Mitigated

To cope with the traffic flows change explained in the previous pgae, the mitigation measure proposed is the addition of a new signal.

In previous simulations, also a dedicated turning lane on Center street was proposed, but further refinements of the simulation showed that the signal is sufficient without revising the right of way..

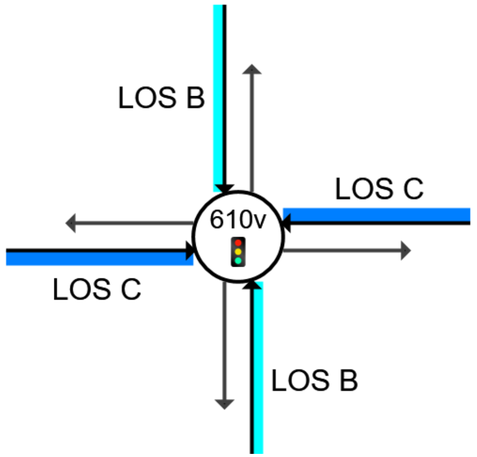




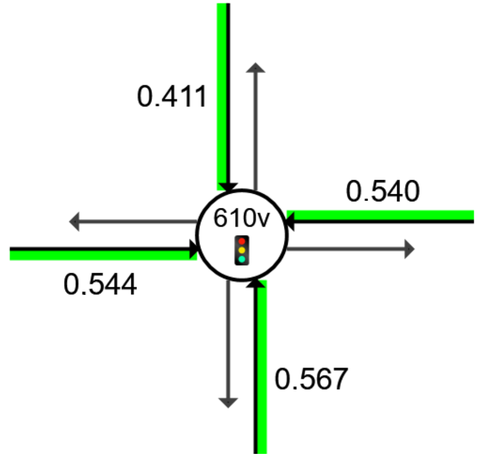
LOS and Saturation Degree is shown within the maximum range



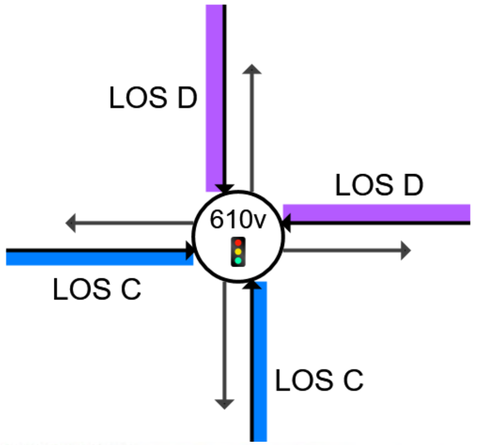
LOS - AM

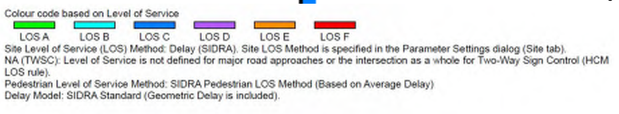


Degree of Saturation - AM

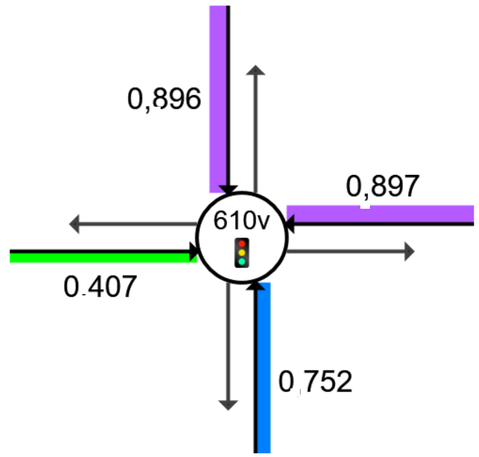


LOS - PM



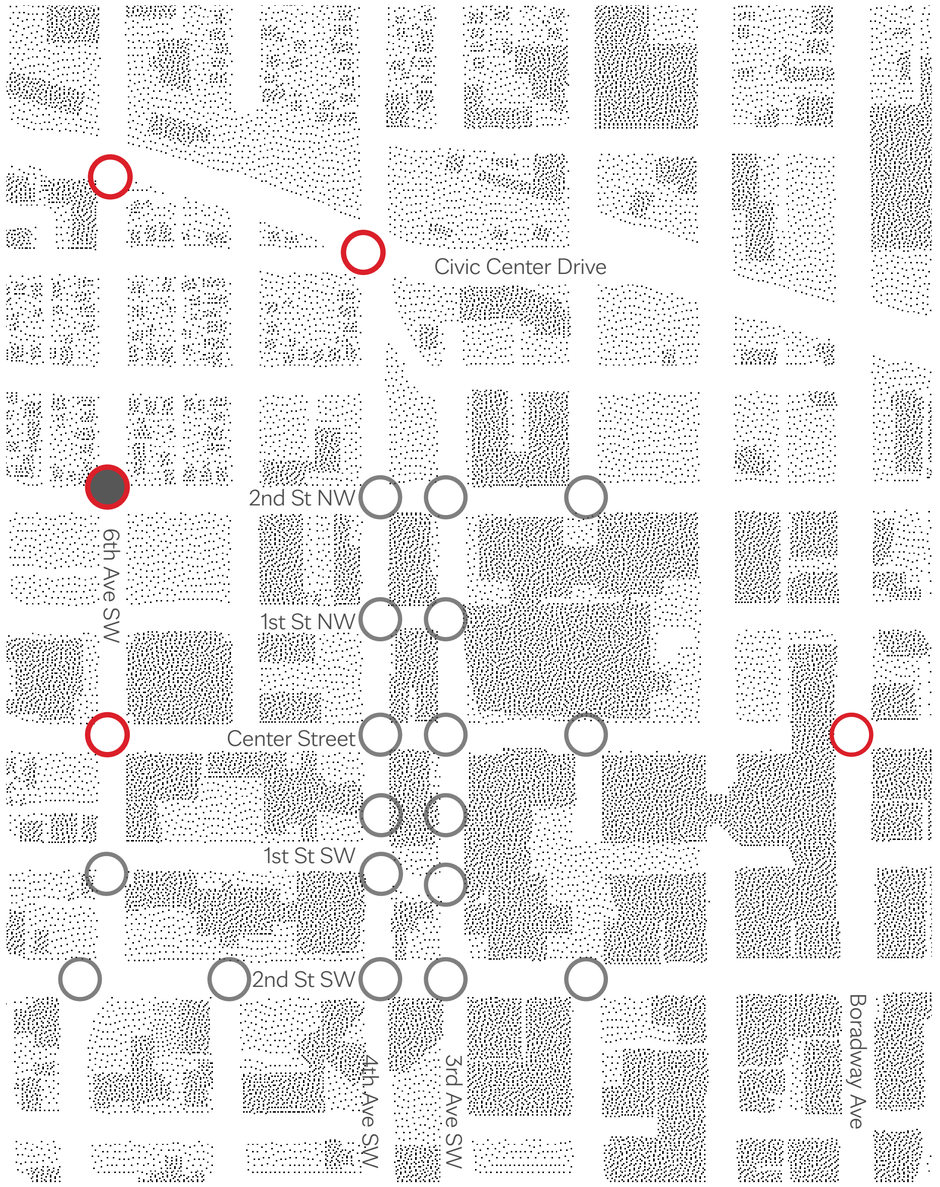


Degree of Saturation - PM





Intersection Location | 2nd St NW - 6th Ave NW



TESTED SCENARIOS	COMPLIANCE WITH CITY ENGINEERING STANDARDS
EXISTING SCENARIO	YES
REFERENCE SCENARIO	NO
PROJECT SCENARIO (UNIMITIGATED)	NO
PROJECT SCENARIO (MITIGATED	YES

Analysed Intersection

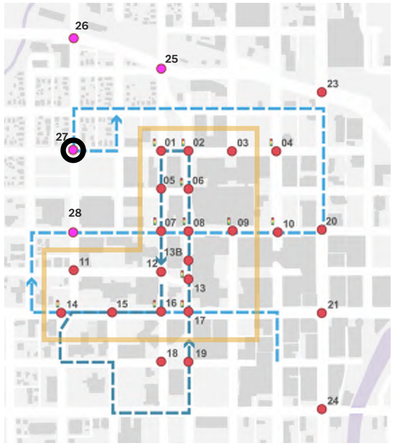
Intersections modeled in Sidra

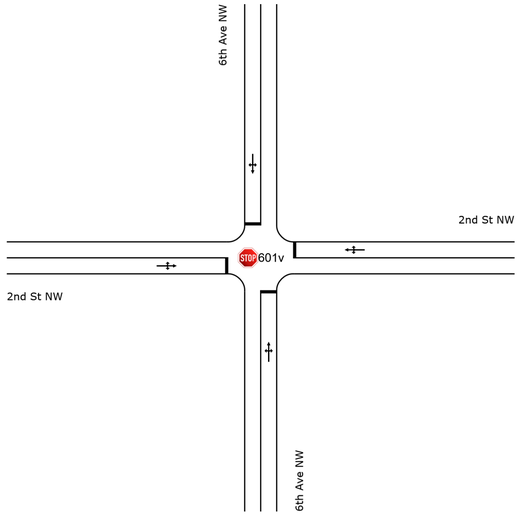
Intersections modeled in Vissim

2nd St NW - 6th Ave NW | Existing Condition

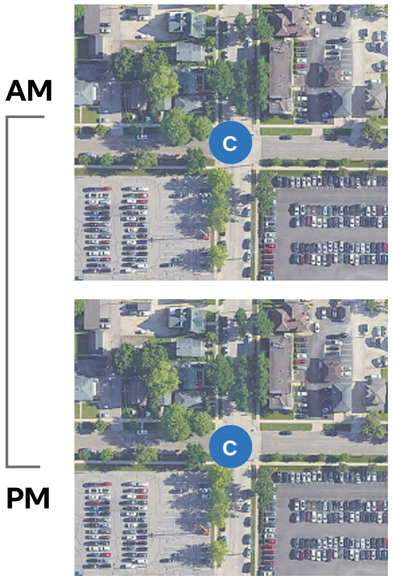
This intersection is currently all-way stop controlled with one lane per direction in all legs.

The intersection is currently characterized by an average delay of 22 seconds in the AM peak (LoS C) and 18 in the PM (LoS C).

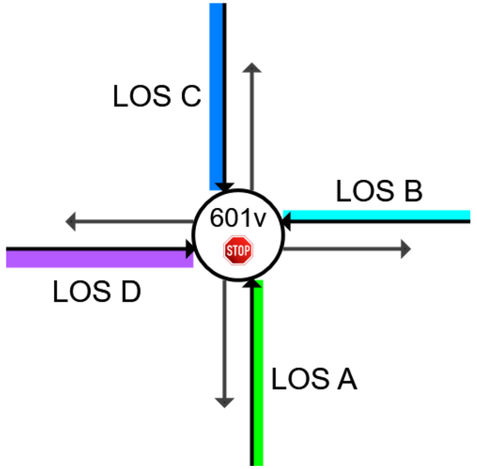




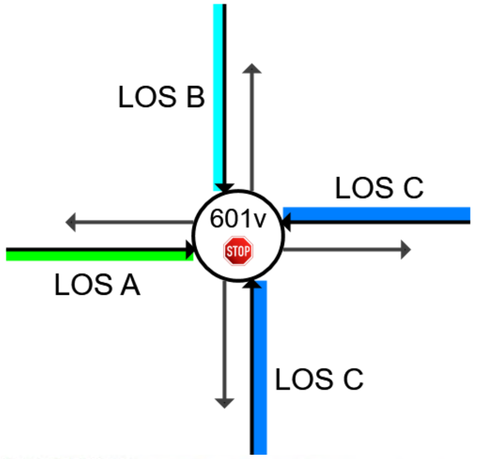
LOS and Saturation Degree is shown within the maximum range



LOS - AM



LOS - PM

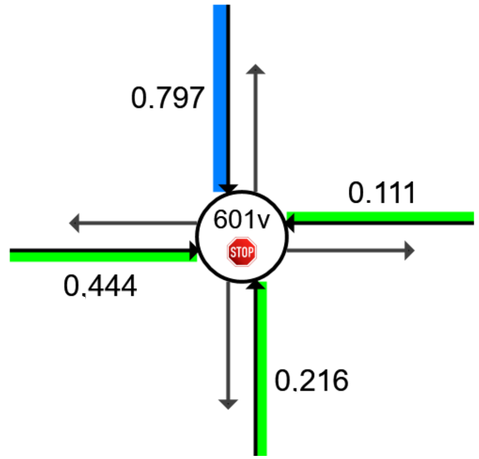


Colour code based on Level of Service

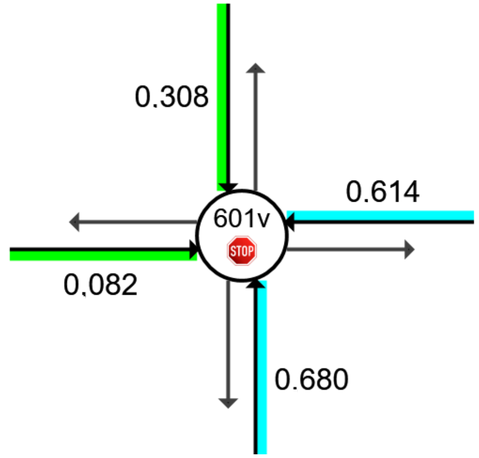
LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Pedestrian Level of Service Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Delay Model: SIDRA Standard (Geometric Delay is included).

Degree of Saturation - AM



Degree of Saturation - PM

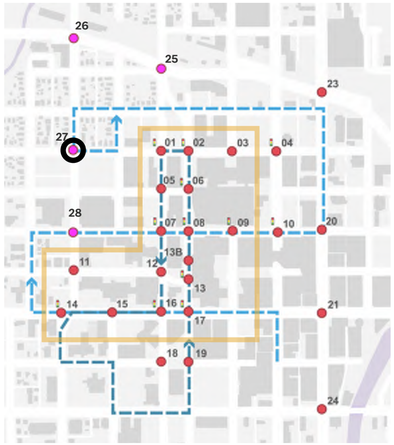


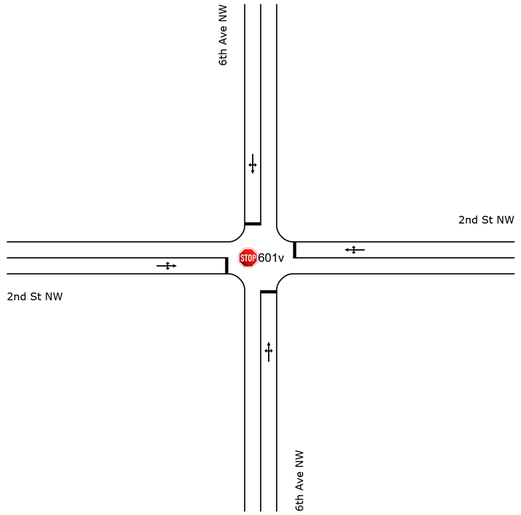
Colour code based on Degree of Saturation

[< 0.6] | [0.6 – 0.7] | [0.7 – 0.8] | [0.8 – 0.9] | [0.9 – 1.0] | [> 1.0]

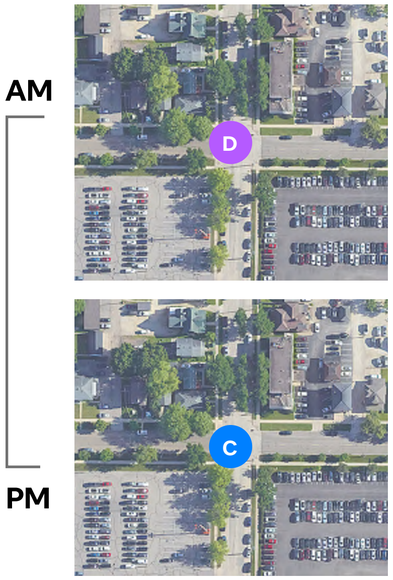
2nd St NW - 6th Ave NW | Reference Scenario (no-build)

In the reference it's visible that the traffic growth leads to higher delays. Specifically the north leg exceeds the traffic engineering standards in terms of saturation.

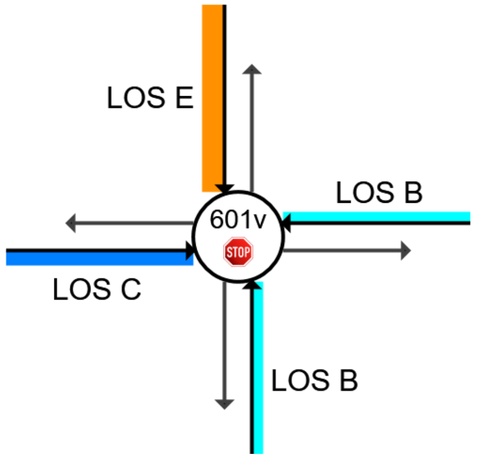




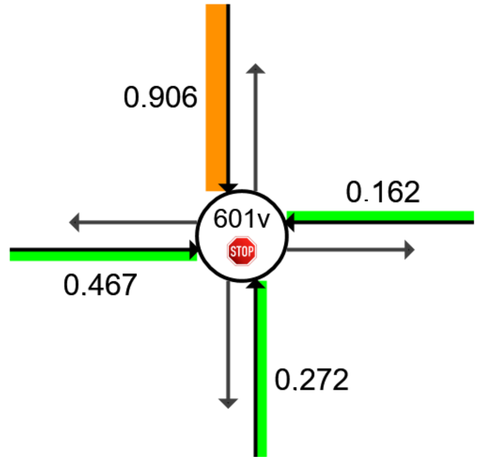
LOS and Saturation Degree is shown within the maximum range



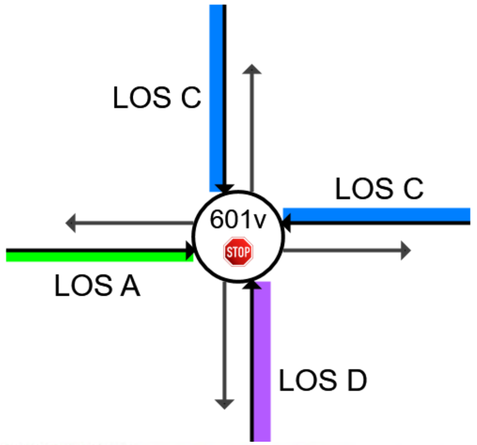
LOS - AM

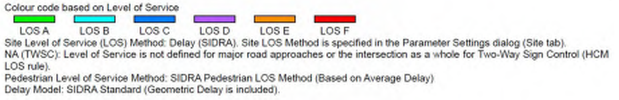


Degree of Saturation - AM



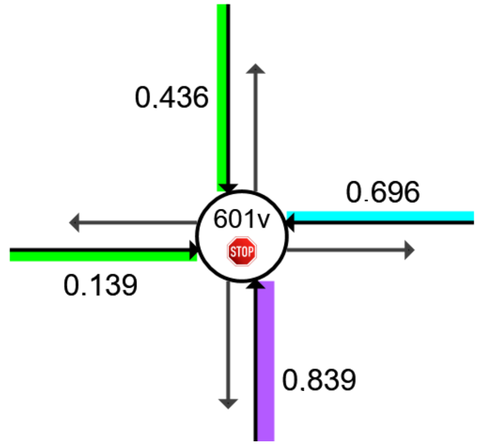
LOS - PM

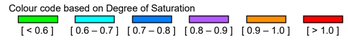




Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Pedestrian Level of Service Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Delay Model: SIDRA Standard (Geometric Delay is included).

Degree of Saturation - PM

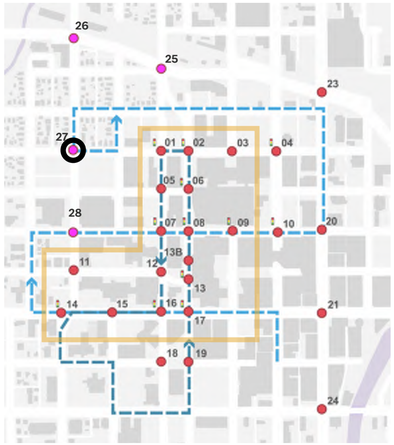


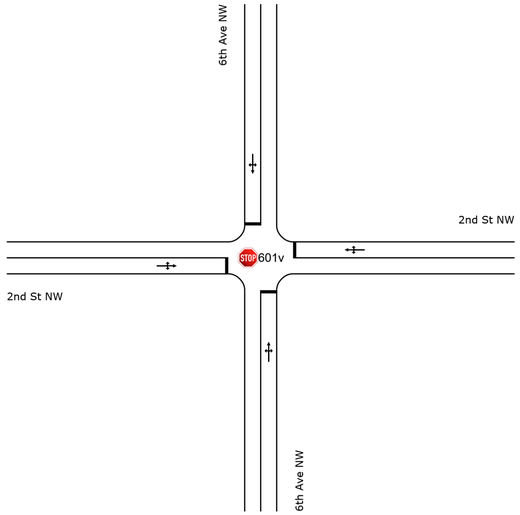


2nd St NW - 6th Ave NW | Project Scenario - Unmitigated

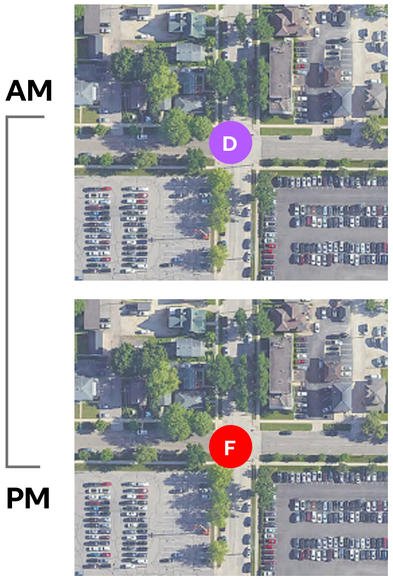
In the unmitigated project scenario, the delays (LOS F) on Center Street exceed the acceptable ranges of the engineering standards both in the AM and PM.

In the next slide we present the possible mitigation measure to cope with this traffic growth.

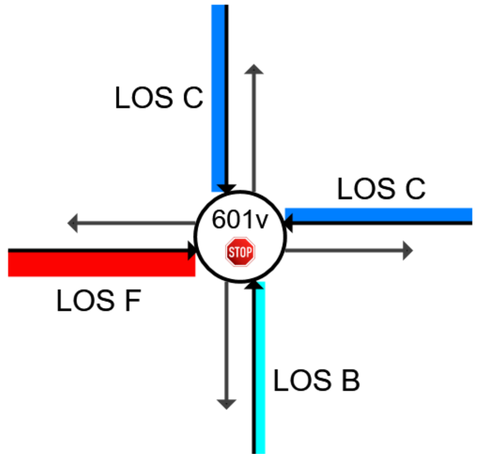




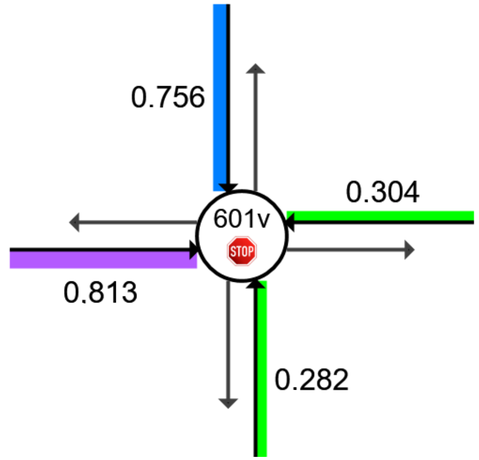
LOS and Saturation Degree is shown within the maximum range



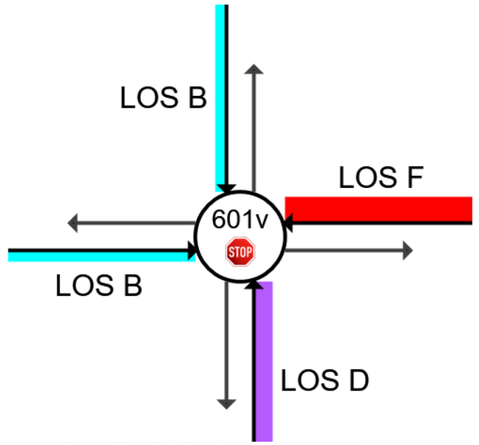
LOS - AM

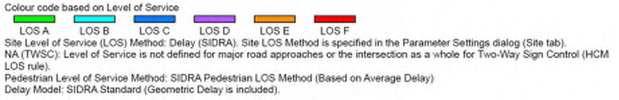


Degree of Saturation - AM

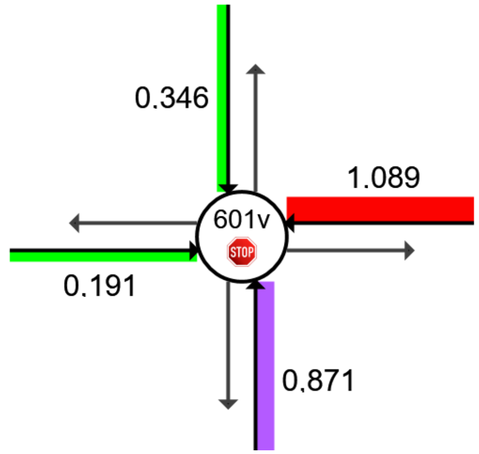


LOS - PM





Degree of Saturation - PM



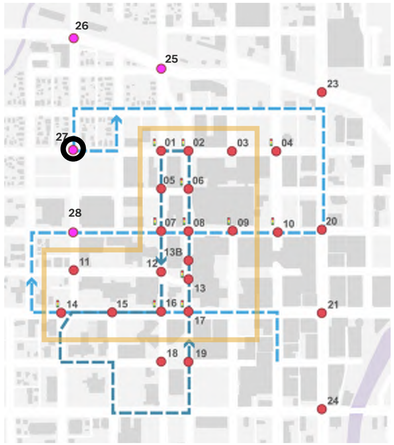


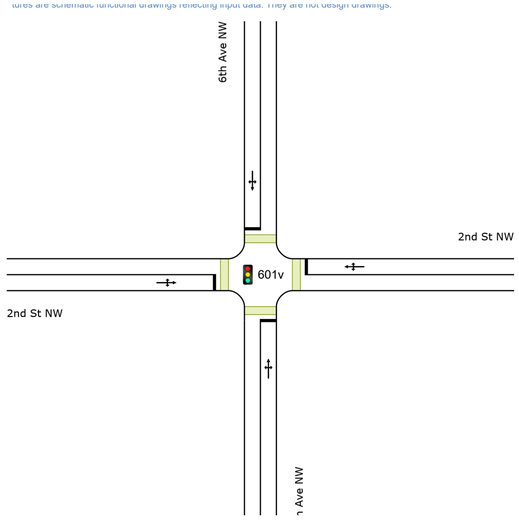
2nd St NW - 6th Ave NW | Project Scenario - Mitigated

At this intersection, currently all-way stop controlled, the implementation of a new signal is proposed in the project scenario.

The model suggests, for the project scenario, an average intersection delay of 12s in the AM and 21s in the PM.







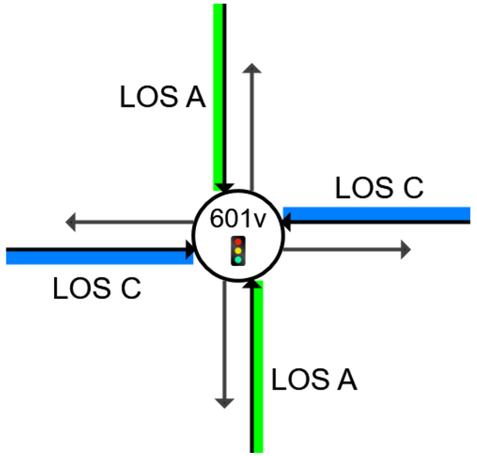
LOS and Saturation Degree is shown within the maximum range

AM

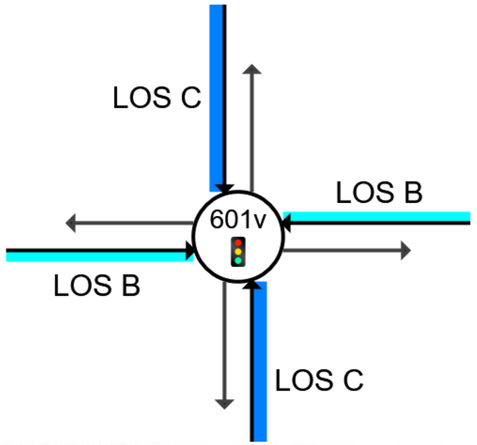
PM



LOS - AM



LOS - PM

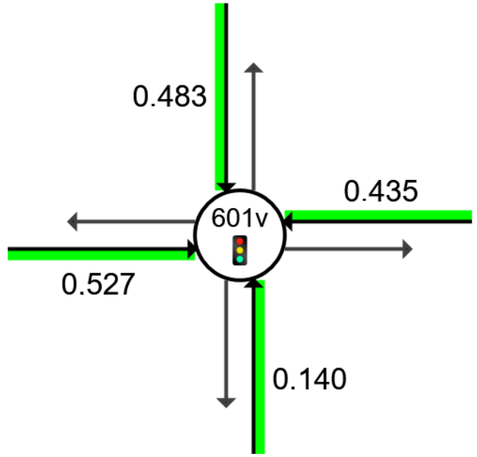


Colour code based on Level of Service

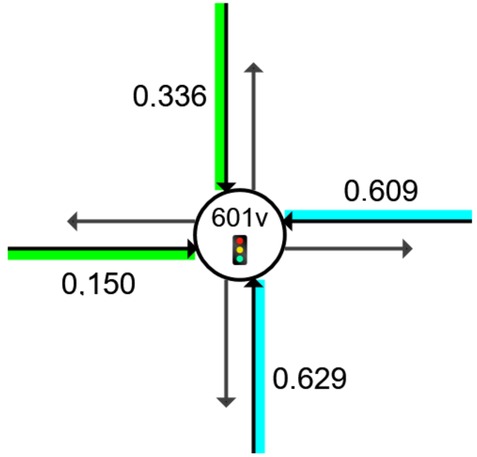
LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
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Delay Model: SIDRA Standard (Geometric Delay is included).

Degree of Saturation - AM



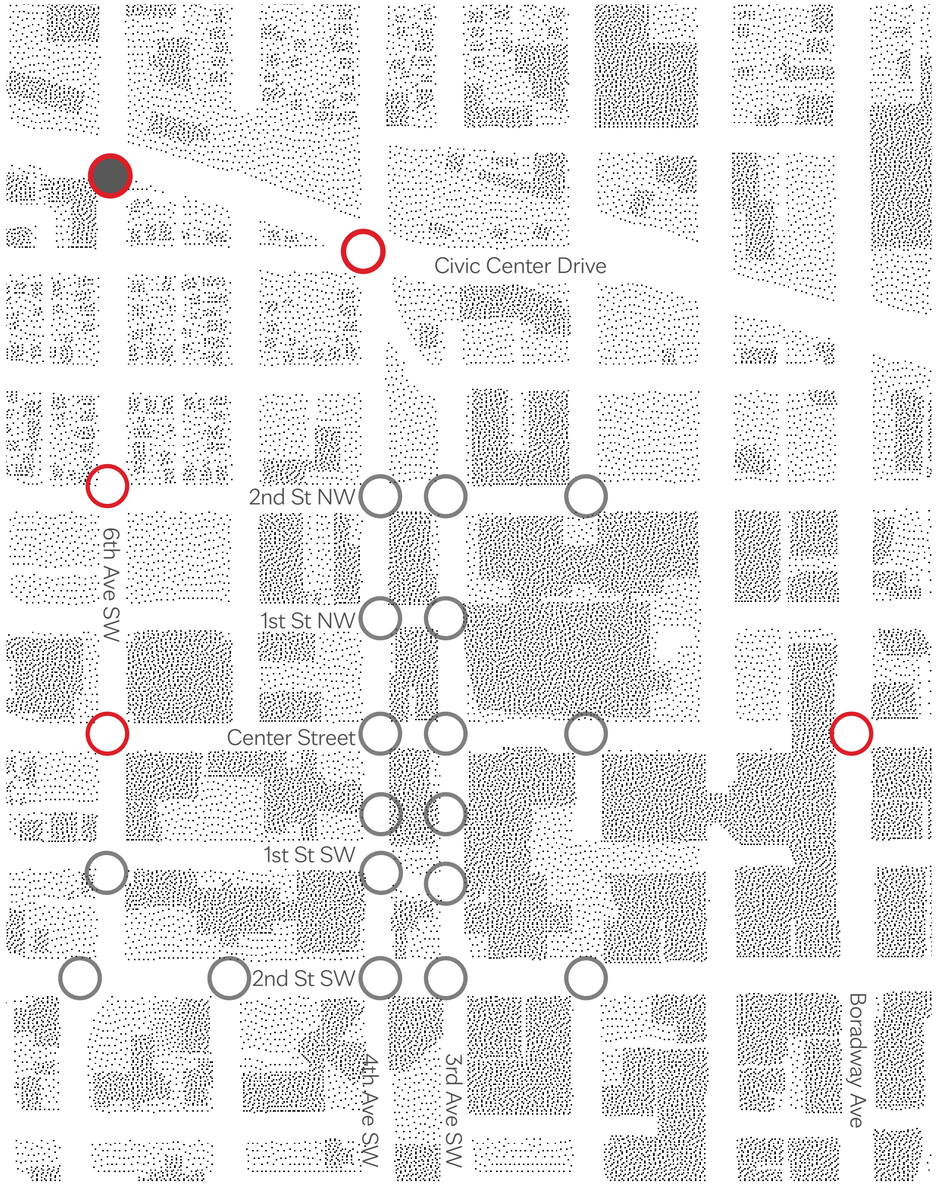
Degree of Saturation - PM



Colour code based on Degree of Saturation

[< 0.6] | [0.6 – 0.7] | [0.7 – 0.8] | [0.8 – 0.9] | [0.9 – 1.0] | [> 1.0]

Intersection Location | Civic Center Dr NW - 6th Ave NW



TESTED SCENARIOS	COMPLIANCE WITH CITY ENGINEERING STANDARDS
EXISTING SCENARIO	NO
REFERENCE SCENARIO	NO
PROJECT SCENARIO (UNIMITIGATED)	NO
PROJECT SCENARIO (MITIGATED	YES

Analysed Intersection

Intersections modeled in Sidra

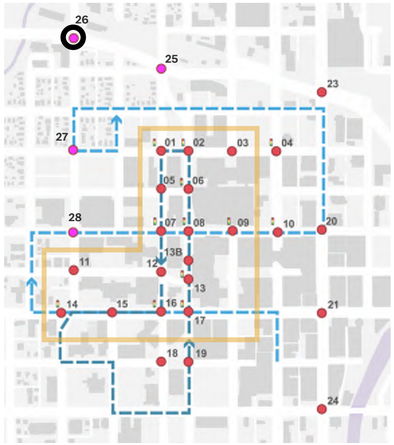
Intersections modeled in Vissim

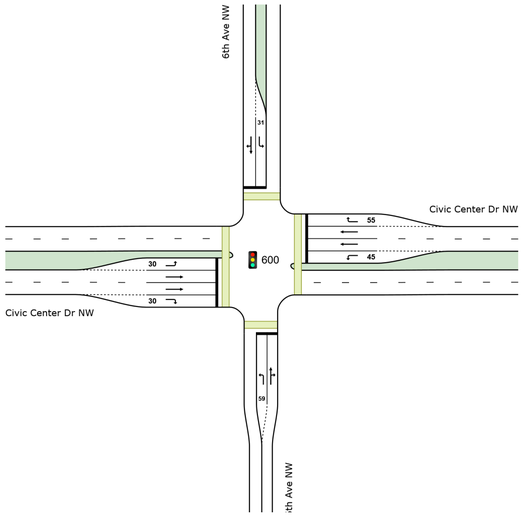
Civic Center Dr NW - 6th Ave NW | Existing Condition

The signalized intersection is currently characterized by an average delay of 15 seconds in the AM peak (LoS B) and 32 in the PM (LoS C).

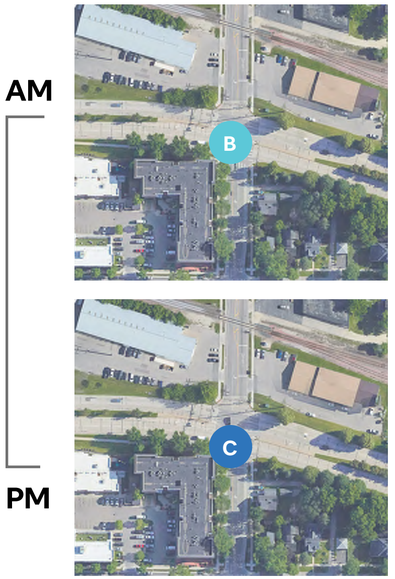
In the PM peak, the south leg of 6th Avenue NW is showing a saturation of 94% making it not compliant with the traffic engineering standards.

All the other legs, in both peaks, show a saturation lower than 60%.

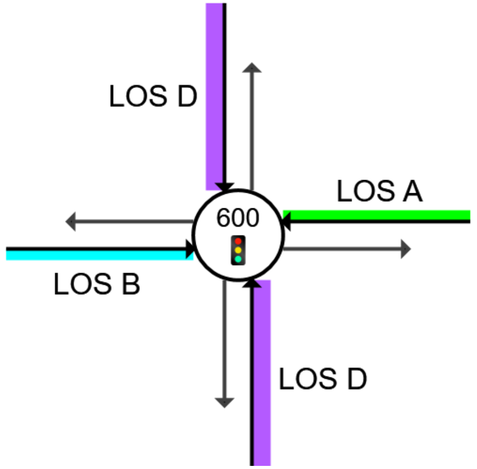




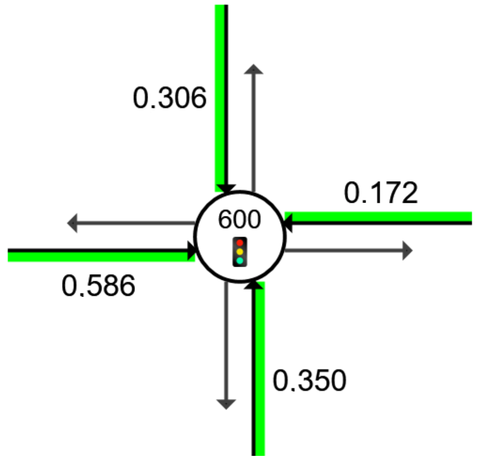
LOS and Saturation Degree is shown within the maximum range



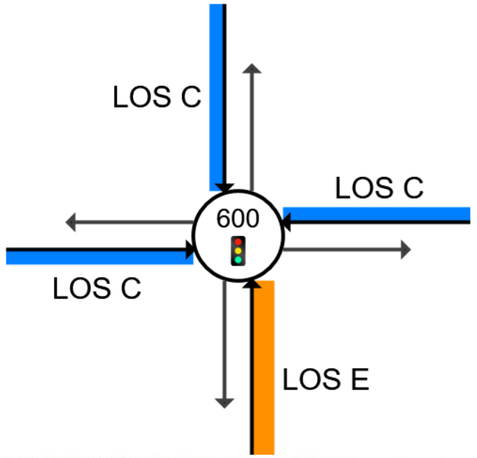
LOS - AM

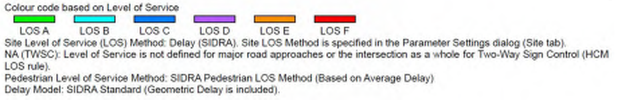


Degree of Saturation - AM

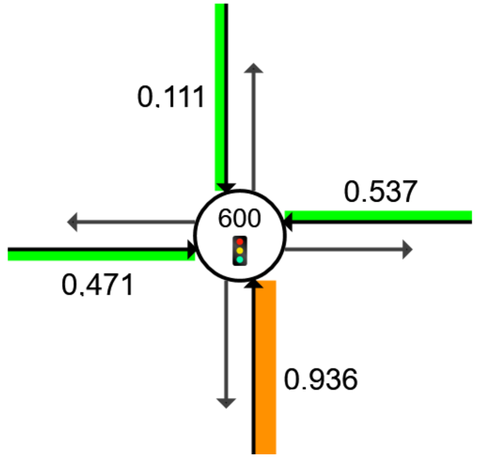


LOS - PM





Degree of Saturation - PM

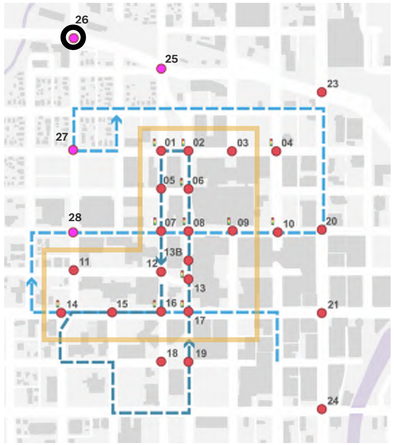


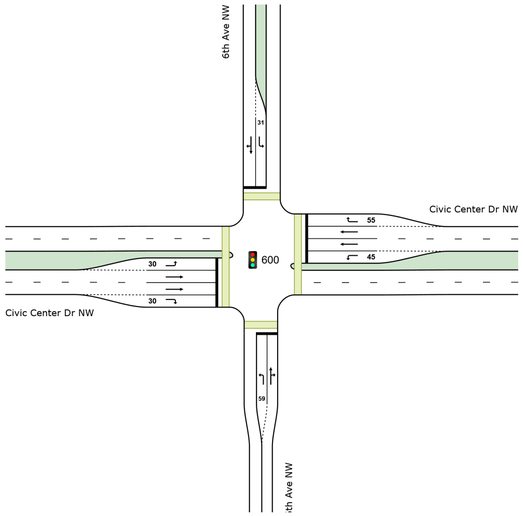


Civic Center Dr NW - 6th Ave NW | Reference Scenario (no-build)

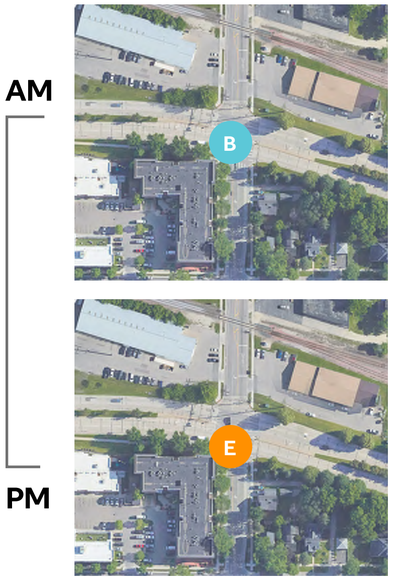
In the reference scenario the intersection is much more congested. Both delays and saturation are increasing not meeting the traffic engineering standards.

In this case the traffic on Civic Center Drive is the street with the highest delays.

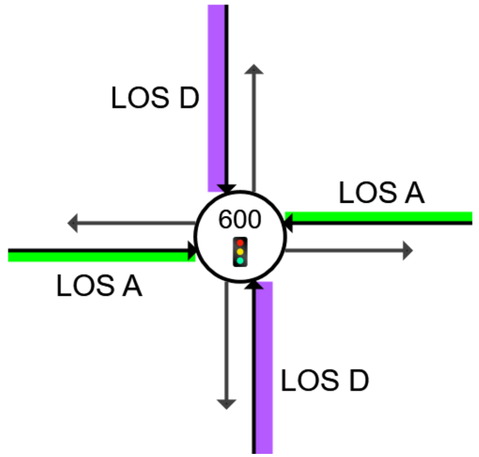




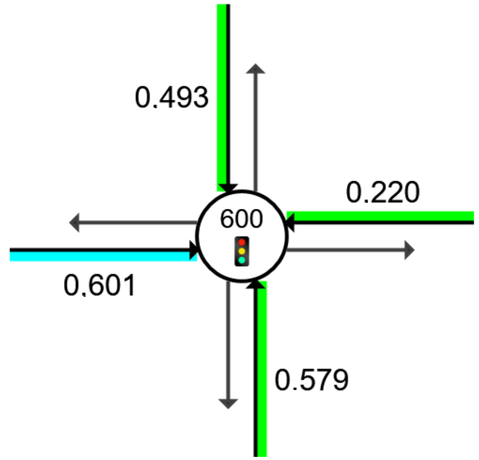
LOS and Saturation Degree is shown within the maximum range



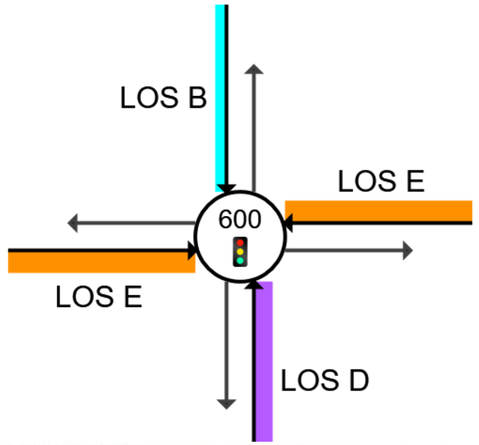
LOS - AM

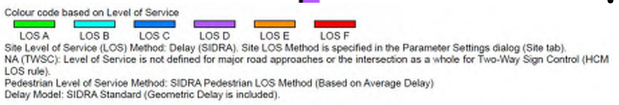


Degree of Saturation - AM

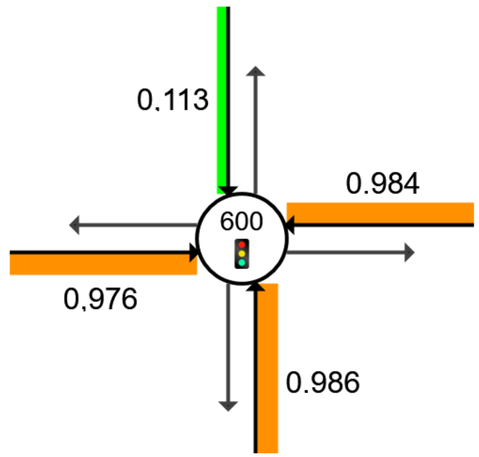


LOS - PM





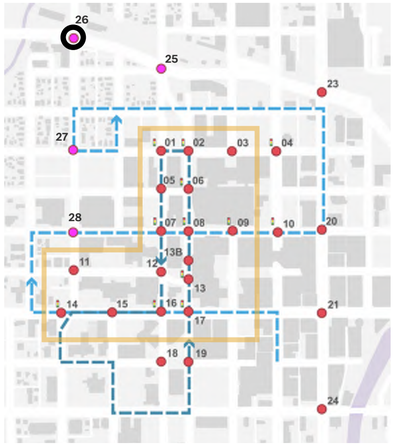
Degree of Saturation - PM

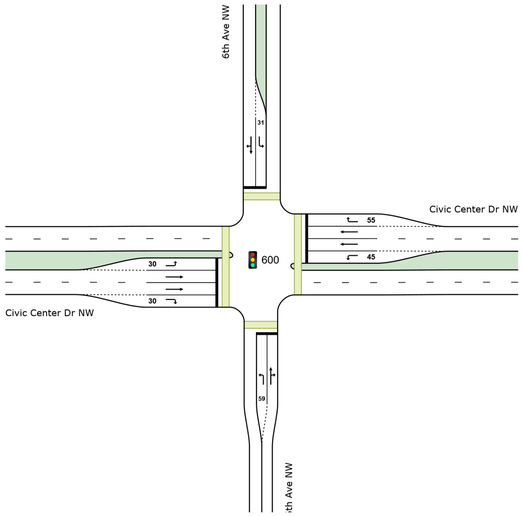




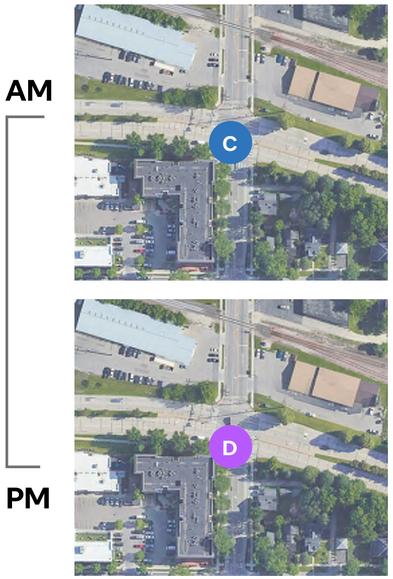
Civic Center Dr NW - 6th Ave NW | Project Scenario - Unmitigated

In the project scenario the critical condition of the south leg becomes worse exceeding the traffic engineering standards both in terms of saturation (130%) and level of service (LOS F).

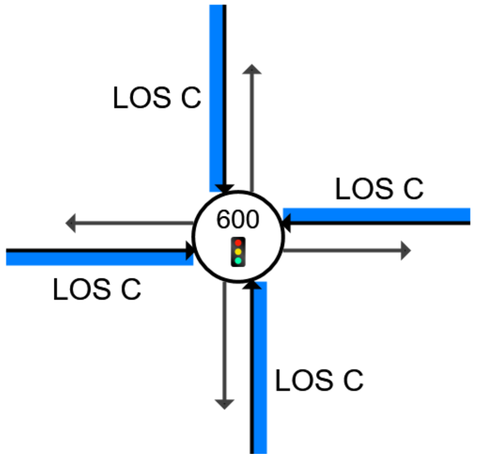




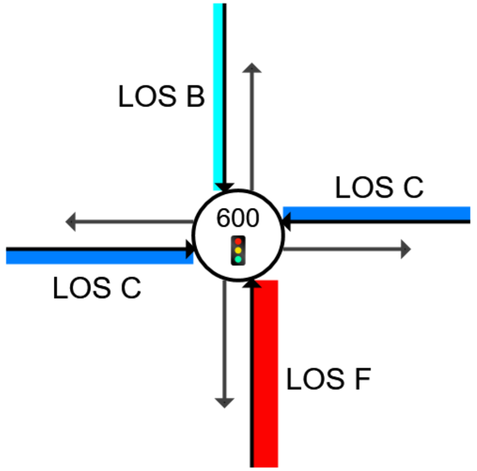
LOS and Saturation Degree is shown within the maximum range



LOS - AM



LOS - PM

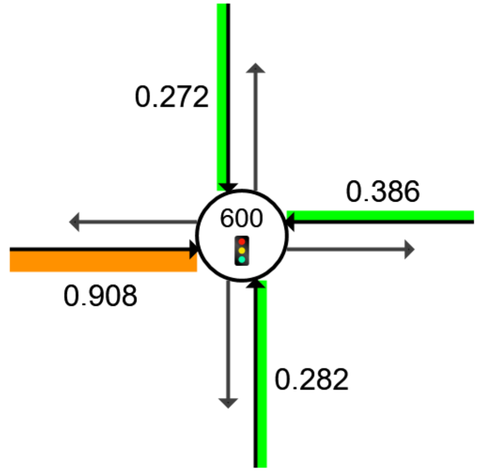


Colour code based on Level of Service

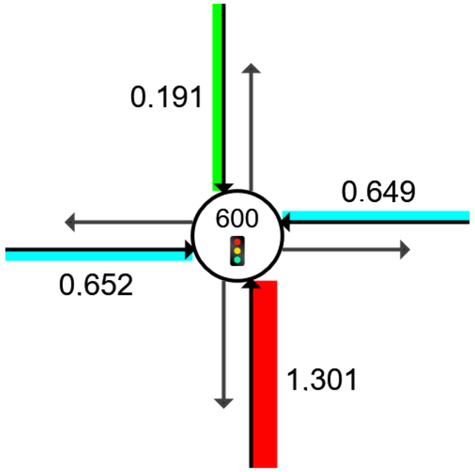
LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Pedestrian Level of Service Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Delay Model: SIDRA Standard (Geometric Delay is included).

Degree of Saturation - AM



Degree of Saturation - PM



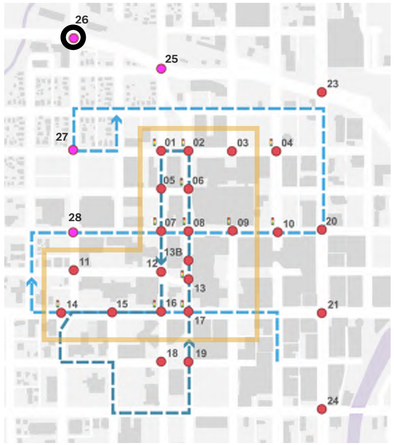
Colour code based on Degree of Saturation

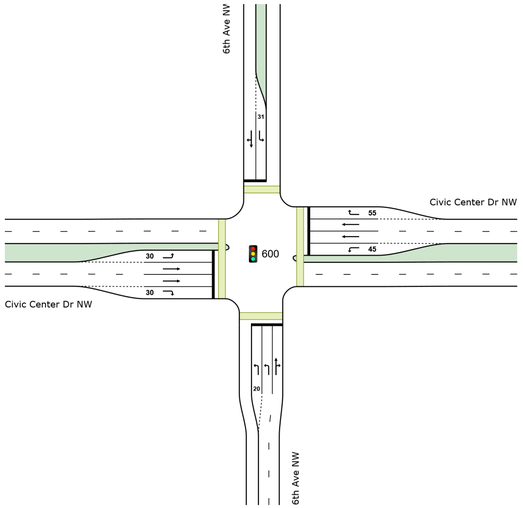
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Civic Center Dr NW - 6th Ave NW | Project Scenario - Mitigated

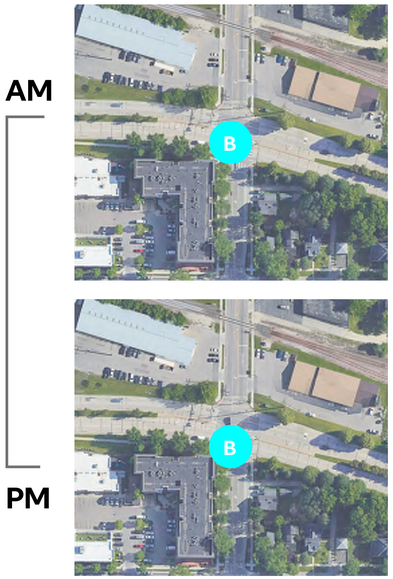
In order to cope with the traffic coming from the south, the mitigation proposed is the addition of a dedicated left turn lane on the south leg of 6th Avenue.

This additional queuing capacity will bring the intersection to much lower delays and saturation levels. More details are included in the following page.

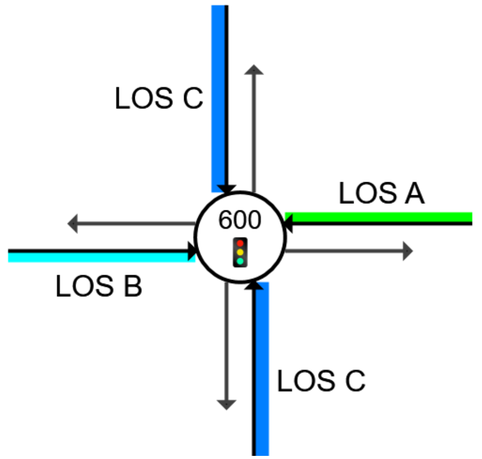




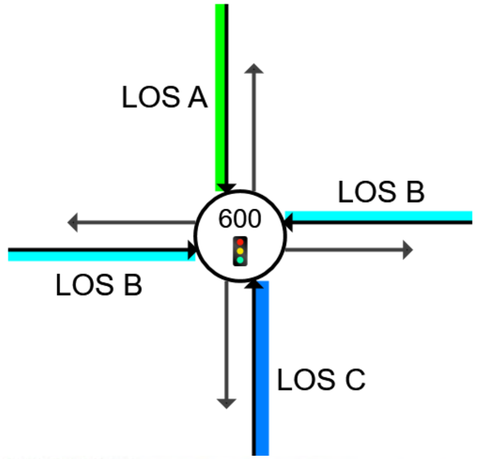
LOS and Saturation Degree is shown within the maximum range

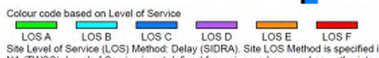


LOS - AM



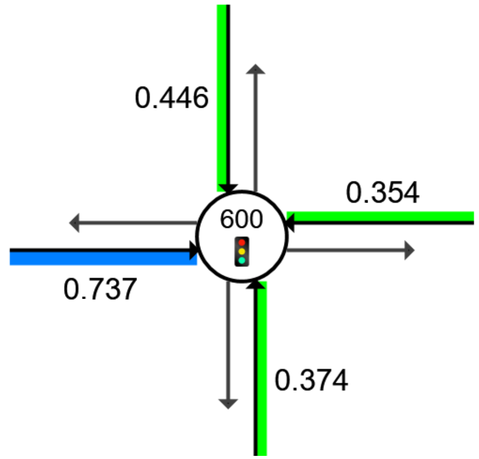
LOS - PM



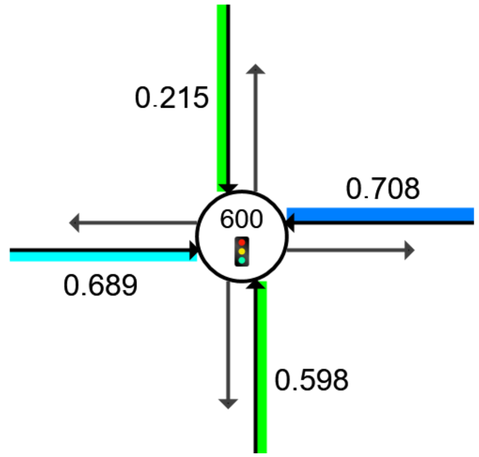


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Pedestrian Level of Service Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Delay Model: SIDRA Standard (Geometric Delay is included).

Degree of Saturation - AM



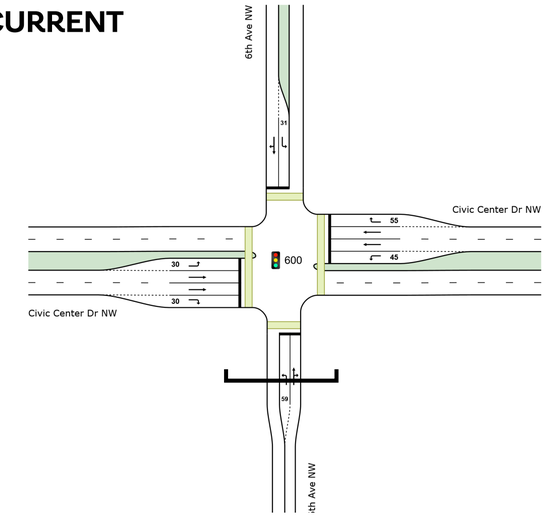
Degree of Saturation - PM



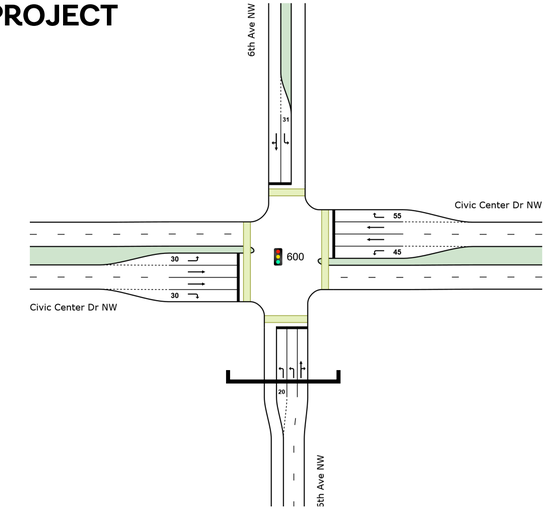


Mitigation Measures Sidra - 6th Avenue & Civic Center Dr NW

CURRENT



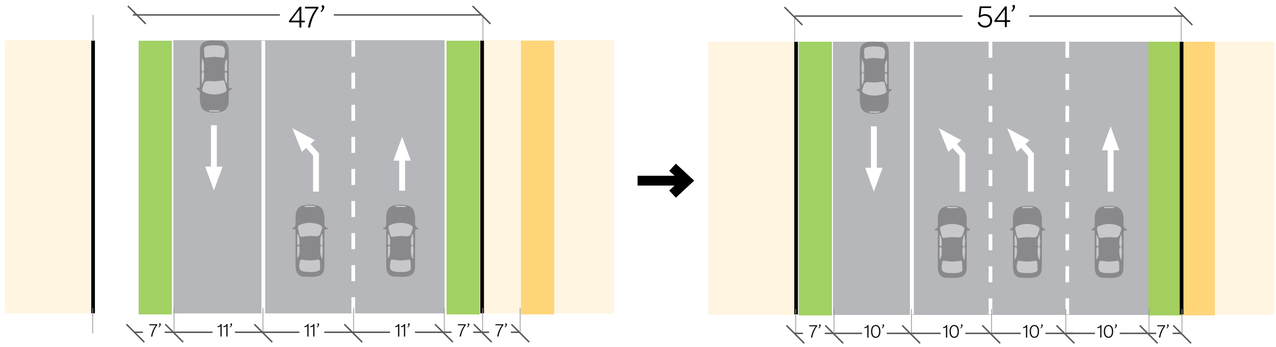
PROJECT



As mentioned, in order to comply with the City engineering standards, the mitigation measure proposed is an additional lane for the left turn. This can be done by resizing the lanes from 11’ to 10’ and by taking about 7’ from the sidewalk/landscape. The length of this enlargement can be limited, in the range of 65’. The bike lane is always kept.

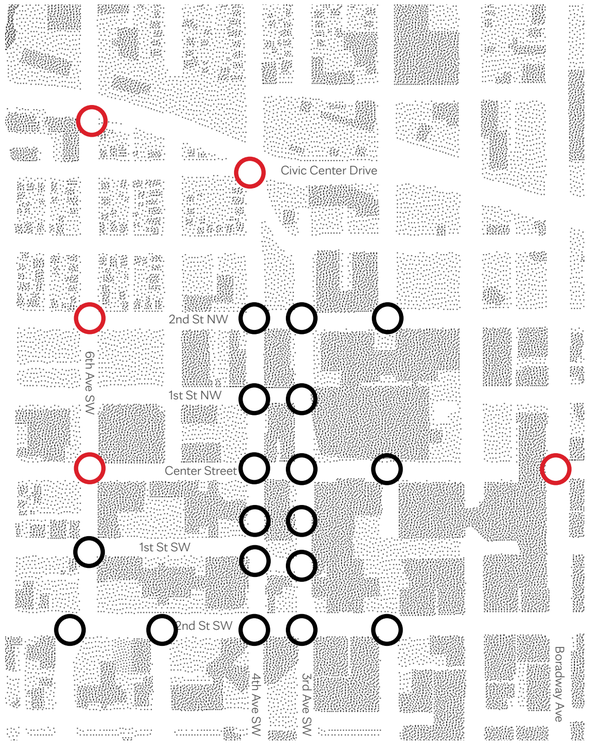
The need for a double left lane is due to the very high flow that from south is going westbound, about 500 veh/h.

It should be highlighted that this upgrade would require enlarging the right of way taking away a portion of public realm. The city and its traffic patterns will change in the following years and these type of upgrades should be evaluated carefully closer to the target year, verifying that traffic has actually reached such levels.





LOS Summary



Intersections modeled in Sidra

Intersections modeled in Vissim

Signalized intersections

LEVELS OF SERVICE

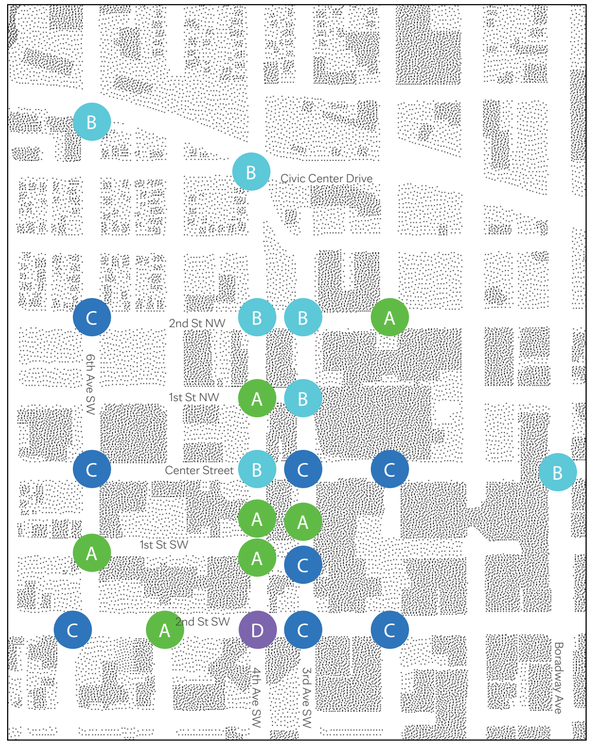
A B C D E F

LOS by movement can be found in Appendix A

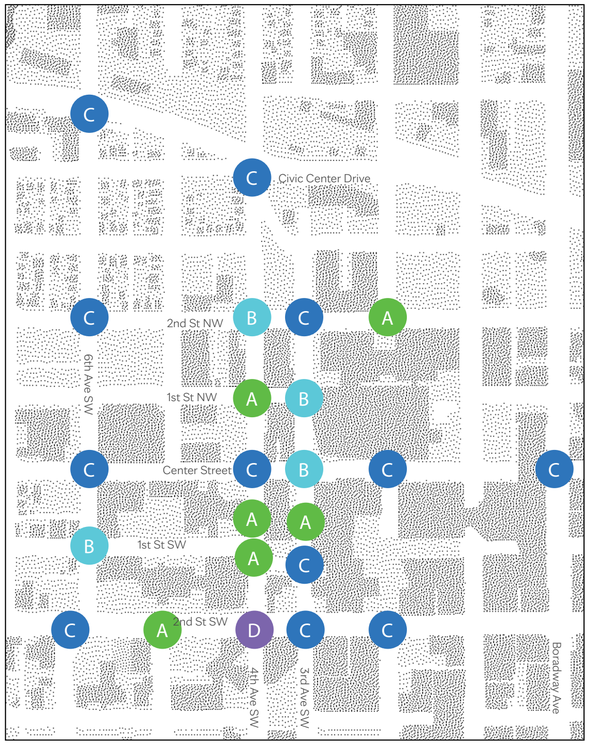
		Existing				Project			
		AM		PM		AM		PM	
	INTERSECTIONS	Avergae Delay (sec)	LOS	Avergae Delay (sec)	LOS	Avergae Delay (sec)	LOS	Avergae Delay (sec)	LOS
VISSIM	2nd St NW - 2nd Ave NW	0.7	A	0.6	A	0.9	A	0.9	A
	W Center St - 2nd Ave SW	22.1	C	26.3	C	38.9	D	12.7	B
	2nd St SW - 2nd Ave SW	22.6	C	21.8	C	22.6	C	16.6	B
	2nd St NW - 3rd Ave NW	13.0	B	26.3	C	15.9	B	20.4	C
	1 st St NW - 3rd Ave NW	13.3	B	17.8	B	26.4	C	30.8	C
	W Center St - 3rd Ave NW	23.4	C	17.8	B	31.5	C	18.2	B
	3rd Ave SW- Parking Entrance	6.6	A	3.1	A				
	1st St SW - 3rd Ave SW	16.2	C	16.6	C				
	2nd St SW - 3rd Ave SW	32.0	C	33.2	C	30.4	C	31.3	C
	2nd St NW - 4th Ave NW	18.4	B	17.1	B	23.5	C	18	B
	1 st St NW - 4th Ave NW	3.5	A	2.3	A	12.4	B	17.4	C
	W Center St - 4th Ave NW	18.2	B	22.3	C	27.8	C	28.9	C
	4th Ave NW - Parking exit	0.7	A	1.9	A				
	1st St SW - 4th Ave SW	2.1	A	6.4	A				
	2nd St SW - 4th Ave SW	48.4	D	45.0	D	22.40	C	26.60	C
	2nd St SW - 5th Ave SW	9.6	A	1.9	A	0.9	A	1	A
	Dropoff/Parking 83	4.6	A	4.8	A				
	1st St SW - 6th Ave SW	1.2	A	10.6	B	1.3	A	3.4	A
	2nd St SW - 6th Ave SW	33.7	C	29.2	C	29.5	C	33.5	C
SIDRA	Broadway Ave S - W Center St.	19.2	B	24.6	C	16.2	B	21.0	C
	4th Ave NW - Civic Center Dr NW	18.0	B	32.2	C	31.6	C	30.0	C
	6th Ave NW - Civic Center Dr NW	14.5	B	32.1	C	13.0	B	18.2	B
	6th Ave NW - 2nd St NW	21.8	C	18.3	C	10.6	B	20.1	C
	6th Ave SW - W Center St	20.7	C	18.6	C	19.9	B	40.0	D

LOS Summary

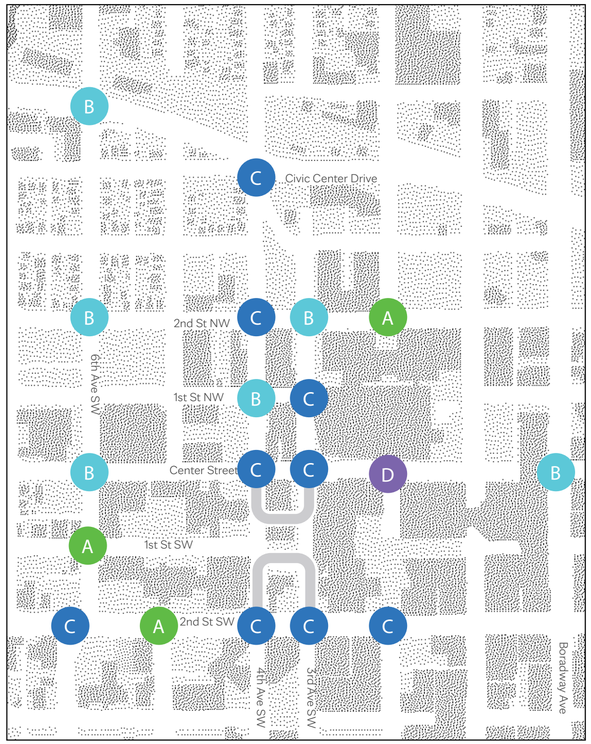
CURRENT - AM



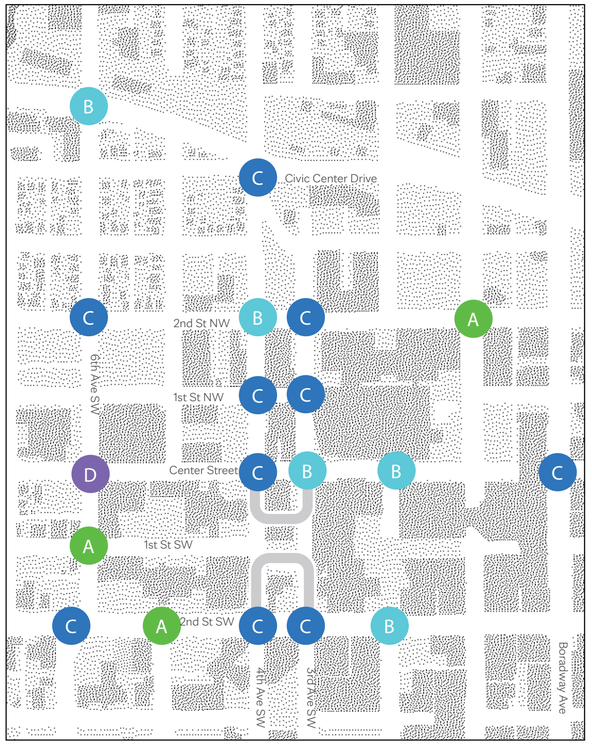
CURRENT - PM



PROJECT (MITIGATED)- AM



PROJECT (MITIGATED) - PM



Traffic Model - Mitigation Measures

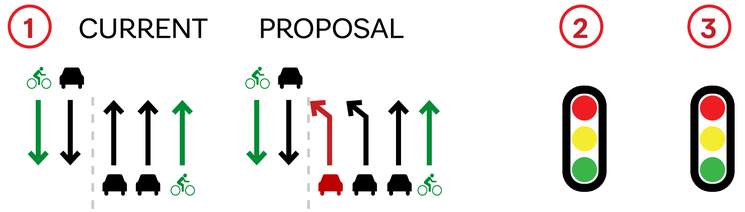
During the model calibration, some mitigation measures on the network were required to avoid congestion. They are minor measures that should be performed on the external network, beyond the Unbound project boundary and have been already included in the project scenarios. They are described as follows:

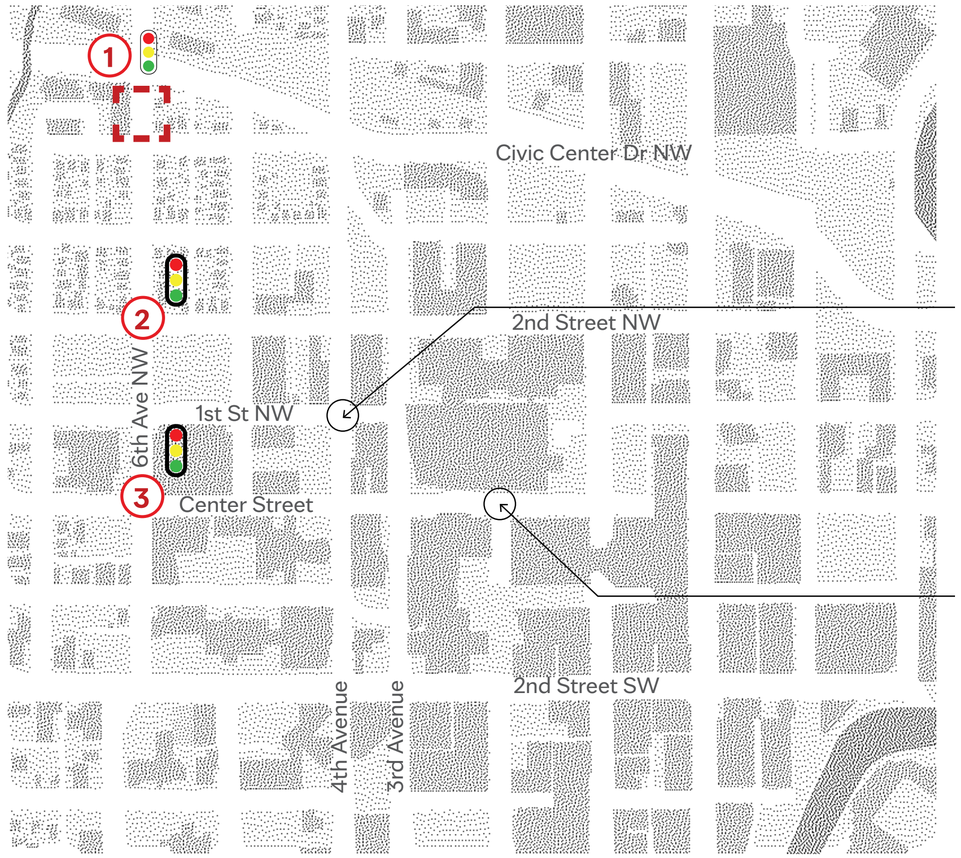
1. Mitigation measure 1: 6th Avenue, south of Civic Center Dr NW. As explained in previous slides the signal phasing could be revised adding split-phases or alternatively a lane (about 65 feet long) for left turn from south to west could be added. Such mitigation measure however may require the modification of curbs at the intersection

2. Mitigation measure 2: new signal was added at 2nd Street NW and 6th Avenue.

3. Mitigation measure 3: new signal was added at Center Street and 6th Avenue.

Additionally, the signals of the whole model have been retimed to cope with traffic changes.





1st St NW and 4th Ave NW

It is currently working as a give-way intersection, following the City's request we have evaluated whether the implementation of signal control would have improved the overall intersection performance. The simulations show that a signal would increase the delays at the intersection.

Detailed model results are shown in Appendix A.

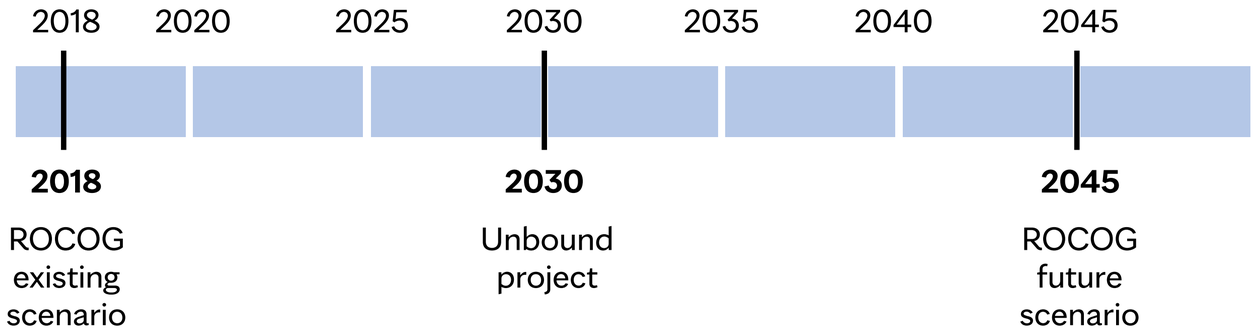
Center Street and 2nd Ave SW

The intersection is not complying with City Engineering Standards due to a LOS F in one minor movement. Further studies for possible mitigation measures can be found in Appendix A.

Disclaimer

It should be noted that, besides the new project flows, the simulations include also the background traffic component forecasted by ROCOG in 2045, while the Unbound project timeline is 2030.

As shown in the timeline on the side 2030 is about halfway between the two ROCOG scenarios, this means that the simulated scenario is actually significantly worse compared to the 2030 horizon



8 Pedestrian and Bicycle Analysis

Rochester Modal Share Surveys

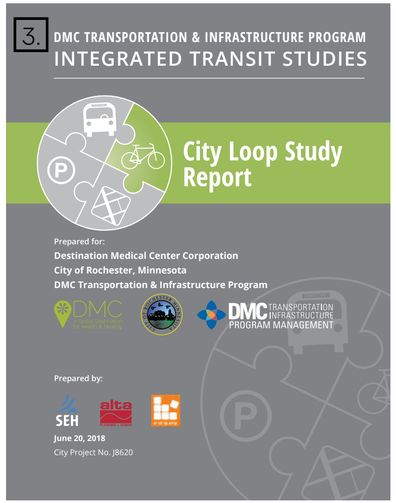
1.



2.



3.



Some of the main planning documents related to sustainable and active mobility:

1. City of Rochester Active Transportation Plan, October 2022

2. New Rapid Transit for a Growing, Equitable Rochester, August 2020

3. City Loop Study Report, June 2018

* City of Rochester Active Transportation Plan, October 2022

Percent of survey respondents who want to travel by the given mode more frequently than they currently do.

30% want to walk more frequently,

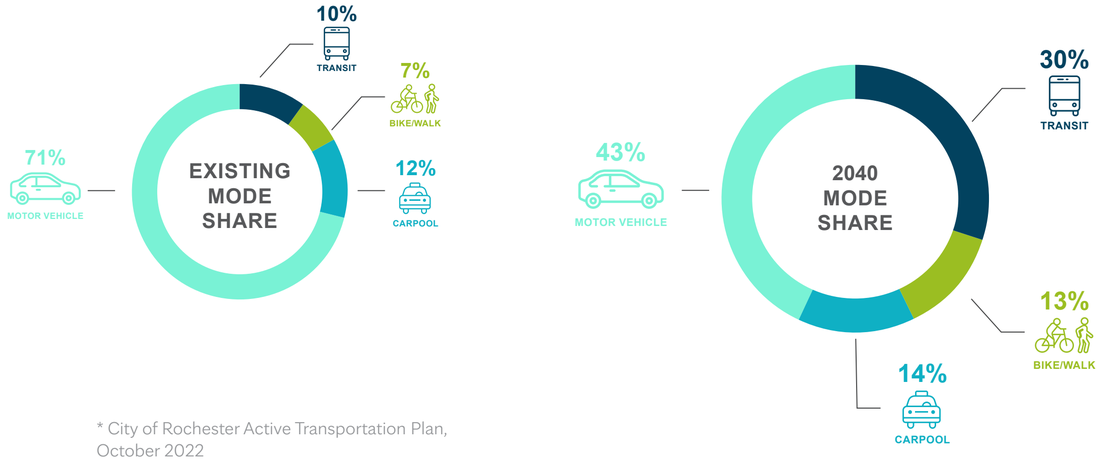
40% want to bike more,

42% want to take transit more and

%35 want to drive less frequently.

To accommodate future growth in jobs, homes, retail, and hotels Rochester aims to have 50% of commuter trips to downtown by modes other than single-occupant automobile by 2040. “This includes transitioning the proportion of commuters cycling or walking from the current 7% to 13%.

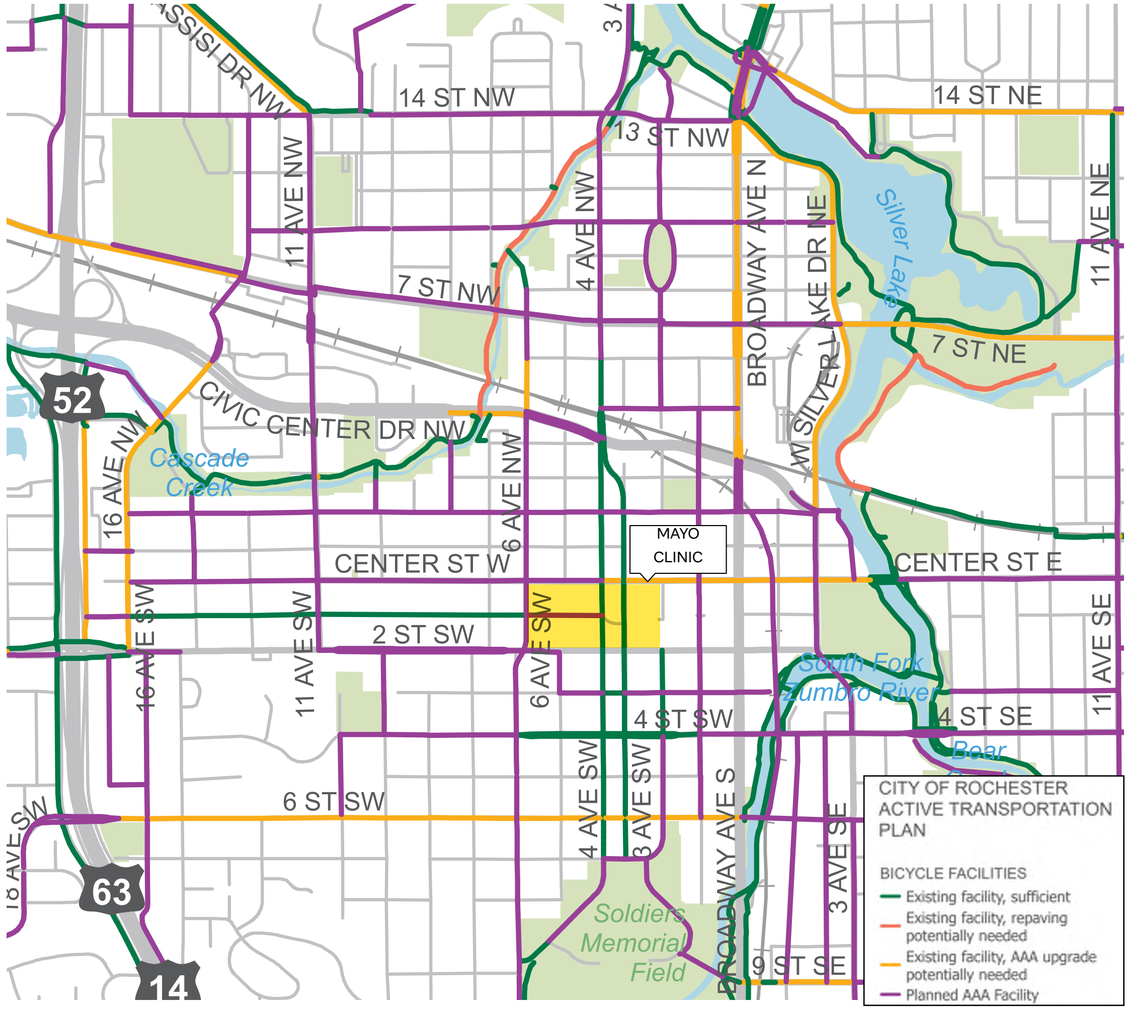
Existing & Future Mode Split



* City of Rochester Active Transportation Plan, October 2022

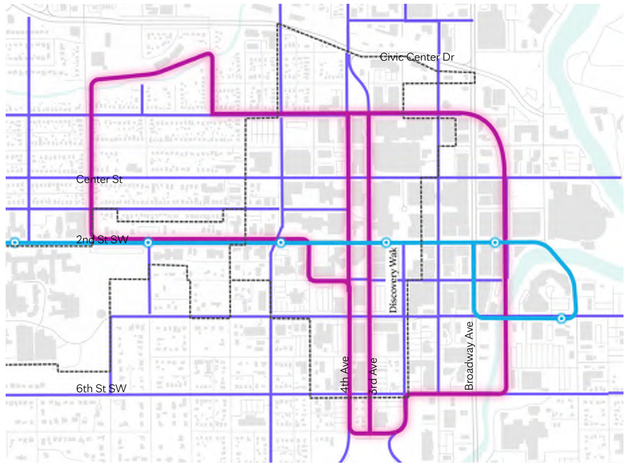
Downtown Bicycle Strategy

City of Rochester Active Transportation Plan



* City of Rochester Active Transportation Plan, October 2022

City Loop Strategy





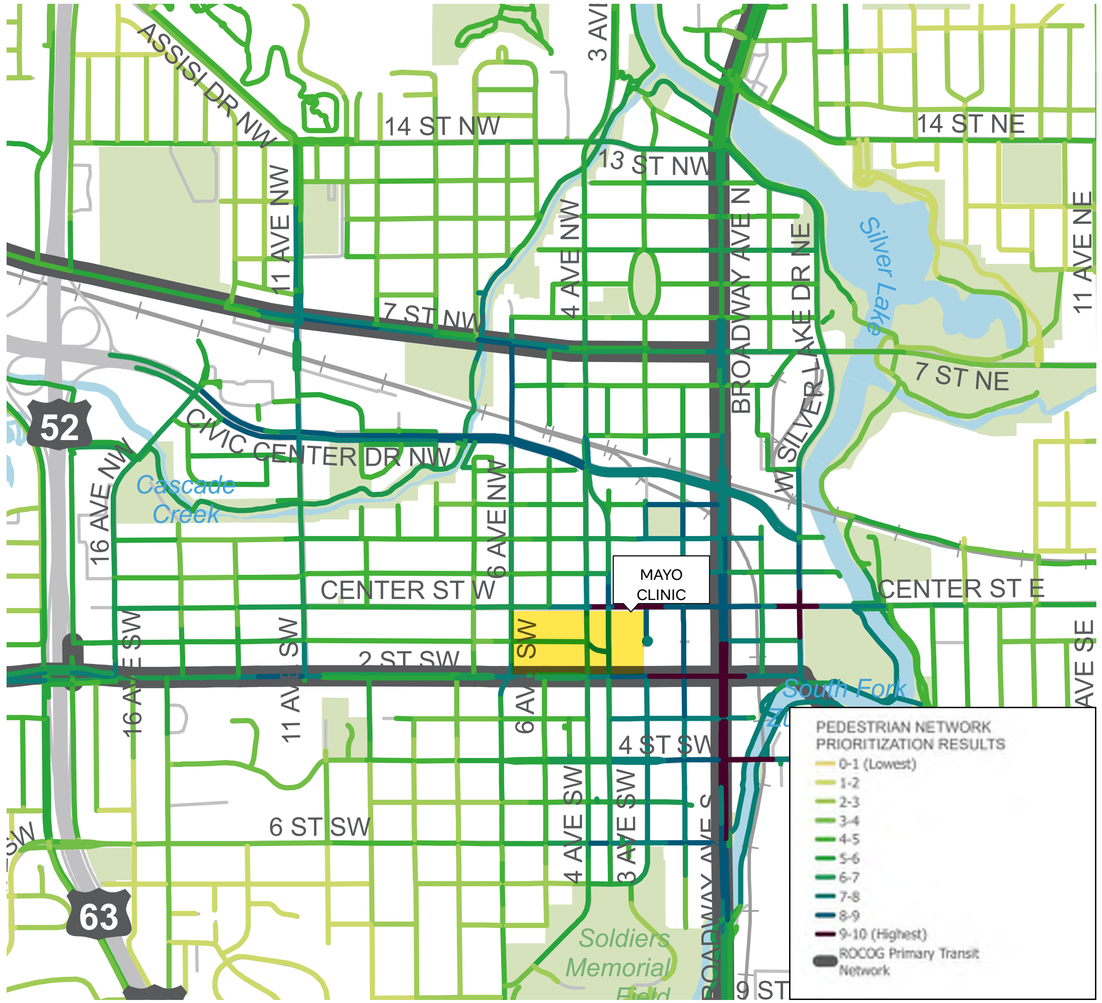
* City Loop Study Report, June 2018

The vision for the City Loop is to create a safe, enjoyable, and healthy way to move about the Development District to experience the sites, visit local shops, and dine in local restaurants and eateries. As its name suggests, the City Loop creates a ring around and through downtown Rochester, connecting six DMC sub-districts on one identifiable and convenient system. Acting as a sidewalk and protected bikeway circulator, it provides a variety of distinct user experiences as people walk, roll, and bike between sub-districts.

The City of Rochester Active Transportation Plan recognizes the City Loop project, and the proposed new bike lanes complement the overall City Loop vision.

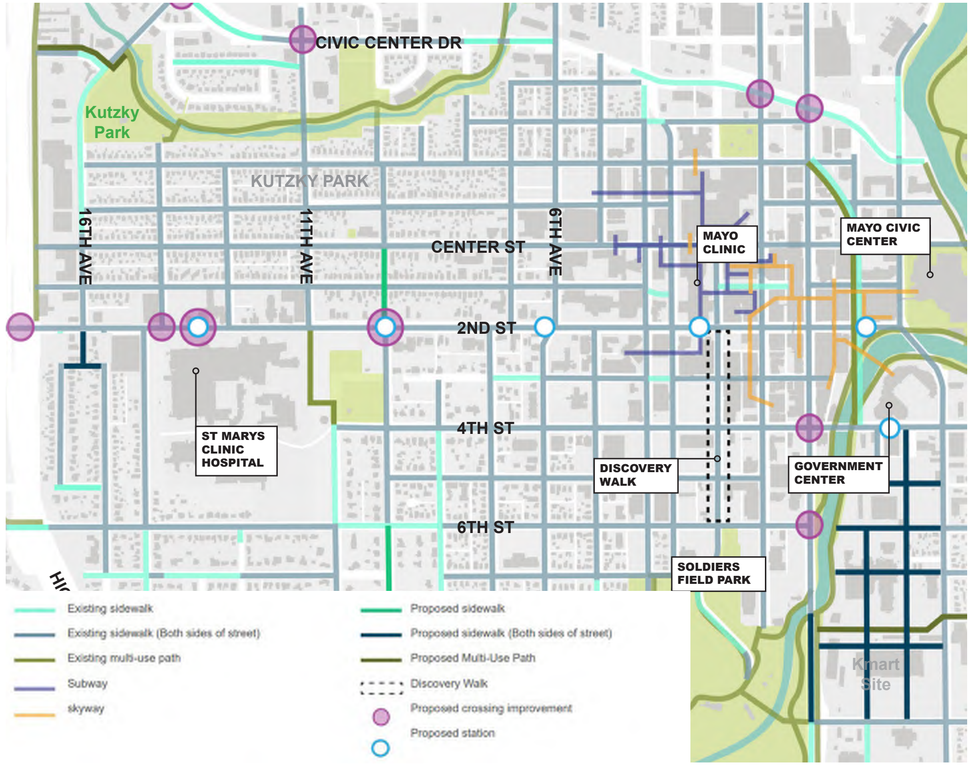
Downtown Pedestrian Strategy

City of Rochester Active Transportation Plan



* City of Rochester Active Transportation Plan, October 2022

City Corridor and Downtown Core: Proposed Pedestrian Connections

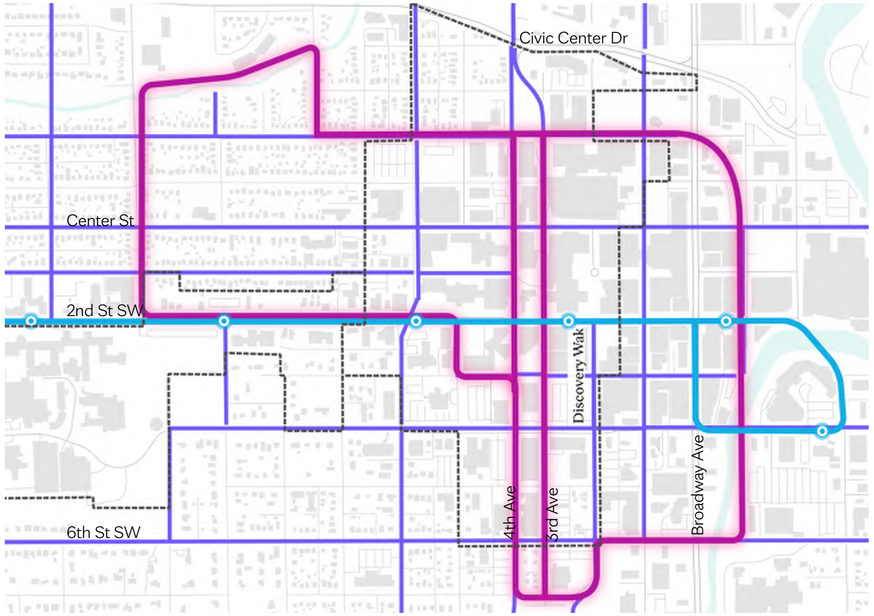


* New Rapid Transit for a Growing, Equitable Rochester, August 2020

The City of Rochester prioritized areas for walking using a combination of various factors in order to assign actions to be taken in order. Streets in the downtown core generally have the highest priority ranking, including Mayo Clinic and its surroundings, as well as streets with higher speed limits carrying higher traffic volumes.

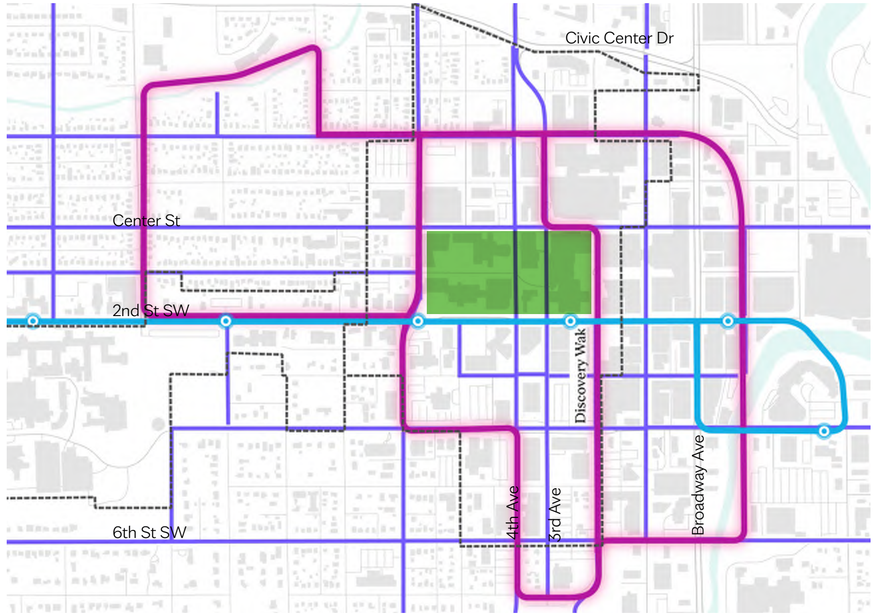
Impact of Closure of the Avenues to Downtown - City Loop

CITY LOOP STRATEGY FROM DMC



The city loop strategy envisages 3rd and 4th avenues as the north-south connector.

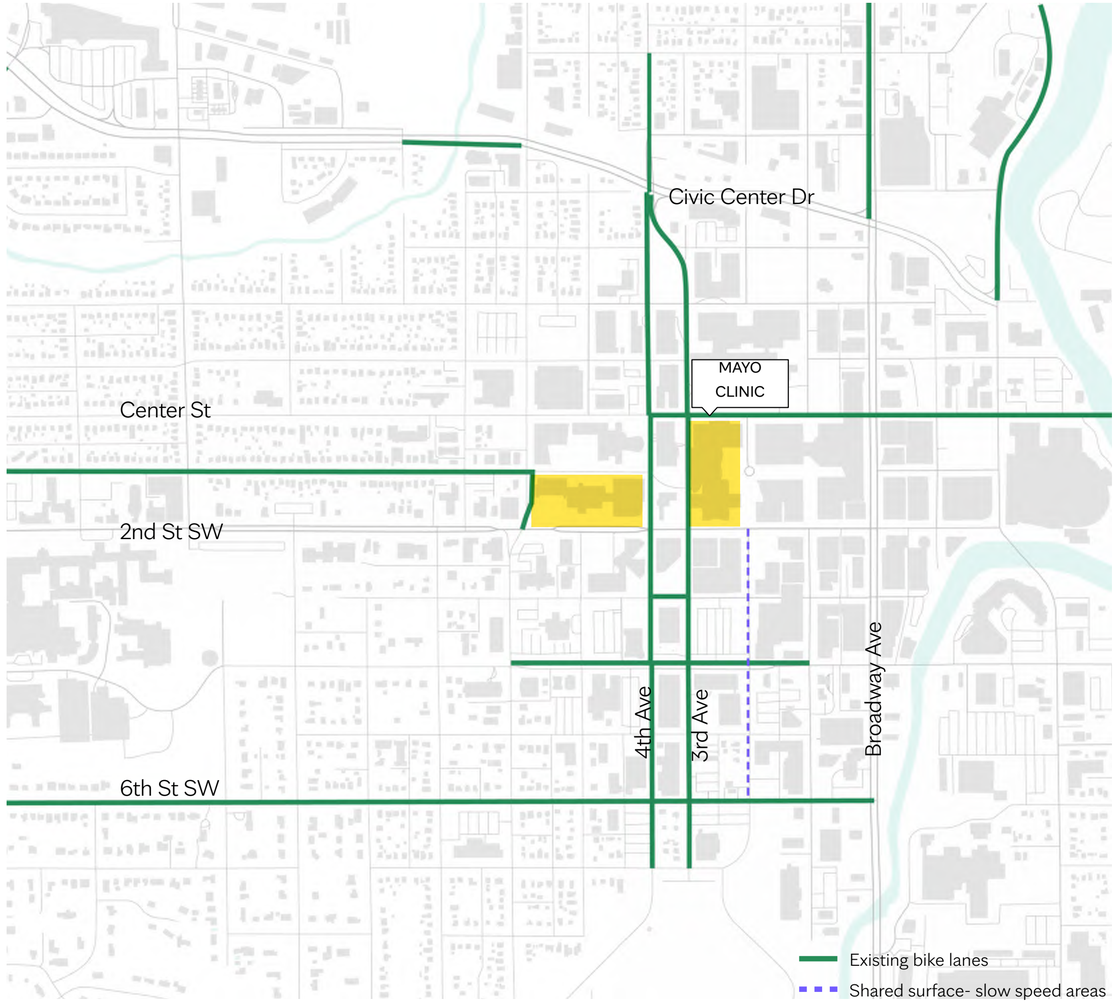
PROPOSED CITY LOOP PROPOSAL



The interruption of the bike lanes due to the Avenue closure will move the through cycle traffic on 2nd and 6th Avenue providing a convenient solution for crossing dowtown. However, as seen before for car traffic, a large portion of users area headed downtown rather than through it: for this reason 3rd and 4th Avenue will still serve as important cycle lanes to reach downtown and the Mayo Clinic campus.
It is important that the implementation of the planned bike network extension to the neighbouring Avenues is brought forward in sinergy with the Unbound project schedule.

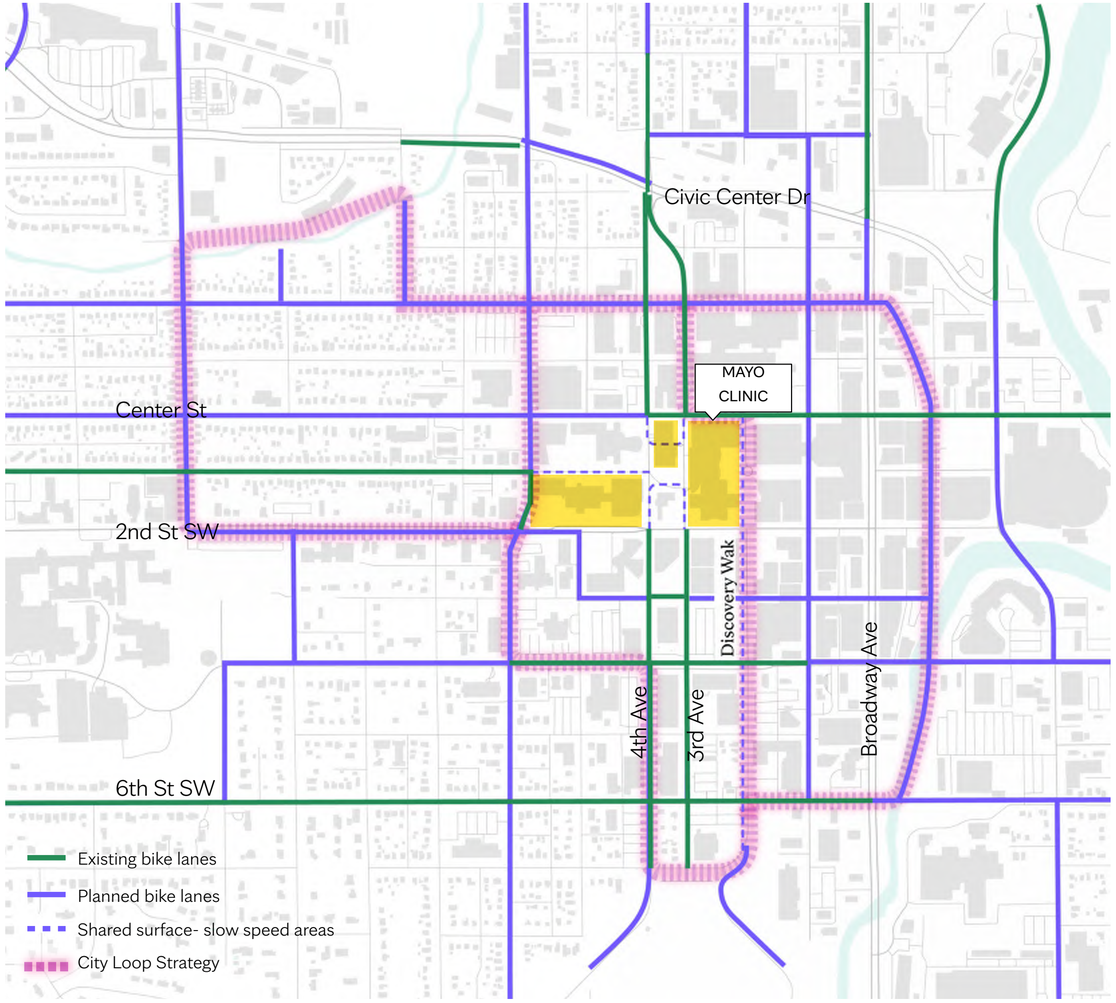
Downtown Bicycle Strategy

Existing Bike Lanes



* MIC Elaboration

Planned Bike Lanes



* MIC Elaboration

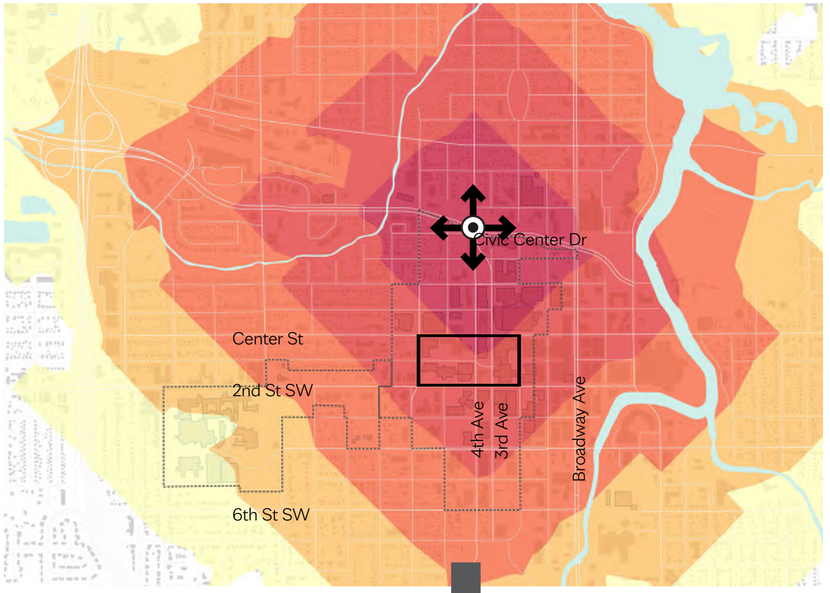
Impact of Closure of the Avenues to Downtown - Bicycle

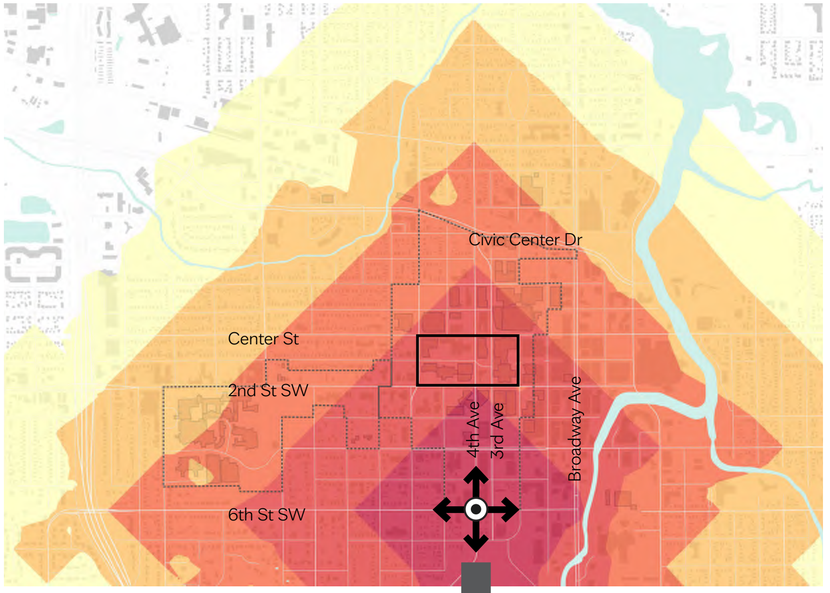
Existing

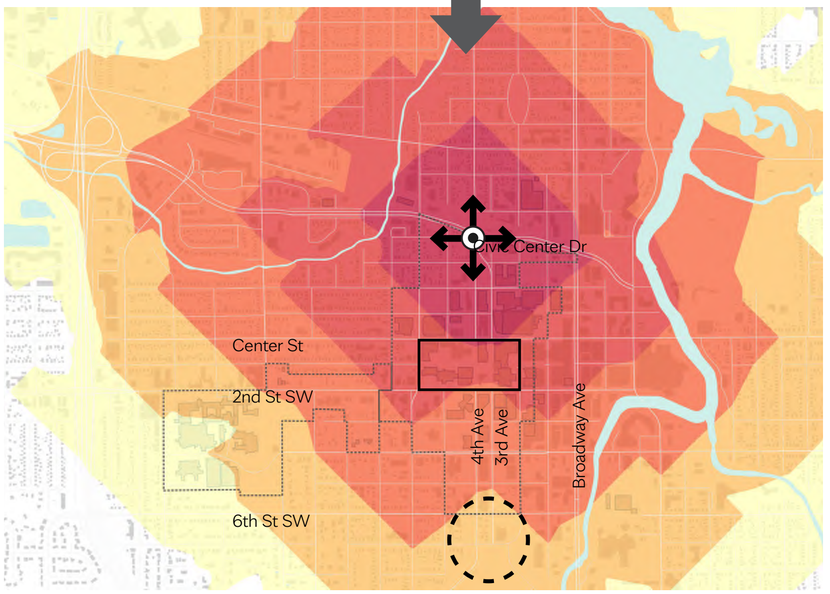
Within 10 minutes by bike, starting from the northern and southern edges of Downtown one can reach all Mayo Clinic buildings and most of the downtown area.

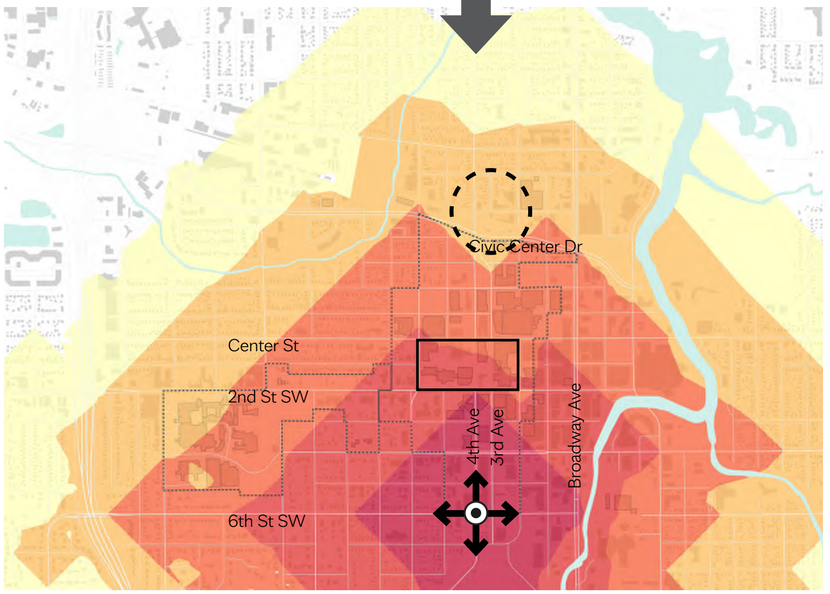
Planned

The impact of the closure of Avenues does not have a major impact on bike accessibility, besides some small delays. Users can still easily reach the campus and decide to use alternative Avenues to pass through downtown







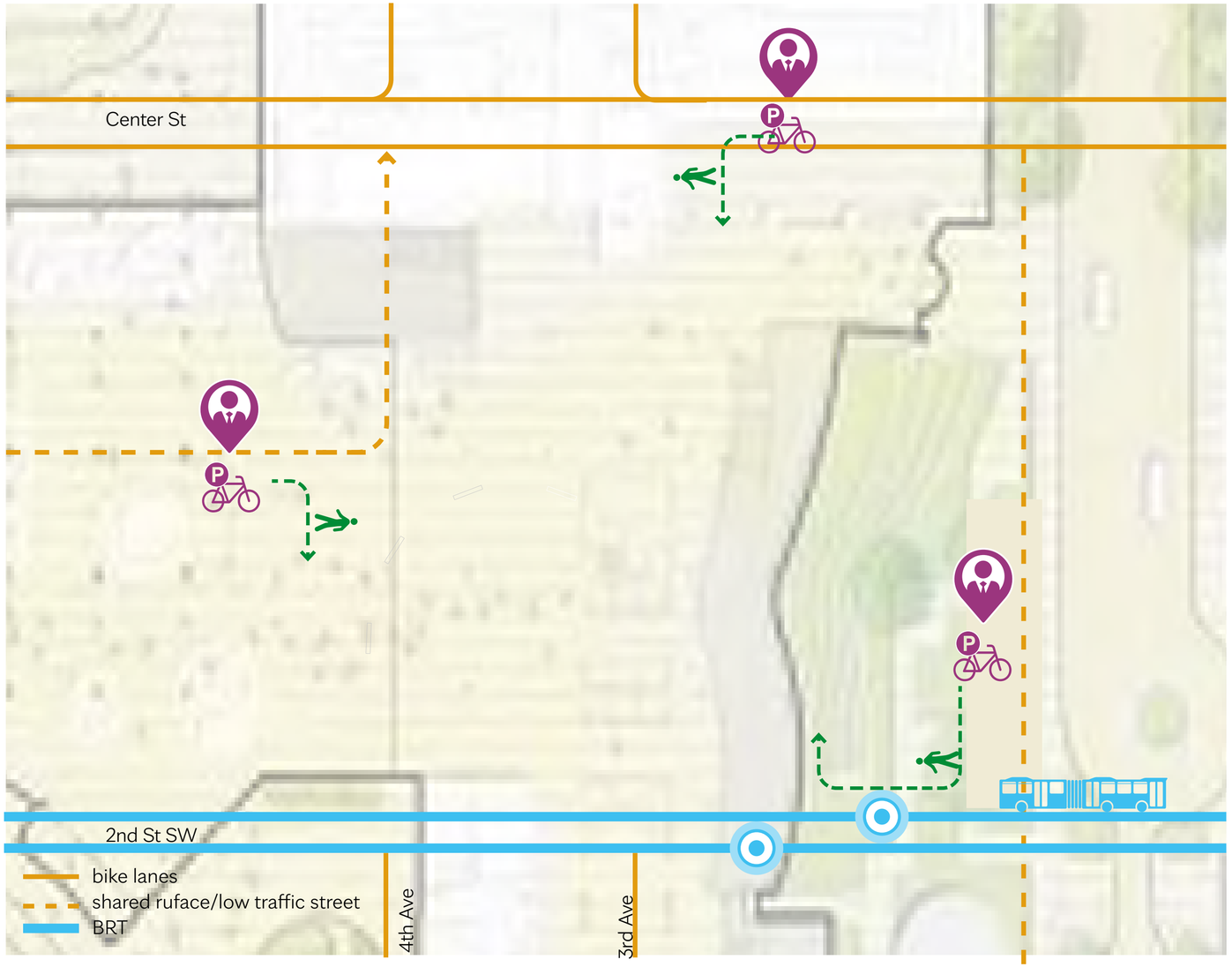


Catchement Areas

Bike (min)

- 2
- 4
- 6
- 8
- 10

Mayo Campus Active Mobility - Bike Network





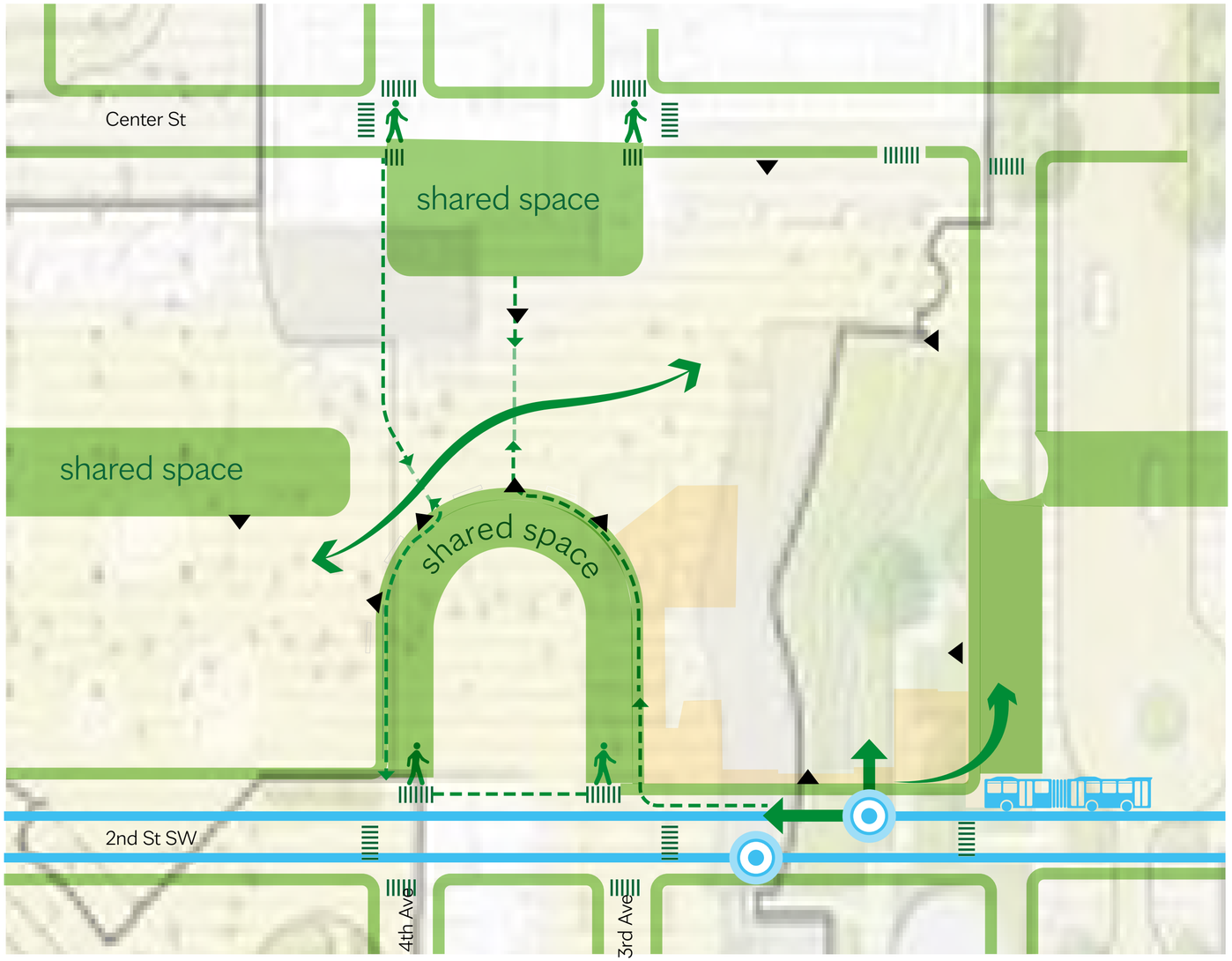






The new campus offers a high-quality public space allowing a prioritized active mobility circulation. For employees, bicycle racks will be available in front of the staff entrances, highly accessible from the planned bike lanes. It is not expected that many patients will reach the front door by bike, so arrival points for cyclists are placed in proximity of secondary entrances.

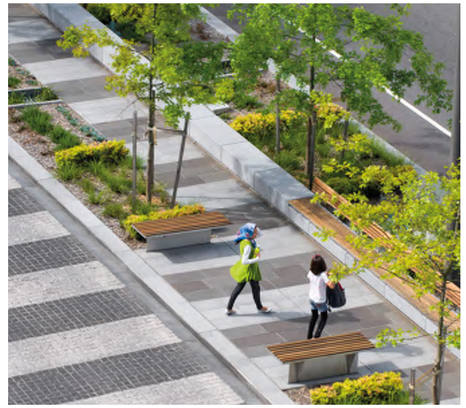
Mayo Campus Active Mobility - Pedestrian Network









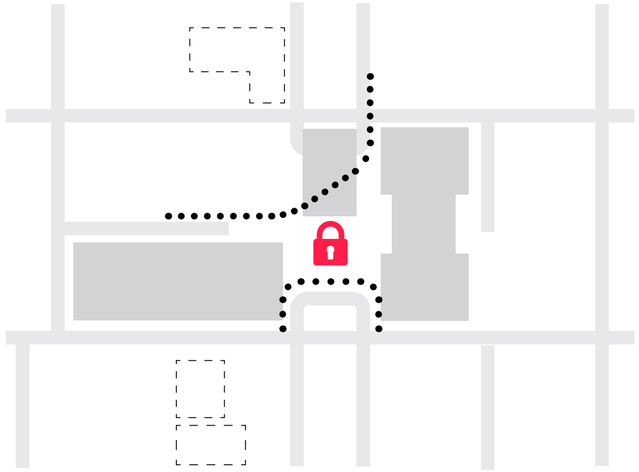


The new BRT line facilitates and promotes active mobility for the campus. Shared surfaces along the drop-off areas will allow a low-speed area allowing active modes to coexist safely and easily. The unified ground floor design will offer a quality public space and a translucent entry experience for the visitors.

Pedestrian Accessibility Options

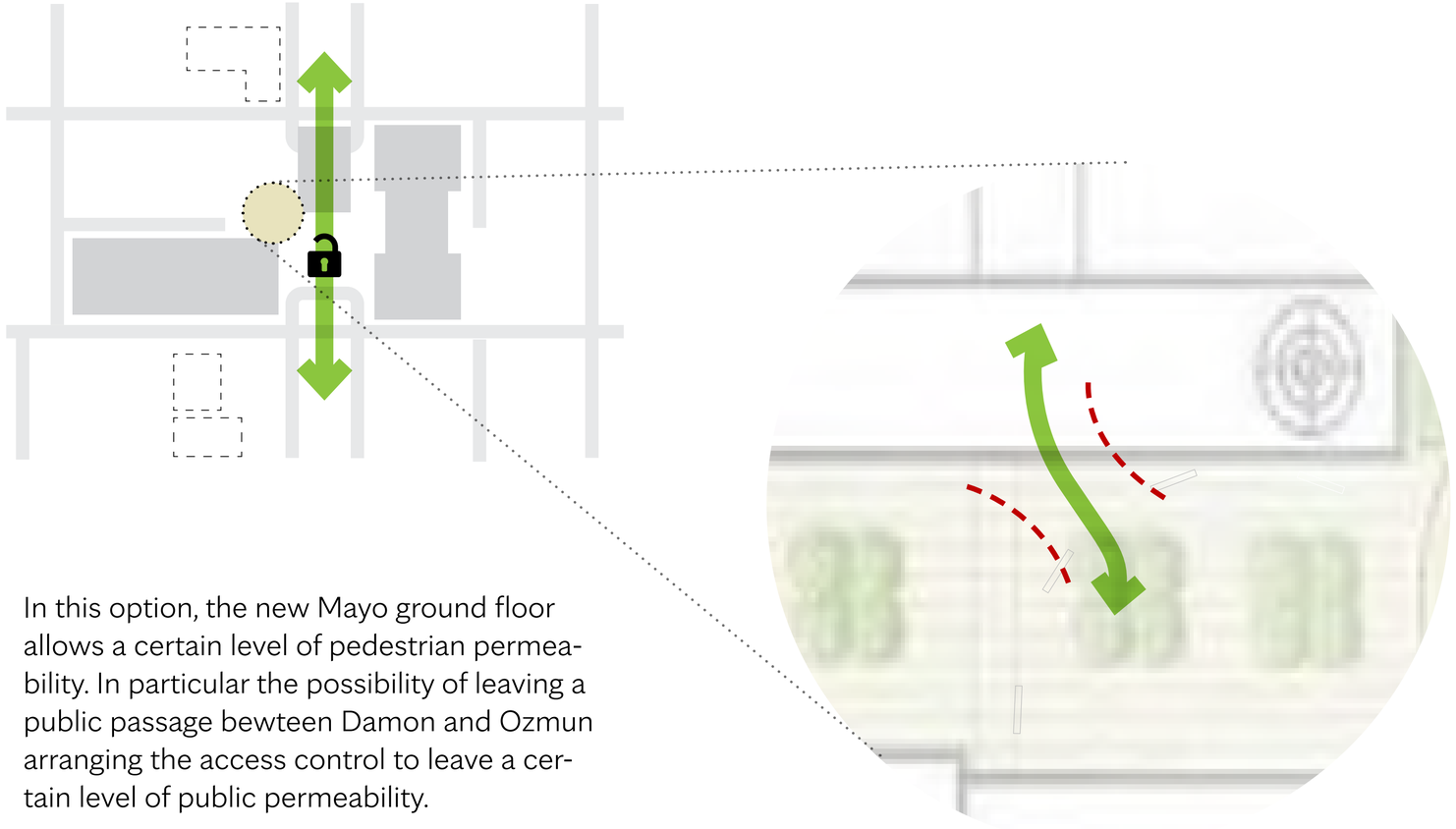
In the next slides we analyze the impact of the new groudn floor connection on pedestrian accessibility. The two scenarios are the following:

GROUND FLOOR CLOSED TO PUBLIC



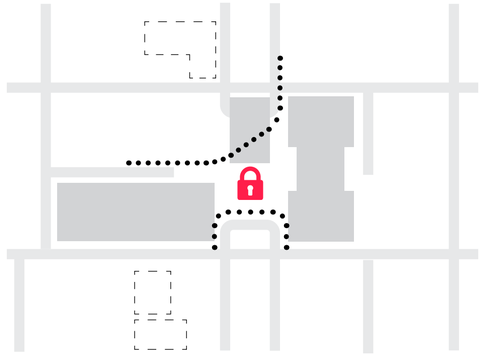
The new Mayo ground floor does not support public permeability and access is strictly controlled. Public pedestrian flows must use alternative routes such as 2nd street

GROUDN FLOOR OPEN TO PUBLIC



In this option, the new Mayo ground floor allows a certain level of pedestrian permeability. In particular the possibility of leaving a public passage bewteen Damon and Ozmun arranging the access control to leave a certain level of public permeability.

Pedestrian Accessibility Options - Mayo Closed to Public

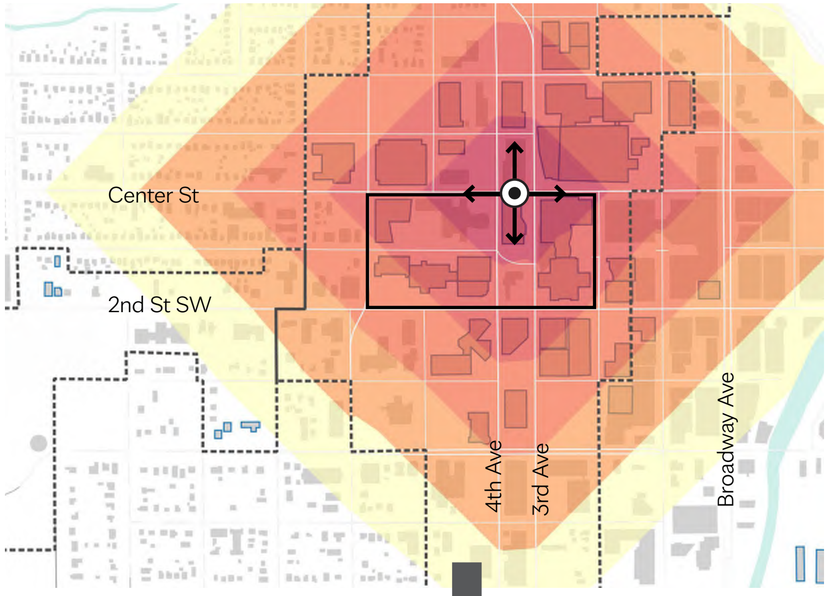


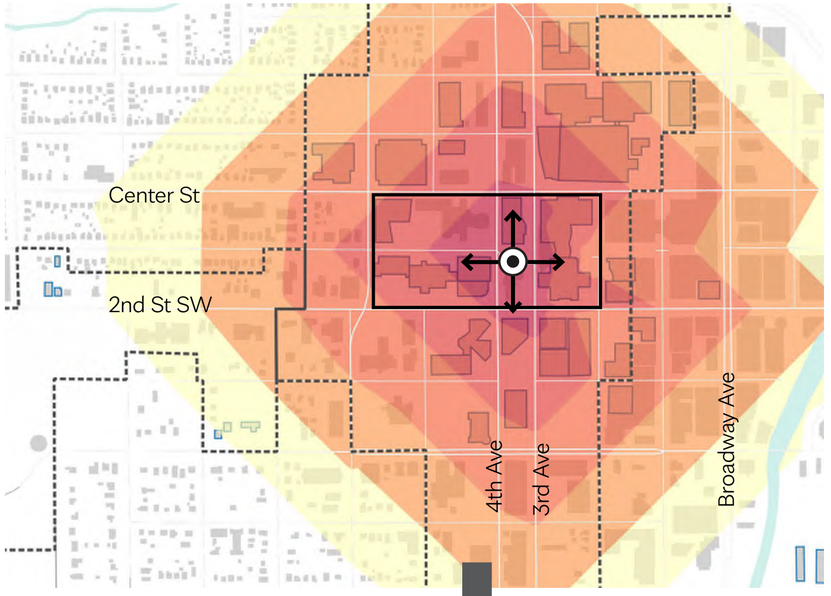
Existing

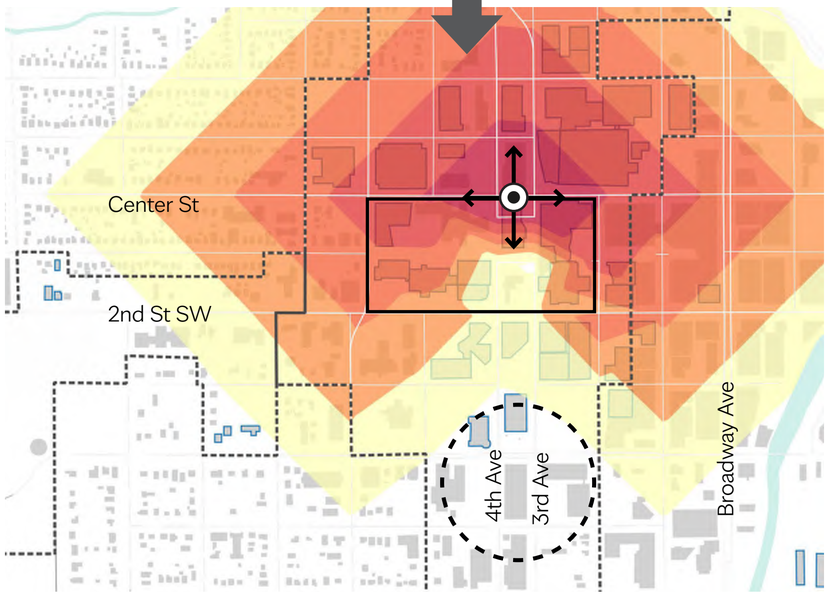
Within the 10 minute walking parameter, starting from the Mayo Clinic area one can reach most of the Mayo Clinic buildings located downtow.

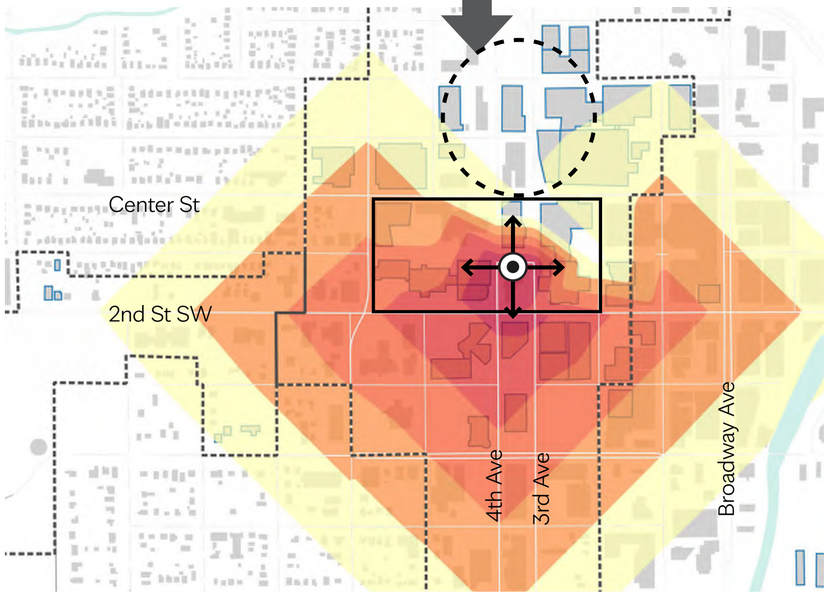
Planned

Having a closed clinic area to the public has an impact on accessibility. For the people arriving at the northern part of the clinic, the discovery square would be out of the 10 minute walking catchment area. As for the people arriving at the southern part of the clinic, some of the clinic areas in the north would be out of the 10 minute walking parameter.







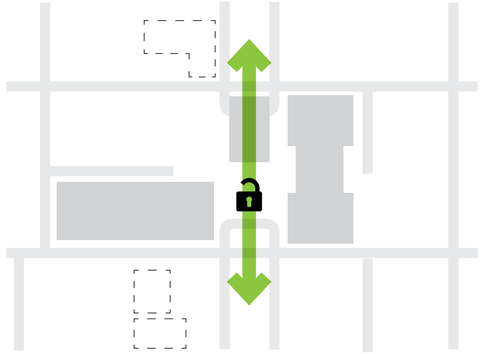


Catchement Areas

Pedestrian (min)

- 2
- 4
- 6
- 8
- 10

Pedestrian Accessibility Options - Mayo Open to Public

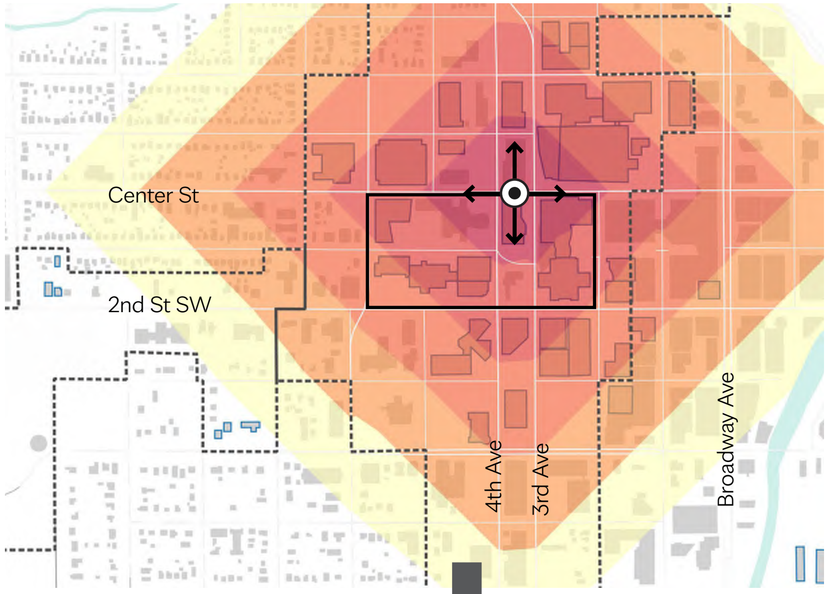


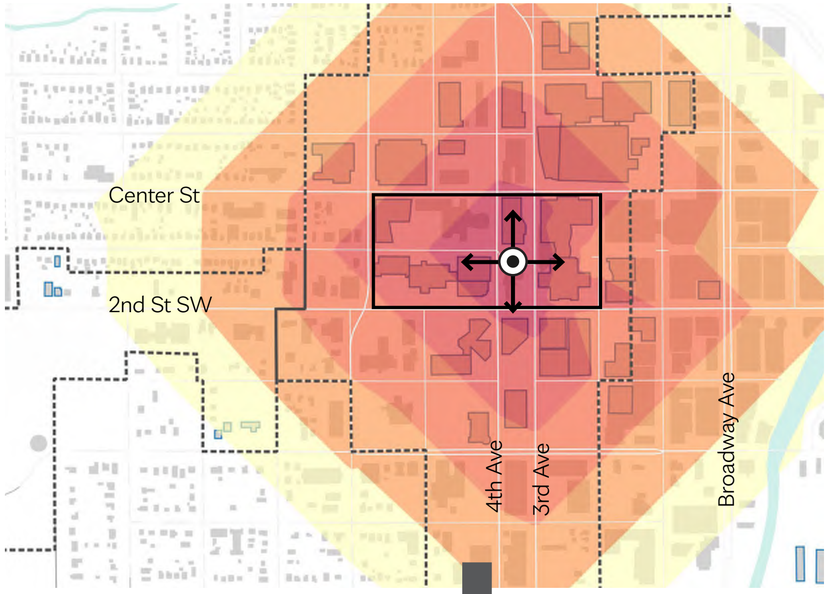
Existing

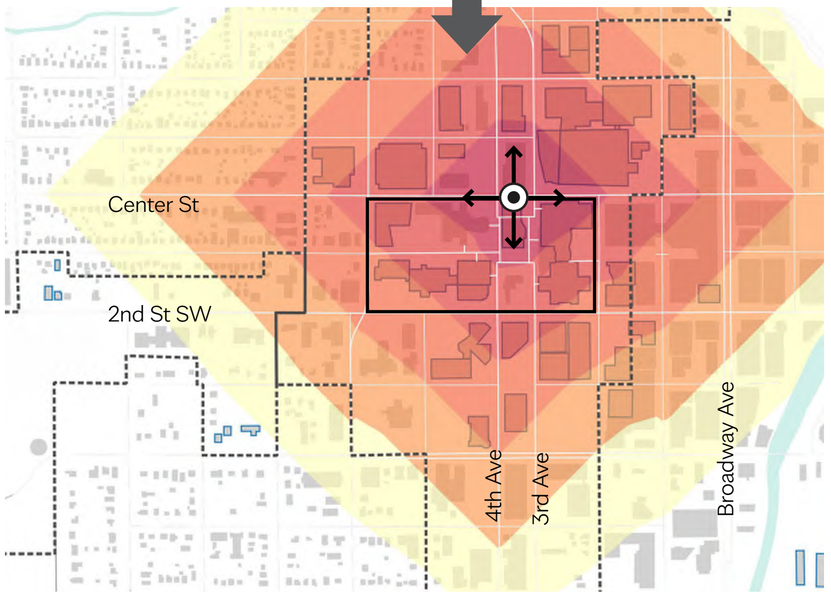
Within the 10 minute walking parameter, starting from the Mayo Clinic area one can reach most of the Mayo Clinic buildings located downtow.

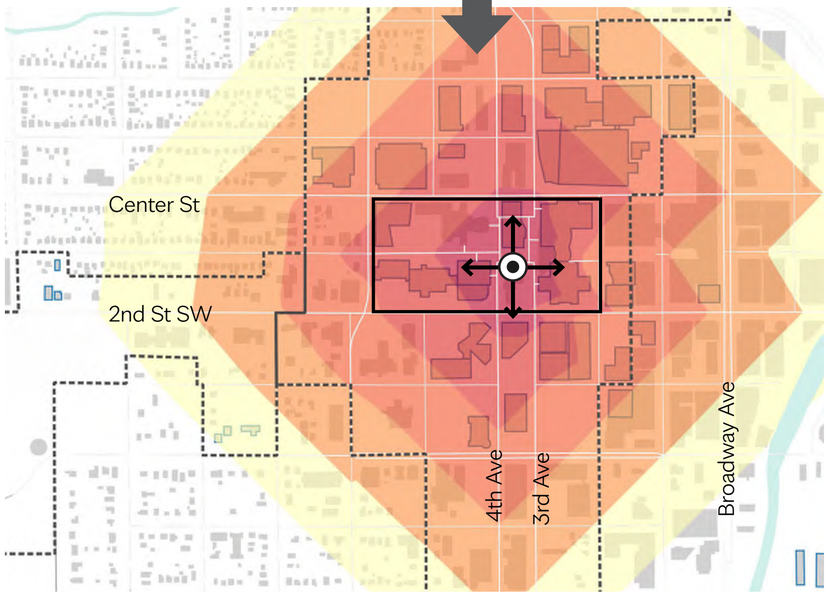
Planned

The possibility of having a public pedestrian passage throug hthe lobby will allow to leave the pedestrian accessibility almost unvaried.









Catchement Areas

Pedestrian (min)

- 2
- 4
- 6
- 8
- 10

Appendix A - Node Evaluation Summary

Node Evaluation Summary - Existing Condition AM

The City engineering standards require that the maximum LOS of the intersection is D, maximum LOS of each single movement is E and saturation is less than 0.9.

Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
UNS	2nd St NW - 2nd Ave NW	2nd St Ave NW North to 2nd St NW West	N-W	SBR	0	0.0	A
		2nd St Ave NW North to Mayo Clinic Jacobson Building	N-S	SBT	0	0.0	A
		2nd St Ave NW North to 2nd St NW East	N-E	SBL	2	1.0	A
		2nd St NW East to 2nd St Ave NW North	E-N	WBR	24	0.8	A
		2nd St NW East to 2nd St NW West	E-W	WBT	88	0.5	A
		2nd St NW East to Mayo Clinic Jacobson Building	E-S	WBL	14	1.5	A
		Mayo Clinic Jacobson Building to 2nd St NW West	S-W	NBL	13	0.9	A
		Mayo Clinic Jacobson Building to 2nd St Ave NW North	S-N	NBT	0	0.0	A
		Mayo Clinic Jacobson Building to 2nd St NW East	S-E	NBR	11	0.6	A
		2nd St NW West to 2nd St Ave NW North	W-N	EBL	6	1.5	A
		2nd St NW West to 2nd St NW East	W-E	EBT	72	0.5	A
		2nd St NW West to Mayo Clinic Jacobson Building	W-S	EBR	11	0.7	A
		--	**Total**		**243**	**0.7**	**A**
SIG	W Center St - 2nd Ave SW	W Center East to W Center West	E-W	WBT	223	26.5	C
		W Center East to 2nd Ave SW South	E-S	WBL	44	31.9	C
		2nd Ave SW South to W Center West	S-W	NBL	36	18.4	B
		2nd Ave SW South to W Center East	S-E	NBR	36	6.1	A
		W Center West to W Center East	W-E	EBT	188	19.7	B
		W Center West to 2nd Ave SW South	W-S	EBR	40	15.4	B
		--	**Total**		**566**	**22.1**	**C**
SIG	2nd St SW - 2nd Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	412	27.8	C
		2nd St SW East to 2nd Ave SW South	E-S	WBL	89	41.2	D
		2nd Ave SW South to 2nd St SW East	S-E	NBR	33	10.0	A
		2nd Ave SW South to 2nd St SW West	S-W	NBL	31	33.8	C
		2nd St SW West to 2nd Ave SW South	W-S	EBR	51	8.8	A
		2nd St SW West to 2nd St SW East	W-E	EBT	332	13.5	B
		--	**Total**		**948**	**22.6**	**C**
SIG	2nd St NW - 3rd Ave NW	2nd St NW East to 3rd Ave NW North	E-N	WBR	22	20.9	C
		2nd St NW East to 2nd St NW West	E-W	WBT	80	22.2	C
		3rd Ave NW South to 2nd St NW West	S-W	NBL	36	6.6	A
		3rd Ave NW South to 3rd Ave NW North	S-N	NBT	153	6.2	A
		3rd Ave NW South to 2nd St NW East	S-E	NBR	39	6.8	A
		2nd St NW West to 3rd Ave NW North	W-N	EBL	13	21.9	C
		2nd St NW West to 2nd St NW East	W-E	EBT	51	22.8	C
		--	**Total**		**394**	**13.0**	**B**
SIG	1 st St NW - 3rd Ave NW	3rd Ave NW South to 1st St NW West	S-W	NBL	54	6.1	A
		3rd Ave NW South to 3rd Ave NW North	S-N	NBT	304	5.0	A
		1st St NW West to 3rd Ave NW North	W-N	EBL	86	47.0	D
		--	**Total**		**445**	**13.3**	**B**
SIG	W Center St - 3rd Ave NW	W Center East to 3rd Ave NW North	E-N	WBR	80	16.6	B
		W Center East to W Center West	E-W	WBT	178	22.9	C
		3rd Ave NW South to W Center West	S-W	NBL	92	29.9	C
		3rd Ave NW South to 3rd Ave NW North	S-N	NBT	215	16.8	B
		3rd Ave NW South to W Center East	S-E	NBR	91	11.8	B
		W Center West to 3rd Ave NW North	W-N	EBL	64	40.2	D
		W Center West to W Center East	W-E	EBT	137	34.0	C
		--	**Total**		**858**	**23.4**	**C**

Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
UNS	3rd Ave SW- Parking Entrance	Dropoff Exit to 3rd Ave SW North	SE-N	WBR	116	13.0	B
		Dropoff Exit to Parking Entrance	SE-W	WBT	18	21.9	C
		3rd Ave SW South to 3rd Ave SW North	S-N	NBT	285	1.8	A
		3rd Ave SW South to Parking Entrance	S-W	NBL	346	7.6	A
		--	**Total**		**765**	**6.6**	**A**
UNS	1st St SW - 3rd Ave SW	3rd Ave SW South to 3rd Ave SW North	S-N	NBT	480	10.5	B
		3rd Ave SW South to Dropoff Entrance	S-NE	NBR	92	11.0	B
		1st St SW West to 3rd Ave SW North	W-N	EBL	151	32.0	D
		1st St SW West to Dropoff Entrance	W-NE	EBT	44	34.8	D
		--	**Total**		**766**	**16.2**	**C**
SIG	2nd St SW - 3rd Ave SW	2nd St SW East to 3rd Ave SW North	E-N	WBR	226	65.7	E
		2nd St SW East to 2nd St SW West	E-W	WBT	219	55.7	E
		3rd Ave SW South to 2nd St SW West	S-W	NBL	50	32.3	C
		3rd Ave SW South to 3rd Ave SW North	S-N	NBT	106	32.6	C
		3rd Ave SW South to 2nd St SW East	S-E	NBR	59	27.4	C
		2nd St SW West to 3rd Ave SW North	W-N	EBL	242	19.2	B
		2nd St SW West to 2nd St SW East	W-E	EBT	325	2.5	A
		--	**Total**		**1225**	**32.0**	**C**
SIG	2nd St NW - 4th Ave NW	4th Ave NW North to 2nd St NW East	N-W	SBR	37	14.9	B
		4th Ave NW North to 4th Ave NW South	N-S	SBT	611	13.8	B
		4th Ave NW North to 2nd St NW East	N-E	SBL	32	14.9	B
		2nd St NW East to 2nd St NW East	E-W	WBT	51	43.0	D
		2nd St NW East to 4th Ave NW South	E-S	WBL	65	43.3	D
		2nd St NW East to 2nd St NW East	W-E	EBT	33	21.5	C
		2nd St NW East to 4th Ave NW South	W-S	EBR	12	23.0	C
		--	**Total**		**840**	**18.4**	**B**
UNS	1 st St NW - 4th Ave NW	4th Ave NW North to 1st St NW West	N-W	SBR	219	4.7	A
		4th Ave NW North to 4th Ave NW South	N-S	SBT	421	3.1	A
		4th Ave NW North to 1st St NW East	N-E	SBL	72	2.6	A
		1st St NW East to 1st St NW West	E-W	WBT	32	4.3	A
		1st St NW East to 4th Ave NW South	E-S	WBL	23	2.9	A
		1st St NW West to 1st St NW East	W-E	EBT	14	4.7	A
		1st St NW West to 4th Ave NW South	W-S	EBR	7	2.0	A
		--	**Total**		**788**	**3.5**	**A**
SIG	W Center St - 4th Ave NW	4th Ave NW North to W Center West	N-W	SBR	26	7.1	A
		4th Ave NW North to 4th Ave NW South	N-S	SBT	299	10.3	B
		4th Ave NW North to W Center East	N-E	SBL	123	16.6	B
		W Center East to W Center West	E-W	WBT	191	26.1	C
		W Center East to 4th Ave NW South	E-S	WBL	78	28.5	C
		W Center West to W Center East	W-E	EBT	79	26.5	C
		W Center West to 4th Ave NW South	W-S	EBR	12	10.2	B
		--	**Total**		**808**	**18.2**	**B**
UNS	4th Ave NW - Parking exit	Parking Exit to 4th Ave NW South	SE-S	WBL	51	2.1	A
		4th Ave NW North to 4th Ave NW South	N-S	SBT	388	0.5	A
		--	**Total**		**439**	**0.7**	**A**
UNS	1st St SW - 4th Ave SW	4th Ave NW North to 1st St SW West	N-W	SBR	59	1.0	A
		4th Ave NW North to 4th Ave NW South	N-S	SBT	205	2.8	A
		4th Ave NW North to 1st St SW East	N-SE	SBL	175	1.4	A
		1st St SW West to 1st St SW East	W-SE	EBT	20	2.5	A
		1st St SW West to 4th Ave NW South	W-S	EBR	17	4.0	A
		--	**Total**		**475**	**2.1**	**A**

Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
SIG	2nd St SW - 4th Ave SW	4th Ave NW North to 4th Ave NW South	N-S	SBT	48	29.8	C
		4th Ave NW North to 2nd St SW East	N-E	SBL	97	32.0	C
		2nd St SW East to 2nd St SW West	E-W	WBT	239	10.1	B
		2nd St SW East to 4th Ave NW South	E-S	WBL	29	14.0	B
		2nd St SW West to 2nd St SW East	W-E	EBT	470	82.8	F
		2nd St SW West to 4th Ave NW South	W-S	EBR	55	24.7	C
		--	**Total**		**1015**	**48.4**	**D**
UNS	2nd St SW - 5th Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	316	0.8	A
		5th Ave SW South to 2nd St SW East	S-E	NBR	25	39.1	E
		2nd St SW West to 2nd St SW East	W-E	EBT	519	13.6	B
		2nd St SW West to 5th Ave SW South	W-S	EBR	75	9.5	A
		--	**Total**		**934**	**9.6**	**A**
UNS	1st St SW - 6th Ave SW	6th Ave SW North to 1st St SW West	N-W	SBR	5	1.1	A
		6th Ave SW North to 6th Ave SW South	N-S	SBT	145	1.1	A
		6th Ave SW North to 1st St SW East	N-E	SBL	42	5.3	A
		1st St SW East to 6th Ave SW North	E-N	WBR	26	1.9	A
		1st St SW East to 1st St SW West	E-W	WBT	13	3.2	A
		1st St SW East to 6th Ave SW South	E-S	WBL	18	3.7	A
		6th Ave SW South to 1st St SW West	S-W	NBL	9	3.0	A
		6th Ave SW South to 6th Ave SW North	S-N	NBT	332	0.5	A
		6th Ave SW South to 1st St SW East	S-E	NBR	184	0.7	A
		1st St SW West to 6th Ave SW North	W-N	EBL	4	4.2	A
		1st St SW West to 1st St SW East	W-E	EBT	19	5.7	A
		1st St SW West to 6th Ave SW South	W-S	EBR	8	1.7	A
		--	**Total**		**805**	**1.2**	**A**
SIG	2nd St SW - 6th Ave SW	6th Ave SW North to 2nd St SW West	N-W	SBR	42	6.7	A
		6th Ave SW North to 6th Ave SW South	N-SW	SBT	97	34.0	C
		6th Ave SW North to 2nd St SW East	N-E	SBL	31	49.8	D
		2nd St SW East to 6th Ave SW North	E-N	WBR	41	12.2	B
		2nd St SW East to 2nd St SW West	E-W	WBT	226	18.8	B
		2nd St SW East to 6th Ave SW South	E-SW	WBL	47	39.3	D
		6th Ave SW South to 2nd St SW West	SW-W	NBL	27	86.7	F
		6th Ave SW South to 6th Ave SW North	SW-N	NBT	304	91.7	F
		6th Ave SW South to 2nd St SW East	SW-E	NBR	39	87.5	F
		2nd St SW West to 6th Ave SW North	W-N	EBL	179	13.1	B
		2nd St SW West to 2nd St SW East	W-E	EBT	534	12.8	B
		2nd St SW West to 6th Ave SW South Bypass	W-S	EBR	66	4.2	A
		--	**Total**		**1633**	**33.7**	**C**

Node Evaluation Summary - Existing Condition PM

The City engineering standards require that the maximum LOS of the intersection is D, maximum LOS of each single movement is E and saturation is less than 0.9.

Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
UNS	2nd St NW - 2nd Ave NW	2nd St Ave NW North to 2nd St NW West	N-W	SBR	9	0.6	A
		2nd St Ave NW North to Mayo Clinic Jacobson Building	N-S	SBT	0	0.0	A
		2nd St Ave NW North to 2nd St NW East	N-E	SBL	1	1.2	A
		2nd St NW East to 2nd St Ave NW North	E-N	WBR	9	0.8	A
		2nd St NW East to 2nd St NW West	E-W	WBT	67	0.5	A
		2nd St NW East to Mayo Clinic Jacobson Building	E-S	WBL	7	2.3	A
		Mayo Clinic Jacobson Building to 2nd St NW West	S-W	NBL	15	1.5	A
		Mayo Clinic Jacobson Building to 2nd St Ave NW North	S-N	NBT	0	0.0	A
		Mayo Clinic Jacobson Building to 2nd St NW East	S-E	NBR	10	1.1	A
		2nd St NW West to 2nd St Ave NW North	W-N	EBL	11	1.0	A
		2nd St NW West to 2nd St NW East	W-E	EBT	174	0.4	A
		2nd St NW West to Mayo Clinic Jacobson Building	W-S	EBR	13	0.7	A
		--	Total		315	0.6	A
SIG	W Center St - 2nd Ave SW	W Center East to W Center West	E-W	WBT	155	38.9	D
		W Center East to 2nd Ave SW South	E-S	WBL	39	54.1	D
		2nd Ave SW South to W Center West	S-W	NBL	53	17.4	B
		2nd Ave SW South to W Center East	S-E	NBR	68	7.7	A
		W Center West to W Center East	W-E	EBT	277	22.9	C
		W Center West to 2nd Ave SW South	W-S	EBR	65	20.0	C
		--	Total		657	26.3	C
SIG	2nd St SW - 2nd Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	346	30.9	C
		2nd St SW East to 2nd Ave SW South	E-S	WBL	4	47.4	D
		2nd Ave SW South to 2nd St SW East	S-E	NBR	89	18.4	B
		2nd Ave SW South to 2nd St SW West	S-W	NBL	88	39.8	D
		2nd St SW West to 2nd Ave SW South	W-S	EBR	43	9.1	A
		2nd St SW West to 2nd St SW East	W-E	EBT	548	14.0	B
		--	Total		1118	21.8	C
SIG	2nd St NW - 3rd Ave NW	2nd St NW East to 3rd Ave NW North	E-N	WBR	29	11.9	B
		2nd St NW East to 2nd St NW West	E-W	WBT	63	10.5	B
		3rd Ave NW South to 2nd St NW West	S-W	NBL	16	40.8	D
		3rd Ave NW South to 3rd Ave NW North	S-N	NBT	299	42.3	D
		3rd Ave NW South to 2nd St NW East	S-E	NBR	65	43.8	D
		2nd St NW West to 3rd Ave NW North	W-N	EBL	114	7.7	A
		2nd St NW West to 2nd St NW East	W-E	EBT	132	5.9	A
		--	Total		718	26.3	C
SIG	1 st St NW - 3rd Ave NW	3rd Ave NW South to 1st St NW West	S-W	NBL	34	16.7	B
		3rd Ave NW South to 3rd Ave NW North	S-N	NBT	347	14.5	B
		1st St NW West to 3rd Ave NW North	W-N	EBL	67	35.0	C
		--	Total		448	17.8	B
SIG	W Center St - 3rd Ave NW	W Center East to 3rd Ave NW North	E-N	WBR	93	10.6	B
		W Center East to W Center West	E-W	WBT	115	13.8	B
		3rd Ave NW South to W Center West	S-W	NBL	71	32.6	C
		3rd Ave NW South to 3rd Ave NW North	S-N	NBT	229	25.4	C
		3rd Ave NW South to W Center East	S-E	NBR	121	19.2	B
		W Center West to 3rd Ave NW North	W-N	EBL	59	16.8	B
		W Center West to W Center East	W-E	EBT	218	9.4	A
		--	Total		906	17.8	B

Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
UNS	3rd Ave SW- Parking Entrance	Dropoff Exit to 3rd Ave SW North	SE-N	WBR	112	10.8	B
		Dropoff Exit to Parking Entrance	SE-W	WBT	0	0.0	A
		3rd Ave SW South to 3rd Ave SW North	S-N	NBT	307	0.6	A
		3rd Ave SW South to Parking Entrance	S-W	NBL	64	1.3	A
		--	Total		483	3.1	A
UNS	1st St SW - 3rd Ave SW	3rd Ave SW South to 3rd Ave SW North	S-N	NBT	278	9.1	A
		3rd Ave SW South to Dropoff Entrance	S-NE	NBR	47	10.3	B
		1st St SW West to 3rd Ave SW North	W-N	EBL	93	30.4	D
		1st St SW West to Dropoff Entrance	W-NE	EBT	65	33.6	D
		--	Total		482	16.6	C
SIG	2nd St SW - 3rd Ave SW	2nd St SW East to 3rd Ave SW North	E-N	WBR	107	79.7	E
		2nd St SW East to 2nd St SW West	E-W	WBT	333	78.3	E
		3rd Ave SW South to 2nd St SW West	S-W	NBL	76	31.6	C
		3rd Ave SW South to 3rd Ave SW North	S-N	NBT	62	33.7	C
		3rd Ave SW South to 2nd St SW East	S-E	NBR	61	23.7	C
		2nd St SW West to 3rd Ave SW North	W-N	EBL	156	10.6	B
		2nd St SW West to 2nd St SW East	W-E	EBT	533	3.1	A
		--	Total		1326	33.2	C
SIG	2nd St NW - 4th Ave NW	4th Ave NW North to 2nd St NW East	N-W	SBR	23	24.1	C
		4th Ave NW North to 4th Ave NW South	N-S	SBT	207	23.1	C
		4th Ave NW North to 2nd St NW East	N-E	SBL	26	22.9	C
		2nd St NW East to 2nd St NW East	E-W	WBT	46	10.3	B
		2nd St NW East to 4th Ave NW South	E-S	WBL	32	14.8	B
		2nd St NW East to 2nd St NW East	W-E	EBT	220	12.1	B
		2nd St NW East to 4th Ave NW South	W-S	EBR	16	13.4	B
		--	Total		570	17.1	B
UNS	1 st St NW - 4th Ave NW	4th Ave NW North to 1st St NW West	N-W	SBR	24	2.8	A
		4th Ave NW North to 4th Ave NW South	N-S	SBT	333	2.4	A
		4th Ave NW North to 1st St NW East	N-E	SBL	32	2.4	A
		1st St NW East to 1st St NW West	E-W	WBT	11	2.1	A
		1st St NW East to 4th Ave NW South	E-S	WBL	23	2.1	A
		1st St NW West to 1st St NW East	W-E	EBT	33	2.4	A
		1st St NW West to 4th Ave NW South	W-S	EBR	35	1.9	A
		--	Total		491	2.3	A
SIG	W Center St - 4th Ave NW	4th Ave NW North to W Center West	N-W	SBR	27	11.0	B
		4th Ave NW North to 4th Ave NW South	N-S	SBT	222	19.0	B
		4th Ave NW North to W Center East	N-E	SBL	142	39.0	D
		W Center East to W Center West	E-W	WBT	123	23.2	C
		W Center East to 4th Ave NW South	E-S	WBL	63	24.6	C
		W Center West to W Center East	W-E	EBT	136	13.9	B
		W Center West to 4th Ave NW South	W-S	EBR	31	8.1	A
		--	Total		743	22.3	C
UNS	4th Ave NW - Parking exit	Parking Exit to 4th Ave NW South	SE-S	WBL	229	3.5	A
		4th Ave NW North to 4th Ave NW South	N-S	SBT	316	0.8	A
		--	Total		545	1.9	A
UNS	1st St SW - 4th Ave SW	4th Ave NW North to 1st St SW West	N-W	SBR	59	2.9	A
		4th Ave NW North to 4th Ave NW South	N-S	SBT	355	6.0	A
		4th Ave NW North to 1st St SW East	N-SE	SBL	132	2.4	A
		1st St SW West to 1st St SW East	W-SE	EBT	26	12.2	B
		1st St SW West to 4th Ave NW South	W-S	EBR	49	21.5	C
		--	Total		620	6.4	A

Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
SIG	2nd St SW - 4th Ave SW	4th Ave NW North to 4th Ave NW South	N-S	SBT	18	38.6	D
		4th Ave NW North to 2nd St SW East	N-E	SBL	190	40.7	D
		2nd St SW East to 2nd St SW West	E-W	WBT	399	11.7	B
		2nd St SW East to 4th Ave NW South	E-S	WBL	11	16.5	B
		2nd St SW West to 2nd St SW East	W-E	EBT	497	69.8	E
		2nd St SW West to 4th Ave NW South	W-S	EBR	18	18.8	B
		--	Total		1334	45.0	D
UNS	2nd St SW - 5th Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	598	0.9	A
		5th Ave SW South to 2nd St SW East	S-E	NBR	64	10.5	B
		2nd St SW West to 2nd St SW East	W-E	EBT	448	2.1	A
		2nd St SW West to 5th Ave SW South	W-S	EBR	24	0.9	A
		--	Total		1134	1.9	A
UNS	1st St SW - 6th Ave SW	6th Ave SW North to 1st St SW West	N-W	SBR	16	4.0	A
		6th Ave SW North to 6th Ave SW South	N-S	SBT	327	7.6	A
		6th Ave SW North to 1st St SW East	N-E	SBL	22	7.2	A
		1st St SW East to 6th Ave SW North	E-N	WBR	70	17.9	C
		1st St SW East to 1st St SW West	E-W	WBT	59	31.2	D
		1st St SW East to 6th Ave SW South	E-S	WBL	61	30.6	D
		6th Ave SW South to 1st St SW West	S-W	NBL	17	16.4	C
		6th Ave SW South to 6th Ave SW North	S-N	NBT	143	0.5	A
		6th Ave SW South to 1st St SW East	S-E	NBR	21	0.6	A
		1st St SW West to 6th Ave SW North	W-N	EBL	5	4.1	A
		1st St SW West to 1st St SW East	W-E	EBT	11	10.4	B
		1st St SW West to 6th Ave SW South	W-S	EBR	9	6.3	A
		--	Total		759	10.6	B
SIG	2nd St SW - 6th Ave SW	6th Ave SW North to 2nd St SW West	N-W	SBR	90	16.3	B
		6th Ave SW North to 6th Ave SW South	N-SW	SBT	238	66.3	E
		6th Ave SW North to 2nd St SW East	N-E	SBL	66	66.3	E
		2nd St SW East to 6th Ave SW North	E-N	WBR	40	18.2	B
		2nd St SW East to 2nd St SW West	E-W	WBT	475	19.6	B
		2nd St SW East to 6th Ave SW South	E-SW	WBL	83	27.9	C
		6th Ave SW South to 2nd St SW West	SW-W	NBL	122	39.7	D
		6th Ave SW South to 6th Ave SW North	SW-N	NBT	105	32.8	C
		6th Ave SW South to 2nd St SW East	SW-E	NBR	36	20.3	C
		2nd St SW West to 6th Ave SW North	W-N	EBL	37	20.3	C
		2nd St SW West to 2nd St SW East	W-E	EBT	370	17.1	B
		2nd St SW West to 6th Ave SW South Bypass	W-S	EBR	66	4.8	A
		--	Total		1728	29.2	C

Node Evaluation Summary - Project Scenario AM

The City engineering standards require that the maximum LOS of the intersection is D, maximum LOS of each single movement is E and saturation is less than 0.9.

Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
UNS	2nd St NW - 2nd Ave NW	2nd St Ave NW North to 2nd St NW West	N-W	SBR	10	1.6	A
		2nd St Ave NW North to Mayo Clinic Jacobson Building	N-S	SBT	12	1.5	A
		2nd St Ave NW North to 2nd St NW East	N-E	SBL	8	2.3	A
		2nd St NW East to 2nd St Ave NW North	E-N	WBR	39	0.8	A
		2nd St NW East to 2nd St NW West	E-W	WBT	160	0.6	A
		2nd St NW East to Mayo Clinic Jacobson Building	E-S	WBL	11	1.4	A
		Mayo Clinic Jacobson Building to 2nd St NW West	S-W	NBL	7	1.6	A
		Mayo Clinic Jacobson Building to 2nd St Ave NW North	S-N	NBT	19	2.1	A
		Mayo Clinic Jacobson Building to 2nd St NW East	S-E	NBR	8	1.1	A
		2nd St NW West to 2nd St Ave NW North	W-N	EBL	14	2.0	A
		2nd St NW West to 2nd St NW East	W-E	EBT	113	0.6	A
		2nd St NW West to Mayo Clinic Jacobson Building	W-S	EBR	9	0.8	A
		--	**Total**		**408**	**0.9**	**A**
SIG	W Center St - 2nd Ave SW	W Center East to W Center West	E-W	WBT	380	63.4	E
		W Center East to 2nd Ave SW South	E-S	WBL	45	66.6	E
		2nd Ave SW South to W Center West	S-W	NBL	37	103.8	F
		2nd Ave SW South to W Center East	S-E	NBR	35	41.2	D
		W Center West to W Center East	W-E	EBT	346	4.9	A
		W Center West to 2nd Ave SW South	W-S	EBR	42	3.7	A
		--	**Total**		**883**	**38.9**	**D**
SIG	2nd St SW - 2nd Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	112	18.6	B
		2nd St SW East to 2nd Ave SW South	E-S	WBL	134	39.3	D
		2nd Ave SW South to 2nd St SW East	S-E	NBR	54	10.9	B
		2nd Ave SW South to 2nd St SW West	S-W	NBL	38	32.9	C
		2nd St SW West to 2nd Ave SW South	W-S	EBR	34	12.5	B
		2nd St SW West to 2nd St SW East	W-E	EBT	144	14.3	B
		--	**Total**		**516**	**22.6**	**C**
SIG	2nd St NW - 3rd Ave NW	2nd St NW East to 3rd Ave NW North	E-N	WBR	19	25.1	C
		2nd St NW East to 2nd St NW West	E-W	WBT	157	27.3	C
		3rd Ave NW South to 2nd St NW West	S-W	NBL	41	14.1	B
		3rd Ave NW South to 3rd Ave NW North	S-N	NBT	314	8.8	A
		3rd Ave NW South to 2nd St NW East	S-E	NBR	63	9.8	A
		2nd St NW West to 3rd Ave NW North	W-N	EBL	11	28.7	C
		2nd St NW West to 2nd St NW East	W-E	EBT	72	23.6	C
		--	**Total**		**678**	**15.9**	**B**
SIG	1 st St NW - 3rd Ave NW	3rd Ave NW South to 1st St NW West	S-W	NBL	150	35.9	D
		3rd Ave NW South to 3rd Ave NW North	S-N	NBT	151	25.3	C
		1st St NW West to 3rd Ave NW North	W-N	EBL	417	23.2	C
		--	**Total**		**718**	**26.4**	**C**
SIG	W Center St - 3rd Ave NW	W Center East to 3rd Ave NW North	E-N	WBR	94	54.5	D
		W Center East to W Center West	E-W	WBT	322	61.4	E
		3rd Ave NW South/Dropoff to W Center West	S-W	NBL	73	18.8	B
		3rd Ave NW South/Dropoff to 3rd Ave NW North	S-N	NBT	87	25.2	C
		3rd Ave NW South/Dropoff to W Center East	S-E	NBR	11	9.2	A
		W Center West to 3rd Ave NW North	W-N	EBL	120	13.5	B
		W Center West to W Center East	W-E	EBT	376	10.2	B
		--	**Total**		**1082**	**31.5**	**C**

Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
SIG	2nd St SW - 3rd Ave SW	2nd St SW East to 3rd Ave SW North	E-N	WBR	57	17.2	B
		2nd St SW East to 2nd St SW West	E-W	WBT	92	30.2	C
		3rd Ave SW South to 2nd St SW West	S-W	NBL	140	65.9	E
		3rd Ave SW South to 3rd Ave SW North	S-N	NBT	70	46.9	D
		3rd Ave SW South to 2nd St SW East	S-E	NBR	38	29.4	C
		2nd St SW West to 3rd Ave SW North	W-N	EBL	55	4.0	A
		2nd St SW West to 2nd St SW East	W-E	EBT	141	1.5	A
		--	**Total**		**592**	**30.2**	**C**
SIG	2nd St NW - 4th Ave NW	4th Ave NW North to 2nd St NW East	N-W	SBR	77	15.0	B
		4th Ave NW North to 4th Ave NW South	N-S	SBT	540	14.5	B
		4th Ave NW North to 2nd St NW East	N-E	SBL	13	14.9	B
		2nd St NW East to 2nd St NW East	E-W	WBT	99	51.0	D
		2nd St NW East to 4th Ave NW South	E-S	WBL	100	53.0	D
		2nd St NW East to 2nd St NW East	W-E	EBT	70	22.6	C
		2nd St NW East to 4th Ave NW South	W-S	EBR	44	25.6	C
		--	**Total**		**942**	**23.5**	**C**
UNS	1 st St NW - 4th Ave NW	4th Ave NW North to 1st St NW West	N-W	SBR	252	6.9	A
		4th Ave NW North to 4th Ave NW South	N-S	SBT	251	7.9	A
		4th Ave NW North to 1st St NW East	N-E	SBL	302	23.1	C
		1st St NW East to 1st St NW West	E-W	WBT	26	19.2	C
		1st St NW East to 4th Ave NW South	E-S	WBL	123	12.9	B
		1st St NW West to 1st St NW East	W-E	EBT	117	13.6	B
		1st St NW West to 4th Ave NW South	W-S	EBR	188	5.9	A
		--	**Total**		**1258**	**12.4**	**B**
SIG	W Center St - 4th Ave NW	4th Ave NW North to W Center West	N-W	SBR	28	25.9	C
		4th Ave NW North to 4th Ave NW South	N-S	SBT	121	34.9	C
		4th Ave NW North to W Center East	N-E	SBL	231	46.1	D
		W Center East to W Center West	E-W	WBT	386	9.6	A
		W Center East to 4th Ave NW South	E-S	WBL	9	15.2	B
		W Center West to W Center East	W-E	EBT	265	35.5	D
		W Center West to 4th Ave NW South	W-S	EBR	40	27.5	C
		--	**Total**		**1081**	**27.8**	**C**
SIG	2nd St SW - 4th Ave SW	4th Ave NW North to 2nd St SW West	N-W	SBR	38	45.2	D
		4th Ave NW North to 4th Ave NW South	N-S	SBT	137	49.5	D
		4th Ave NW North to 2nd St SW East	N-E	SBL	6	49.6	D
		2nd St SW East to 2nd St SW West	E-W	WBT	107	3.7	A
		2nd St SW East to 4th Ave NW South	E-S	WBL	125	7.0	A
		2nd St SW West to 2nd St SW East	W-E	EBT	188	29.0	C
		2nd St SW West to 4th Ave NW South	W-S	EBR	200	10.0	A
		--	**Total**		**802**	**21.8**	**C**
UNS	2nd St SW - 5th Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	147	0.3	A
		5th Ave SW South to 2nd St SW East	S-E	NBR	140	2.0	A
		2nd St SW West to 5th Ave SW South	W-S	EBR	167	1.2	A
		2nd St SW West to 2nd St SW East	W-E	EBT	188	0.3	A
		--	**Total**		**643**	**0.9**	**A**

Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
UNS	1st St SW - 6th Ave SW	6th Ave SW North to 6th Ave SW South	N-S	SBT	244	0.5	A
		6th Ave SW North to 1st St SW East	N-E	SBL	0	0.0	A
		1st St SW East to 6th Ave SW North	E-N	WBR	11	2.5	A
		1st St SW East to 1st St SW West	E-W	WBT	12	5.3	A
		1st St SW East to 6th Ave SW South	E-S	WBL	12	7.9	A
		6th Ave SW South to 1st St SW West	S-W	NBL	13	2.3	A
		6th Ave SW South to 6th Ave SW North	S-N	NBT	399	0.7	A
		6th Ave SW South to 1st St SW East	S-E	NBR	29	0.7	A
		1st St SW West to 6th Ave SW North	W-N	EBL	27	5.1	A
		1st St SW West to 1st St SW East	W-E	EBT	5	4.5	A
		1st St SW West to 6th Ave SW South	W-S	EBR	148	2.6	A
		--	**Total**		**943**	**1.3**	**A**
SIG	2nd St SW - 6th Ave SW	6th Ave SW North to 2nd St SW West	N-W	SBR	34	12.7	B
		6th Ave SW North to 6th Ave SW South	N-SW	SBT	133	20.2	C
		6th Ave SW North to 2nd St SW East	N-E	SBL	237	27.0	C
		2nd St SW East to 6th Ave SW North	E-N	WBR	55	15.8	B
		2nd St SW East to 2nd St SW West	E-W	WBT	86	40.8	D
		2nd St SW East to 6th Ave SW South	E-SW	WBL	7	42.6	D
		6th Ave SW South to 2nd St SW West	SW-W	NBL	44	35.8	D
		6th Ave SW South to 6th Ave SW North	SW-N	NBT	275	40.2	D
		6th Ave SW South to 2nd St SW East	SW-E	NBR	7	35.6	D
		2nd St SW West to 6th Ave SW North	W-N	EBL	110	44.0	D
		2nd St SW West to 2nd St SW East	W-E	EBT	112	22.5	C
		2nd St SW West to 6th Ave SW South Bypass	W-S	EBR	65	1.9	A
		--	**Total**		**1164**	**29.7**	**C**

In the project AM scenario all movements have LOS lower than E, except for one movement at the intersection between Center Street and 2nd Street. However this affects only a very small number of vehicles (37 out of a total of 887 - 4% of total). The flow is coming from the Mayo/ Kahler drop-off where there is plent y of space for queuing, without the risk of backing up into other intersections. Different configurations have been tested and results are shown in the next page.

Node Evaluation Summary - Project Scenario PM

The City engineering standards require that the maximum LOS of the intersection is D, maximum LOS of each single movement is E and saturation is less than 0.9.

Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
UNS	2nd St NW - 2nd Ave NW	2nd St Ave NW North to 2nd St NW West	N-W	SBR	5	1.1	A
		2nd St Ave NW North to Mayo Clinic Jacobson Building	N-S	SBT	18	2.8	A
		2nd St Ave NW North to 2nd St NW East	N-E	SBL	10	3.4	A
		2nd St NW East to 2nd St Ave NW North	E-N	WBR	17	0.6	A
		2nd St NW East to 2nd St NW West	E-W	WBT	120	0.5	A
		2nd St NW East to Mayo Clinic Jacobson Building	E-S	WBL	5	2.1	A
		Mayo Clinic Jacobson Building to 2nd St NW West	S-W	NBL	13	3.1	A
		Mayo Clinic Jacobson Building to 2nd St Ave NW North	S-N	NBT	0	0.0	A
		Mayo Clinic Jacobson Building to 2nd St NW East	S-E	NBR	24	2.1	A
		2nd St NW West to 2nd St Ave NW North	W-N	EBL	54	1.6	A
		2nd St NW West to 2nd St NW East	W-E	EBT	336	0.7	A
		2nd St NW West to Mayo Clinic Jacobson Building	W-S	EBR	11	0.9	A
		--	**Total**		**614**	**0.9**	**A**
SIG	W Center St - 2nd Ave SW	W Center East to W Center West	E-W	WBT	346	17.5	B
		W Center East to 2nd Ave SW South	E-S	WBL	41	21.8	C
		2nd Ave SW South to W Center West	S-W	NBL	35	50.7	D
		2nd Ave SW South to W Center East	S-E	NBR	67	22.9	C
		W Center West to W Center East	W-E	EBT	401	3.8	A
		W Center West to 2nd Ave SW South	W-S	EBR	63	3.5	A
		--	**Total**		**953**	**12.7**	**B**
SIG	2nd St SW - 2nd Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	219	17.5	B
		2nd St SW East to 2nd Ave SW South	E-S	WBL	3	23.7	C
		2nd Ave SW South to 2nd St SW East	S-E	NBR	187	13.1	B
		2nd Ave SW South to 2nd St SW West	S-W	NBL	31	34.8	C
		2nd St SW West to 2nd Ave SW South	W-S	EBR	141	15.8	B
		2nd St SW West to 2nd St SW East	W-E	EBT	120	16.7	B
		--	**Total**		**701**	**16.6**	**B**
SIG	2nd St NW - 3rd Ave NW	2nd St NW East to 3rd Ave NW North	E-N	WBR	8	13.1	B
		2nd St NW East to 2nd St NW West	E-W	WBT	130	12.4	B
		3rd Ave NW South to 2nd St NW West	S-W	NBL	92	30.7	C
		3rd Ave NW South to 3rd Ave NW North	S-N	NBT	364	30.3	C
		3rd Ave NW South to 2nd St NW East	S-E	NBR	163	33.4	C
		2nd St NW West to 3rd Ave NW North	W-N	EBL	105	5.2	A
		2nd St NW West to 2nd St NW East	W-E	EBT	239	3.8	A
		--	**Total**		**1101**	**20.4**	**C**
SIG	1 st St NW - 3rd Ave NW	3rd Ave NW South to 1st St NW West	S-W	NBL	145	59.5	E
		3rd Ave NW South to 3rd Ave NW North	S-N	NBT	210	39.7	D
		1st St NW West to 3rd Ave NW North	W-N	EBL	520	19.0	B
		--	**Total**		**875**	**30.8**	**C**
SIG	W Center St - 3rd Ave NW	W Center East to 3rd Ave NW North	E-N	WBR	133	28.0	C
		W Center East to W Center West	E-W	WBT	247	34.6	C
		3rd Ave NW South/Dropoff to W Center West	S-W	NBL	49	19.2	B
		3rd Ave NW South/Dropoff to 3rd Ave NW North	S-N	NBT	122	23.0	C
		3rd Ave NW South/Dropoff to W Center East	S-E	NBR	23	7.6	A
		W Center West to 3rd Ave NW North	W-N	EBL	99	10.4	B
		W Center West to W Center East	W-E	EBT	442	6.9	A
		--	**Total**		**1115**	**18.2**	**B**

Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
SIG	2nd St SW - 3rd Ave SW	2nd St SW East to 3rd Ave SW North	E-N	WBR	52	26.6	C
		2nd St SW East to 2nd St SW West	E-W	WBT	199	37.4	D
		3rd Ave SW South to 2nd St SW West	S-W	NBL	168	62.5	E
		3rd Ave SW South to 3rd Ave SW North	S-N	NBT	43	45.0	D
		3rd Ave SW South to 2nd St SW East	S-E	NBR	121	32.6	C
		2nd St SW West to 3rd Ave SW North	W-N	EBL	136	10.2	B
		2nd St SW West to 2nd St SW East	W-E	EBT	142	2.0	A
		--	**Total**		**861**	**31.4**	**C**
SIG	2nd St NW - 4th Ave NW	4th Ave NW North to 2nd St NW East	N-W	SBR	24	24.4	C
		4th Ave NW North to 4th Ave NW South	N-S	SBT	302	24.4	C
		4th Ave NW North to 2nd St NW East	N-E	SBL	11	26.1	C
		2nd St NW East to 2nd St NW East	E-W	WBT	193	13.6	B
		2nd St NW East to 4th Ave NW South	E-S	WBL	29	23.6	C
		2nd St NW East to 2nd St NW East	W-E	EBT	334	13.8	B
		2nd St NW East to 4th Ave NW South	W-S	EBR	26	13.8	B
		--	**Total**		**919**	**18.0**	**B**
UNS	1 st St NW - 4th Ave NW	4th Ave NW North to 1st St NW West	N-W	SBR	26	5.5	A
		4th Ave NW North to 4th Ave NW South	N-S	SBT	223	6.7	A
		4th Ave NW North to 1st St NW East	N-E	SBL	286	30.3	D
		1st St NW East to 1st St NW West	E-W	WBT	51	24.5	C
		1st St NW East to 4th Ave NW South	E-S	WBL	93	25.0	C
		1st St NW West to 1st St NW East	W-E	EBT	234	13.4	B
		1st St NW West to 4th Ave NW South	W-S	EBR	81	4.5	A
		--	**Total**		**995**	**17.4**	**C**
SIG	W Center St - 4th Ave NW	4th Ave NW North to W Center West	N-W	SBR	17	19.4	B
		4th Ave NW North to 4th Ave NW South	N-S	SBT	104	33.4	C
		4th Ave NW North to W Center East	N-E	SBL	151	41.1	D
		W Center East to W Center West	E-W	WBT	289	6.3	A
		W Center East to 4th Ave NW South	E-S	WBL	7	15.4	B
		W Center West to W Center East	W-E	EBT	389	39.5	D
		W Center West to 4th Ave NW South	W-S	EBR	86	32.3	C
		--	**Total**		**1043**	**28.9**	**C**
SIG	2nd St SW - 4th Ave SW	4th Ave NW North to 2nd St SW West	N-W	SBR	61	48.9	D
		4th Ave NW North to 4th Ave NW South	N-S	SBT	150	54.7	D
		4th Ave NW North to 2nd St SW East	N-E	SBL	18	53.6	D
		2nd St SW East to 2nd St SW West	E-W	WBT	253	8.7	A
		2nd St SW East to 4th Ave NW South	E-S	WBL	116	12.8	B
		2nd St SW West to 2nd St SW East	W-E	EBT	258	36.7	D
		2nd St SW West to 4th Ave NW South	W-S	EBR	219	14.8	B
		--	**Total**		**1075**	**26.5**	**C**
UNS	2nd St SW - 5th Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	315	0.2	A
		5th Ave SW South to 2nd St SW East	S-E	NBR	216	2.7	A
		2nd St SW West to 5th Ave SW South	W-S	EBR	72	1.1	A
		2nd St SW West to 2nd St SW East	W-E	EBT	170	0.4	A
		--	**Total**		**772**	**1.0**	**A**

Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
UNS	1st St SW - 6th Ave SW	6th Ave SW North to 6th Ave SW South	N-S	SBT	456	0.9	A
		6th Ave SW North to 1st St SW East	N-E	SBL	5	5.2	A
		1st St SW East to 6th Ave SW North	E-N	WBR	2	2.0	A
		1st St SW East to 1st St SW West	E-W	WBT	12	10.7	B
		1st St SW East to 6th Ave SW South	E-S	WBL	7	11.3	B
		6th Ave SW South to 1st St SW West	S-W	NBL	170	7.6	A
		6th Ave SW South to 6th Ave SW North	S-N	NBT	319	3.3	A
		6th Ave SW South to 1st St SW East	S-E	NBR	7	2.2	A
		1st St SW West to 6th Ave SW North	W-N	EBL	77	11.1	B
		1st St SW West to 1st St SW East	W-E	EBT	10	12.2	B
		1st St SW West to 6th Ave SW South	W-S	EBR	46	5.0	A
		--	**Total**		**1150**	**3.7**	**A**
SIG	2nd St SW - 6th Ave SW	6th Ave SW North to 2nd St SW West	N-W	SBR	77	10.9	B
		6th Ave SW North to 6th Ave SW South	N-SW	SBT	253	15.0	B
		6th Ave SW North to 2nd St SW East	N-E	SBL	178	17.0	B
		2nd St SW East to 6th Ave SW North	E-N	WBR	134	16.4	B
		2nd St SW East to 2nd St SW West	E-W	WBT	138	32.2	C
		2nd St SW East to 6th Ave SW South	E-SW	WBL	41	36.5	D
		6th Ave SW South to 2nd St SW West	SW-W	NBL	226	67.5	E
		6th Ave SW South to 6th Ave SW North	SW-N	NBT	327	55.9	E
		6th Ave SW South to 2nd St SW East	SW-E	NBR	5	41.8	D
		2nd St SW West to 6th Ave SW North	W-N	EBL	35	32.4	C
		2nd St SW West to 2nd St SW East	W-E	EBT	59	27.2	C
		2nd St SW West to 6th Ave SW South Bypass	W-S	EBR	65	2.1	A
		--	**Total**		**1538**	**34.1**	**C**

2nd Avenue & Center Street - Scenarios comparison - AM scenario

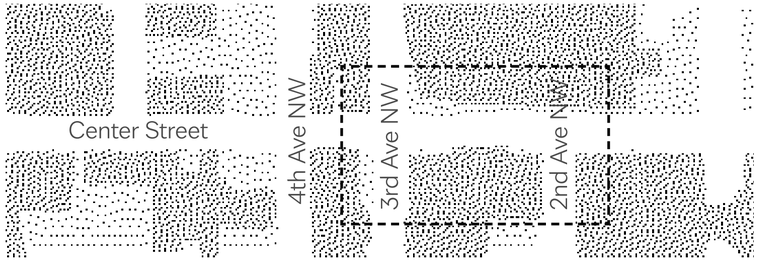
The queuing on 2nd Avenue (LOS F) is due to the traffic on Center Street, in fact vehicles have to wait to turn westbound. For this reason the first mitigation measure is to add a right turn lane (about 80ft long) on Center Street & 3rd Avenue to reduce congestion on Center. Such measure, common to all scenarios, requires a modification to the curb and bike lane.

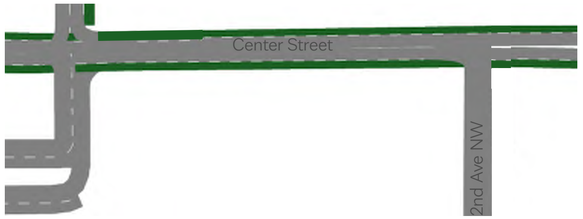
In scenario 1 no other mitigation is proposed and it is not sufficient to meet the standards

In Scenario 2 the mini-roundabout slightly increases delays still not satisfying the standards.

In Scenario 3 we test the addition of a short right-turn lane (60 feet) in the north-bound direction of 2nd Avenue removing part of the existing Kahler drop-off and this allows to meet the standards.

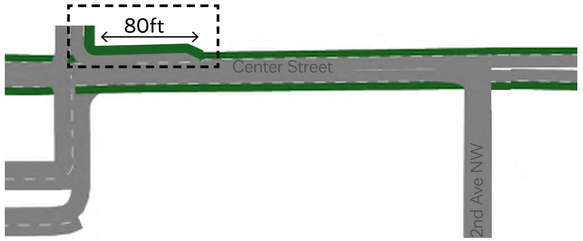
This type of interventions is invasive and for this reason it should be evaluated carefully. The movement with LOS F of the unmitigated scenario is a residual flow (4% of intersection vehicles) and occurs only in the AM peak.





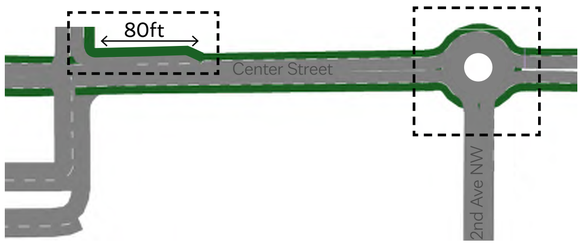
PROJECT SCENARIO (UNMITIAGATED)

SIGNALIZED / UNSIGALIZED	STREET NAMES	MOVEMENT	DIRECTION	MOVEM.	VOLUME (VEH/H)	DELAY (SEC)	LOS
SIGNALIZED	W Center St - 2nd Ave SW	W Center East to W Center West	E-W	WBT	380	63.4	E
		W Center East to 2nd Ave SW South	E-S	WBL	45	66.6	E
		2nd Ave SW South to W Center West	S-W	NBL	37	103.8	F
		2nd Ave SW South to W Center East	S-E	NBR	35	41.2	D
		W Center West to W Center East	W-E	EBT	346	4.9	A
		W Center West to 2nd Ave SW South	W-S	EBR	42	3.7	A
		--	**Total**		**883**	**38.9**	**D**



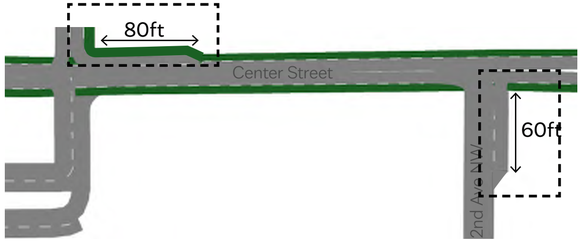
SCENARIO 1 - TURN LANE ON CENTER

SIGNALIZED / UNSIGALIZED	STREET NAMES	MOVEMENT	DIRECTION	MOVEM.	VOLUME (VEH/H)	DELAY (SEC)	LOS
SIGNALIZED	W Center St - 2nd Ave SW	W Center East to W Center West	E-W	WBT	385	47.7	D
		W Center East to 2nd Ave SW South	E-S	WBL	46	51.7	D
		2nd Ave SW South to W Center West	S-W	NBL	37	89.1	F
		2nd Ave SW South to W Center East	S-E	NBR	35	34.7	C
		W Center West to W Center East	W-E	EBT	346	4.9	A
		W Center West to 2nd Ave SW South	W-S	EBR	42	4.2	A
		--	**Total**		**890**	**30.7**	**D**



SCENARIO 2 - MINI ROUNDABOUT + TURN LANE ON CENTER

SIGNALIZED / UNSIGALIZED	STREET NAMES	MOVEMENT	DIRECTION	MOVEM.	VOLUME (VEH/H)	DELAY (SEC)	LOS
UNSIGNAL-IZED	W Center St - 2nd Ave SW	W Center East to W Center West	E-W	WBT	385	56.0	F
		W Center East to 2nd Ave SW South	E-S	WBL	45	52.4	F
		2nd Ave SW South to W Center West	S-W	NBL	37	25.1	D
		2nd Ave SW South to W Center East	S-E	NBR	35	5.6	A
		W Center West to W Center East	W-E	EBT	346	7.4	A
		W Center West to 2nd Ave SW South	W-S	EBR	42	6.4	A
		--	**Total**		**889**	**31.5**	**D**



SCENARIO 3 - TURN LANE @ 2ND AVE + TURN LANE ON CENTER

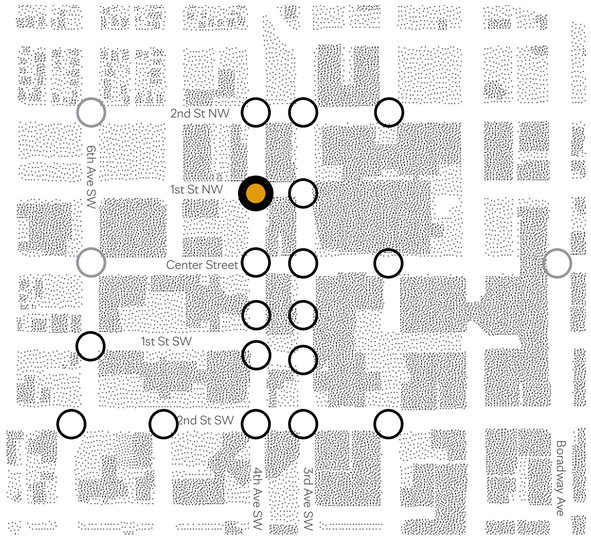
SIGNALIZED / UNSIGALIZED	STREET NAMES	MOVEMENT	DIRECTION	MOVEM.	VOLUME (VEH/H)	DELAY (SEC)	LOS
SIGNALIZED	W Center St - 2nd Ave SW	W Center East to W Center West	E-W	WBT	388	42.6	D
		W Center East to 2nd Ave SW South	E-S	WBL	46	47.4	D
		2nd Ave SW South to W Center West	S-W	NBL	37	72.1	E
		2nd Ave SW South to W Center East	S-E	NBR	35	13.1	B
		W Center West to W Center East	W-E	EBT	346	5.0	A
		W Center West to 2nd Ave SW South	W-S	EBR	42	3.7	A
		--	**Total**		**893**	**26.8**	**C**

4th Avenue NW & 1st Street NW - Scenarios comparison - PM scenario

We have tested the introduction of a signal at the intersection indicated below.

The simulation shows that the overall LOS becomes worse with two movements with LOS F.

The results on the side represent the PM scenario which is the worst case for this intersection.



EXISTING CONDITION

SIGNALIZED / UNSIGALIZED	STREET NAMES	MOVEMENT	DIRECTION	MOVEM.	VOLUME (VEH/H)	DELAY (SEC)	LOS
UNSIGNAL-IZED	1 st St NW - 4th Ave NW	4th Ave NW North to 1st St NW West	N-W	SBR	24	2.8	A
		4th Ave NW North to 4th Ave NW South	N-S	SBT	333	2.4	A
		4th Ave NW North to 1st St NW East	N-E	SBL	32	2.4	A
		1st St NW East to 1st St NW West	E-W	WBT	11	2.1	A
		1st St NW East to 4th Ave NW South	E-S	WBL	23	2.1	A
		1st St NW West to 1st St NW East	W-E	EBT	33	2.4	A
		1st St NW West to 4th Ave NW South	W-S	EBR	35	1.9	A
		--	**Total**		**491**	**2.3**	**A**

PROJECT SCENARIOS

SCENARIO 1 UNMITIGATED (no signal)

SIGNALIZED / UNSIGALIZED	STREET NAMES	MOVEMENT	DIRECTION	MOVEM.	VOLUME (VEH/H)	DELAY (SEC)	LOS
UNSIGNAL-IZED	1 st St NW - 4th Ave NW	4th Ave NW North to 1st St NW West	N-W	SBR	26	5.5	A
		4th Ave NW North to 4th Ave NW South	N-S	SBT	223	6.7	A
		4th Ave NW North to 1st St NW East	N-E	SBL	286	30.3	D
		1st St NW East to 1st St NW West	E-W	WBT	51	24.5	C
		1st St NW East to 4th Ave NW South	E-S	WBL	93	25.0	C
		1st St NW West to 1st St NW East	W-E	EBT	234	13.4	B
		1st St NW West to 4th Ave NW South	W-S	EBR	81	4.5	A
		--	**Total**		**995**	**17.4**	**C**

SCENARIO 2 WITH SIGNAL

SIGNALIZED / UNSIGALIZED	STREET NAMES	MOVEMENT	DIRECTION	MOVEM.	VOLUME (VEH/H)	DELAY (SEC)	LOS
SIGNALIZED	1 st St NW - 4th Ave NW	4th Ave NW North to 1st St NW West	N-W	SBR	27	9.6	A
		4th Ave NW North to 4th Ave NW South	N-S	SBT	223	16.8	B
		4th Ave NW North to 1st St NW East	N-E	SBL	287	25.4	C
		1st St NW East to 1st St NW West	E-W	WBT	48	81.4	F
		1st St NW East to 4th Ave NW South	E-S	WBL	89	91.5	F
		1st St NW West to 1st St NW East	W-E	EBT	216	46.2	D
		1st St NW West to 4th Ave NW South	W-S	EBR	75	28.0	C
		--	**Total**		**964**	**36.4**	**D**

W Center St - Broadway Ave

The City engineering standards require that the maximum LOS of the intersection is D, maximum LOS of each single movement is E and saturation is less than 0.9.

Existing Condition

AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: Broadway Ave S								
1	L2	76	0	80	0,0	*0,162	16,1	LOS B
2	T1	205	3	216	1,5	0,116	11,8	LOS B
3	R2	22	1	23	4,5	0,116	10,1	LOS B
Approach		303	4	319	1,3	0,162	12,8	LOS B
East: W Center St.								
4	L2	23	1	24	4,3	0,038	23,2	LOS C
5	T1	181	0	191	0,0	0,433	35,5	LOS D
6	R2	22	0	23	0,0	0,433	35,5	LOS D
Approach		226	1	238	0,4	0,433	34,2	LOS C
North: Broadway Ave N								
7	L2	41	1	43	2,4	0,071	14,3	LOS B
8	T1	347	8	365	2,3	0,178	13,6	LOS B
9	R2	85	0	89	0,0	0,065	1,1	LOS A
Approach		473	9	498	1,9	0,178	11,4	LOS B
West: W Center St.								
10	L2	52	0	55	0,0	0,084	23,7	LOS C
11	T1	69	11	73	15,9	0,314	34,0	LOS C
12	R2	64	1	67	1,6	0,314	34,0	LOS C
Approach		185	12	195	6,5	0,314	31,1	LOS C
All Vehicles		1187	26	1249	2,2	0,433	19,2	LOS B

PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: Broadway Ave S								
1	L2	93	0	98	0,0	*0,229	23,4	LOS C
2	T1	380	5	400	1,3	0,222	16,4	LOS B
3	R2	52	0	55	0,0	0,222	15,4	LOS B
Approach		525	5	553	1,0	0,229	17,6	LOS B
East: W Center St.								
4	L2	28	0	29	0,0	0,043	26,7	LOS C
5	T1	90	0	95	0,0	0,231	39,2	LOS D
6	R2	27	0	28	0,0	0,231	39,2	LOS D
Approach		145	0	153	0,0	0,231	36,8	LOS D
North: Broadway Ave N								
7	L2	51	0	54	0,0	0,114	20,6	LOS C
8	T1	471	[illegible]	496	0,6	0,241	17,5	LOS B
9	R2	58	0	61	0,0	0,042	0,7	LOS A
Approach		580	3	611	0,5	0,241	16,1	LOS B
West: W Center St.								
10	L2	76	0	80	0,0	*0,118	28,0	LOS C
11	T1	159	10	167	6,3	*0,595	47,8	LOS D
12	R2	125	0	132	0,0	0,595	47,8	LOS D
Approach		360	10	379	2,8	0,595	43,6	LOS D
All Vehicles		1610	18	1695	1,1	0,595	24,6	LOS C

Project Scenario

AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: Broadway Ave S								
1	L2	186	0	196	0,0	*0,525	20,4	LOS C
2	T1	249	3	262	1,2	0,153	10,9	LOS B
3	R2	34	1	36	2,9	0,153	9,2	LOS A
Approach		469	4	494	0,9	0,525	14,5	LOS B
East: W Center St.								
4	L2	56	1	59	1,8	0,089	19,3	LOS B
5	T1	101	0	106	0,0	0,277	24,9	LOS C
6	R2	50	0	53	0,0	0,277	24,9	LOS C
Approach		207	1	218	0,5	0,277	23,4	LOS C
North: Broadway Ave N								
7	L2	48	1	51	2,1	0,091	13,4	LOS B
8	T1	525	8	553	1,5	0,283	13,2	LOS B
9	R2	128	0	135	0,0	0,096	0,7	LOS A
Approach		701	9	738	1,3	0,283	11,0	LOS B
West: W Center St.								
10	L2	41	0	43	0,0	*0,066	19,2	LOS B
11	T1	170	11	179	6,5	*0,515	27,2	LOS C
12	R2	96	1	101	1,0	0,515	27,2	LOS C
Approach		307	12	323	3,9	0,515	26,1	LOS C
All Vehicles		1684	26	1773	1,5	0,525	16,2	LOS B

PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: Broadway Ave S								
1	L2	209	0	220	0,0	*0,686	32,3	LOS C
2	T1	541	5	569	0,9	0,340	15,9	LOS B
3	R2	92	0	97	0,0	0,340	14,7	LOS B
Approach		842	5	886	0,6	0,686	19,8	LOS B
East: W Center St.								
4	L2	184	0	194	0,0	0,270	23,6	LOS C
5	T1	26	0	27	0,0	0,150	26,2	LOS C
6	R2	65	0	68	0,0	0,150	26,2	LOS C
Approach		275	0	289	0,0	0,270	24,5	LOS C
North: Broadway Ave N								
7	L2	86	0	91	0,0	0,264	22,4	LOS C
8	T1	609	3	641	0,5	0,326	16,6	LOS B
9	R2	123	0	129	0,0	0,088	0,4	LOS A
Approach		818	3	861	0,4	0,326	14,8	LOS B
West: W Center St.								
10	L2	78	0	82	0,0	*0,117	22,1	LOS C
11	T1	177	10	186	5,6	*0,670	34,1	LOS C
12	R2	216	0	227	0,0	0,670	34,1	LOS C
Approach		471	10	496	2,1	0,670	32,1	LOS C
All Vehicles		2406	18	2533	0,7	0,686	21,0	LOS C

Civic Center Dr - 4th Ave NW

The City engineering standards require that the maximum LOS of the intersection is D, maximum LOS of each single movement is E and saturation is less than 0.9.

Existing Condition

AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 4th Ave NW								
1	L2	97	1	102	1,0	0,257	26,4	LOS C
2	T1	90	2	95	2,2	0,127	13,0	LOS B
3	R2	18	1	19	5,6	0,127	17,6	LOS B
Approach		205	4	216	2,0	0,257	19,8	LOS B
East: Civic Center Dr NW								
4	L2	64	1	67	1,6	0,356	35,2	LOS D
5	T1	328	4	345	1,2	0,235	18,6	LOS B
6	R2	20	1	21	5,0	0,235	22,5	LOS C
Approach		412	6	434	1,5	0,356	21,4	LOS C
North: 4th Ave NW								
7	L2	42	0	44	0,0	0,068	18,8	LOS B
8	T1	367	1	386	0,3	*0,442	17,7	LOS B
9	R2	18	0	19	0,0	0,442	21,2	LOS C
Approach		427	1	449	0,2	0,442	17,9	LOS B
West: Civic Center Dr NW								
10	L2	43	1	45	2,3	0,111	26,5	LOS C
11	T1	657	17	692	2,6	0,465	21,2	LOS C
12	R2	411	2	433	0,5	*0,392	7,9	LOS A
Approach		1111	20	1169	1,8	0,465	16,5	LOS B
All Vehicles		2155	31	2268	1,4	0,465	18,0	LOS B

PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 4th Ave NW								
1	L2	242	1	255	0,4	0,393	41,0	LOS D
2	T1	256	1	269	0,4	*0,637	49,7	LOS D
3	R2	39	0	41	0,0	0,637	54,3	LOS D
Approach		537	2	565	0,4	0,637	46,2	LOS D
East: Civic Center Dr NW								
4	L2	15	1	16	6,7	0,016	19,5	LOS B
5	T1	678	3	714	0,4	*0,432	28,1	LOS C
6	R2	38	1	40	2,6	0,432	33,0	LOS C
Approach		731	5	769	0,7	0,432	28,1	LOS C
North: 4th Ave NW								
7	L2	40	0	42	0,0	*0,064	35,4	LOS D
8	T1	126	1	133	0,8	0,348	44,7	LOS D
9	R2	37	0	39	0,0	0,348	48,2	LOS D
Approach		203	1	214	0,5	0,348	43,5	LOS D
West: Civic Center Dr NW								
10	L2	52	0	55	0,0	*0,053	19,8	LOS B
11	T1	586	3	617	0,5	0,366	26,6	LOS C
12	R2	108	0	114	0,0	0,064	4,8	LOS A
Approach		746	3	785	0,4	0,366	22,9	LOS C
All Vehicles		2217	11	2334	0,5	0,637	32,2	LOS C

Project Scenario

AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 4th Ave NW								
1	L2	197	1	207	0,5	0,680	41,6	LOS D
2	T1	187	2	197	1,1	0,427	30,7	LOS C
3	R2	41	1	43	2,4	0,427	35,3	LOS D
Approach		425	4	447	0,9	0,680	36,2	LOS D
East: Civic Center Dr NW								
4	L2	110	1	116	0,9	0,336	34,8	LOS C
5	T1	476	4	501	0,8	0,385	24,0	LOS C
6	R2	34	1	36	2,9	0,385	29,3	LOS C
Approach		620	6	653	1,0	0,385	26,2	LOS C
North: 4th Ave NW								
7	L2	51	0	54	0,0	0,115	27,5	LOS C
8	T1	423	1	445	0,2	*0,818	39,8	LOS D
9	R2	19	0	20	0,0	0,818	43,3	LOS D
Approach		493	1	519	0,2	0,818	38,7	LOS D
West: Civic Center Dr NW								
10	L2	56	1	59	1,8	0,134	25,3	LOS C
11	T1	835	17	879	2,0	*0,802	34,9	LOS C
12	R2	331	2	348	0,6	0,439	17,8	LOS B
Approach		1222	20	1286	1,6	0,802	29,8	LOS C
All Vehicles		2760	31	2905	1,1	0,818	31,6	LOS C

PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 4th Ave NW								
1	L2	108	1	114	0,9	0,369	41,2	LOS D
2	T1	171	1	180	0,6	0,522	36,8	LOS D
3	R2	54	0	57	0,0	0,522	41,4	LOS D
Approach		333	2	351	0,6	0,522	39,0	LOS D
East: Civic Center Dr NW								
4	L2	18	1	19	5,6	0,058	26,0	LOS C
5	T1	1022	3	1076	0,3	0,748	29,1	LOS C
6	R2	82	1	86	1,2	*0,748	35,3	LOS D
Approach		1122	5	1181	0,4	0,748	29,5	LOS C
North: 4th Ave NW								
7	L2	28	0	29	0,0	0,079	36,2	LOS D
8	T1	262	1	276	0,4	*0,762	49,2	LOS D
9	R2	39	0	41	0,0	0,762	52,7	LOS D
Approach		329	1	346	0,3	0,762	48,5	LOS D
West: Civic Center Dr NW								
10	L2	186	0	196	0,0	0,584	37,5	LOS D
11	T1	851	3	896	0,4	0,529	21,0	LOS C
12	R2	115	0	121	0,0	0,108	10,6	LOS B
Approach		1152	3	1213	0,3	0,584	22,6	LOS C
All Vehicles		2936	11	3091	0,4	0,762	30,0	LOS C

Civic Center Dr - 6th Ave NW

The City engineering standards require that the maximum LOS of the intersection is D, maximum LOS of each single movement is E and saturation is less than 0.9.

Existing Condition

AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave NW								
1	L2	97	0	102	0,0	0,350	54,0	LOS D
2	T1	59	4	62	6,8	0,172	35,3	LOS D
3	R2	18	1	19	5,6	0,172	39,6	LOS D
Approach		174	5	183	2,9	0,350	46,2	LOS D
East: Civic Center Dr NW								
4	L2	15	0	16	0,0	0,117	26,6	LOS C
5	T1	417	5	439	1,2	0,172	9,2	LOS A
6	R2	8	0	8	0,0	0,005	5,0	LOS A
Approach		440	5	463	1,1	0,172	9,7	LOS A
North: 6th Ave NW								
7	L2	3	0	3	0,0	0,009	44,4	LOS D
8	T1	129	4	136	3,1	*0,306	40,5	LOS D
9	R2	14	0	15	0,0	0,306	44,0	LOS D
Approach		146	4	154	2,7	0,306	41,0	LOS D
West: Civic Center Dr NW								
10	L2	35	0	37	0,0	0,061	15,2	LOS B
11	T1	1083	16	1140	1,5	*0,586	11,9	LOS B
12	R2	525	1	553	0,2	0,368	6,0	LOS A
Approach		1643	17	1729	1,0	0,586	10,1	LOS B
All Vehicles		2403	31	2529	1,3	0,586	14,5	LOS B

PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave NW								
1	L2	439	0	462	0,0	*0,936	68,6	LOS E
2	T1	132	3	139	2,3	0,237	24,7	LOS C
3	R2	51	0	54	0,0	0,237	29,0	LOS C
Approach		622	3	655	0,5	0,936	56,0	LOS E
East: Civic Center Dr NW								
4	L2	24	0	25	0,0	0,097	36,5	LOS D
5	T1	926	6	975	0,6	*0,537	26,0	LOS C
6	R2	25	0	26	0,0	0,019	5,2	LOS A
Approach		975	6	1026	0,6	0,537	25,8	LOS C
North: 6th Ave NW								
7	L2	16	0	17	0,0	0,035	33,2	LOS C
8	T1	57	5	60	8,8	0,111	19,1	LOS B
9	R2	29	0	31	0,0	0,111	22,6	LOS C
Approach		102	5	107	4,9	0,111	22,3	LOS C
West: Civic Center Dr NW								
10	L2	59	0	62	0,0	0,320	45,4	LOS D
11	T1	687	3	723	0,4	0,471	24,0	LOS C
12	R2	107	1	113	0,9	0,079	5,0	LOS A
Approach		853	4	898	0,5	0,471	23,1	LOS C
All Vehicles		2552	18	2686	0,7	0,936	32,1	LOS C

Reference Scenario

AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave NW								
1	L2	106	0	112	0,0	*0,579	58,2	LOS E
2	T1	98	0	103	0,0	0,324	41,1	LOS D
3	R2	21	0	22	0,0	0,324	41,1	LOS D
Approach		225	0	237	0,0	0,579	49,2	LOS D
East: Civic Center Dr NW								
4	L2	15	0	16	0,0	0,087	16,1	LOS B
5	T1	583	0	614	0,0	0,220	6,6	LOS A
6	R2	16	0	17	0,0	0,011	0,6	LOS A
Approach		614	0	646	0,0	0,220	6,7	LOS A
North: 6th Ave NW								
7	L2	3	0	3	0,0	0,013	46,6	LOS D
8	T1	179	0	188	0,0	0,493	46,4	LOS D
9	R2	5	0	5	0,0	0,493	46,4	LOS D
Approach		187	0	197	0,0	0,493	46,5	LOS D
West: Civic Center Dr NW								
10	L2	31	0	33	0,0	0,057	8,1	LOS A
11	T1	1216	0	1280	0,0	*0,601	9,4	LOS A
12	R2	593	0	624	0,0	0,420	2,0	LOS A
Approach		1840	0	1937	0,0	0,601	7,0	LOS A
All Vehicles		2866	0	3017	0,0	0,601	12,8	LOS B

PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave NW								
1	L2	586	0	617	0,0	*0,986	53,4	LOS D
2	T1	217	0	228	0,0	0,310	12,2	LOS B
3	R2	128	0	135	0,0	0,310	12,2	LOS B
Approach		931	0	980	0,0	0,986	38,1	LOS D
East: Civic Center Dr NW								
4	L2	25	0	26	0,0	0,396	70,4	LOS E
5	T1	1081	0	1138	0,0	*0,984	81,4	LOS F
6	R2	19	0	20	0,0	0,017	0,7	LOS A
Approach		1125	0	1184	0,0	0,984	79,8	LOS E
North: 6th Ave NW								
7	L2	16	0	17	0,0	0,029	15,3	LOS B
8	T1	70	0	74	0,0	0,113	9,7	LOS A
9	R2	59	0	62	0,0	0,113	9,7	LOS A
Approach		145	0	153	0,0	0,113	10,3	LOS B
West: Civic Center Dr NW								
10	L2	28	0	29	0,0	0,461	71,5	LOS E
11	T1	913	0	961	0,0	0,976	80,0	LOS F
12	R2	222	0	234	0,0	0,179	0,4	LOS A
Approach		1163	0	1224	0,0	0,976	64,6	LOS E
All Vehicles		3364	0	3541	0,0	0,986	60,0	LOS E

Civic Center Dr - 6th Ave NW

The City engineering standards require that the maximum LOS of the intersection is D, maximum LOS of each single movement is E and saturation is less than 0.9.

Project Scenario -Unmitigated

AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave NW								
1	L2	122	0	128	0,0	*0,282	32,4	LOS C
2	T1	100	0	105	0,0	0,159	23,4	LOS C
3	R2	24	0	25	0,0	0,159	23,4	LOS C
Approach		246	0	259	0,0	0,282	27,8	LOS C
East: Civic Center Dr NW								
4	L2	19	0	20	0,0	0,235	57,5	LOS E
5	T1	662	0	697	0,0	0,386	22,7	LOS C
6	R2	11	0	12	0,0	0,008	0,5	LOS A
Approach		692	0	728	0,0	0,386	23,3	LOS C
North: 6th Ave NW								
7	L2	2	0	2	0,0	0,004	25,8	LOS C
8	T1	207	0	218	0,0	0,272	25,6	LOS C
9	R2	11	0	12	0,0	0,272	25,6	LOS C
Approach		220	0	232	0,0	0,272	25,6	LOS C
West: Civic Center Dr NW								
10	L2	20	0	21	0,0	0,065	28,4	LOS C
11	T1	1196	0	1259	0,0	*0,908	44,7	LOS D
12	R2	549	0	578	0,0	0,455	2,0	LOS A
Approach		1765	0	1858	0,0	0,908	31,2	LOS C
All Vehicles		2923	0	3077	0,0	0,908	28,6	LOS C

PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave NW								
1	L2	509	0	536	0,0	*1,301	184,8	LOS F
2	T1	254	0	267	0,0	0,526	27,7	LOS C
3	R2	157	0	165	0,0	0,526	27,7	LOS C
Approach		920	0	968	0,0	1,301	114,6	LOS F
East: Civic Center Dr NW								
4	L2	27	0	28	0,0	0,158	38,4	LOS D
5	T1	1095	0	1153	0,0	0,649	27,7	LOS C
6	R2	47	0	49	0,0	0,039	1,5	LOS A
Approach		1169	0	1231	0,0	0,649	26,9	LOS C
North: 6th Ave NW								
7	L2	3	0	3	0,0	0,010	37,3	LOS D
8	T1	79	0	83	0,0	0,191	18,1	LOS B
9	R2	75	0	79	0,0	0,191	18,1	LOS B
Approach		157	0	165	0,0	0,191	18,5	LOS B
West: Civic Center Dr NW								
10	L2	23	0	24	0,0	0,136	38,8	LOS D
11	T1	991	0	1043	0,0	*0,652	27,0	LOS C
12	R2	193	0	203	0,0	0,142	0,5	LOS A
Approach		1207	0	1271	0,0	0,652	23,0	LOS C
All Vehicles		3453	0	3635	0,0	1,301	48,5	LOS D

Project Scenario - Mitigated

AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave NW								
1	L2	122	0	128	0,0	0,374	24,3	LOS C
2	T1	100	0	105	0,0	0,255	17,1	LOS B
3	R2	24	0	25	0,0	0,255	17,1	LOS B
Approach		246	0	259	0,0	0,374	20,7	LOS C
East: Civic Center Dr NW								
4	L2	19	0	20	0,0	0,094	18,4	LOS B
5	T1	662	0	697	0,0	0,354	9,6	LOS A
6	R2	11	0	12	0,0	0,009	1,0	LOS A
Approach		692	0	728	0,0	0,354	9,7	LOS A
North: 6th Ave NW								
7	L2	2	0	2	0,0	0,005	16,9	LOS B
8	T1	207	0	218	0,0	*0,446	21,0	LOS C
9	R2	11	0	12	0,0	0,446	21,0	LOS C
Approach		220	0	232	0,0	0,446	20,9	LOS C
West: Civic Center Dr NW								
10	L2	20	0	21	0,0	0,047	10,7	LOS B
11	T1	1196	0	1259	0,0	*0,737	16,3	LOS B
12	R2	549	0	578	0,0	0,451	3,5	LOS A
Approach		1765	0	1858	0,0	0,737	12,2	LOS B
All Vehicles		2923	0	3077	0,0	0,737	13,0	LOS B

PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave NW								
1	L2	509	0	536	0,0	0,558	21,1	LOS C
2	T1	254	0	267	0,0	*0,598	18,9	LOS B
3	R2	157	0	165	0,0	0,598	18,9	LOS B
Approach		920	0	968	0,0	0,598	20,1	LOS C
East: Civic Center Dr NW								
4	L2	27	0	28	0,0	0,123	22,3	LOS C
5	T1	1095	0	1153	0,0	*0,708	20,2	LOS C
6	R2	47	0	49	0,0	0,041	1,7	LOS A
Approach		1169	0	1231	0,0	0,708	19,5	LOS B
North: 6th Ave NW								
7	L2	3	0	3	0,0	0,010	19,0	LOS B
8	T1	79	0	83	0,0	0,215	9,1	LOS A
9	R2	75	0	79	0,0	0,215	9,1	LOS A
Approach		157	0	165	0,0	0,215	9,3	LOS A
West: Civic Center Dr NW								
10	L2	23	0	24	0,0	0,108	23,0	LOS C
11	T1	991	0	1043	0,0	0,689	19,6	LOS B
12	R2	193	0	203	0,0	0,152	1,1	LOS A
Approach		1207	0	1271	0,0	0,689	16,7	LOS B
All Vehicles		3453	0	3635	0,0	0,708	18,2	LOS B

W Center St - 6th Ave NW

The City engineering standards require that the maximum LOS of the intersection is D, maximum LOS of each single movement is E and saturation is less than 0.9.

Existing Condition

AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	INPUT VOLUMES HV] veh/h	DEMAND FLOWS [Total veh/h	DEMAND FLOWS HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave SW								
1	L2	19	0	20	0,0	0,664	20,4	LOS C
2	T1	254	3	267	1,2	0,664	20,4	LOS C
3	R2	97	0	102	0,0	0,664	20,4	LOS C
Approach		370	3	389	0,8	0,664	20,4	LOS C
East: W Center St								
4	L2	55	1	58	1,8	0,341	17,0	LOS C
5	T1	55	0	58	0,0	0,341	17,0	LOS C
6	R2	16	1	17	6,3	0,341	17,0	LOS C
Approach		126	2	133	1,6	0,341	17,0	LOS C
North: 6th Ave NW								
7	L2	29	0	31	0,0	0,399	12,7	LOS B
8	T1	197	2	207	1,0	0,399	12,7	LOS B
9	R2	6	0	6	0,0	0,399	12,7	LOS B
Approach		232	2	244	0,9	0,399	12,7	LOS B
West: W Center St								
10	L2	47	0	49	0,0	0,664	31,8	LOS D
11	T1	132	1	139	0,8	0,664	31,8	LOS D
12	R2	38	0	40	0,0	0,664	31,8	LOS D
Approach		217	1	228	0,5	0,664	31,8	LOS D
All Vehicles		945	8	995	0,8	0,664	20,7	LOS C

PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	INPUT VOLUMES HV] veh/h	DEMAND FLOWS [Total veh/h	DEMAND FLOWS HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave SW								
1	L2	29	0	31	0,0	0,512	17,1	LOS C
2	T1	178	2	187	1,1	0,512	17,1	LOS C
3	R2	43	0	45	0,0	0,512	17,1	LOS C
Approach		250	2	263	0,8	0,512	17,1	LOS C
East: W Center St								
4	L2	115	0	121	0,0	0,631	20,9	LOS C
5	T1	167	4	176	2,4	0,631	20,9	LOS C
6	R2	31	0	33	0,0	0,631	20,9	LOS C
Approach		313	4	329	1,3	0,631	20,9	LOS C
North: 6th Ave NW								
7	L2	27	1	28	3,7	0,550	17,9	LOS C
8	T1	217	5	228	2,3	0,550	17,9	LOS C
9	R2	31	0	33	0,0	0,550	17,9	LOS C
Approach		275	6	289	2,2	0,550	17,9	LOS C
West: W Center St								
10	L2	7	0	7	0,0	0,254	16,8	LOS C
11	T1	61	0	64	0,0	0,254	16,8	LOS C
12	R2	16	0	17	0,0	0,254	16,8	LOS C
Approach		84	0	88	0,0	0,254	16,8	LOS C
All Vehicles		922	12	971	1,3	0,631	18,6	LOS C

Reference Scenario

AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	INPUT VOLUMES HV] veh/h	DEMAND FLOWS [Total veh/h	DEMAND FLOWS HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave SW								
1	L2	18	0	19	0,0	0,707	22,7	LOS C
2	T1	265	0	279	0,0	0,707	22,7	LOS C
3	R2	107	0	113	0,0	0,707	22,7	LOS C
Approach		390	0	411	0,0	0,707	22,7	LOS C
East: W Center St								
4	L2	46	0	48	0,0	0,374	16,5	LOS C
5	T1	86	0	91	0,0	0,374	16,5	LOS C
6	R2	19	0	20	0,0	0,374	16,5	LOS C
Approach		151	0	159	0,0	0,374	16,5	LOS C
North: 6th Ave NW								
7	L2	29	0	31	0,0	0,399	12,8	LOS B
8	T1	194	0	204	0,0	0,399	12,8	LOS B
9	R2	7	0	7	0,0	0,399	12,8	LOS B
Approach		230	0	242	0,0	0,399	12,8	LOS B
West: W Center St								
10	L2	38	0	40	0,0	0,627	25,4	LOS D
11	T1	181	0	191	0,0	0,627	25,4	LOS D
12	R2	26	0	27	0,0	0,627	25,4	LOS D
Approach		245	0	258	0,0	0,627	25,4	LOS D
All Vehicles		1016	0	1069	0,0	0,707	20,2	LOS C

PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	INPUT VOLUMES HV] veh/h	DEMAND FLOWS [Total veh/h	DEMAND FLOWS HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave SW								
1	L2	28	0	29	0,0	0,751	29,1	LOS D
2	T1	283	0	298	0,0	0,751	29,1	LOS D
3	R2	41	0	43	0,0	0,751	29,1	LOS D
Approach		352	0	371	0,0	0,751	29,1	LOS D
East: W Center St								
4	L2	151	0	159	0,0	0,816	33,1	LOS D
5	T1	230	0	242	0,0	0,816	33,1	LOS D
6	R2	32	0	34	0,0	0,816	33,1	LOS D
Approach		413	0	435	0,0	0,816	33,1	LOS D
North: 6th Ave NW								
7	L2	35	0	37	0,0	0,669	23,7	LOS C
8	T1	246	0	259	0,0	0,669	23,7	LOS C
9	R2	34	0	36	0,0	0,669	23,7	LOS C
Approach		315	0	332	0,0	0,669	23,7	LOS C
West: W Center St								
10	L2	10	0	11	0,0	0,442	20,2	LOS C
11	T1	127	0	134	0,0	0,442	20,2	LOS C
12	R2	19	0	20	0,0	0,442	20,2	LOS C
Approach		156	0	164	0,0	0,442	20,2	LOS C
All Vehicles		1236	0	1301	0,0	0,816	27,9	LOS D

W Center St - 6th Ave NW

The City engineering standards require that the maximum LOS of the intersection is D, maximum LOS of each single movement is E and saturation is less than 0.9.

Project Scenario -Unmitigated

AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	INPUT VOLUMES HV] veh/h	DEMAND FLOWS [Total veh/h	DEMAND FLOWS HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave SW								
1	L2	19	0	20	0,0	0,912	48,6	LOS E
2	T1	282	0	297	0,0	0,912	48,6	LOS E
3	R2	127	0	134	0,0	0,912	48,6	LOS E
Approach		428	0	451	0,0	0,912	48,6	LOS E
East: W Center St								
4	L2	91	0	96	0,0	0,501	17,9	LOS C
5	T1	116	0	122	0,0	0,501	17,9	LOS C
6	R2	19	0	20	0,0	0,501	17,9	LOS C
Approach		226	0	238	0,0	0,501	17,9	LOS C
North: 6th Ave NW								
7	L2	45	0	47	0,0	0,449	14,9	LOS B
8	T1	178	0	187	0,0	0,449	14,9	LOS B
9	R2	8	0	8	0,0	0,449	14,9	LOS B
Approach		231	0	243	0,0	0,449	14,9	LOS B
West: W Center St								
10	L2	37	0	39	0,0	0,761	34,5	LOS D
11	T1	245	0	258	0,0	0,761	34,5	LOS D
12	R2	18	0	19	0,0	0,761	34,5	LOS D
Approach		300	0	316	0,0	0,761	34,5	LOS D
All Vehicles		1185	0	1247	0,0	0,912	32,6	LOS D

PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	INPUT VOLUMES HV] veh/h	DEMAND FLOWS [Total veh/h	DEMAND FLOWS HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave SW								
1	L2	27	0	28	0,0	0,956	62,4	LOS F
2	T1	295	0	311	0,0	0,956	62,4	LOS F
3	R2	68	0	72	0,0	0,956	62,4	LOS F
Approach		390	0	411	0,0	0,956	62,4	LOS F
East: W Center St								
4	L2	202	0	213	0,0	0,903	44,2	LOS E
5	T1	237	0	249	0,0	0,903	44,2	LOS E
6	R2	25	0	26	0,0	0,903	44,2	LOS E
Approach		464	0	488	0,0	0,903	44,2	LOS E
North: 6th Ave NW								
7	L2	63	0	66	0,0	0,848	40,2	LOS E
8	T1	283	0	298	0,0	0,848	40,2	LOS E
9	R2	35	0	37	0,0	0,848	40,2	LOS E
Approach		381	0	401	0,0	0,848	40,2	LOS E
West: W Center St								
10	L2	9	0	9	0,0	0,790	39,3	LOS E
11	T1	272	0	286	0,0	0,790	39,3	LOS E
12	R2	11	0	12	0,0	0,790	39,3	LOS E
Approach		292	0	307	0,0	0,790	39,3	LOS E
All Vehicles		1527	0	1607	0,0	0,956	46,9	LOS E

Project Scenario - Mitigated

AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	INPUT VOLUMES HV] veh/h	DEMAND FLOWS [Total veh/h	DEMAND FLOWS HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave SW								
1	L2	19	0	20	0,0	*0,567	16,4	LOS B
2	T1	282	0	297	0,0	0,567	16,4	LOS B
3	R2	127	0	134	0,0	0,567	16,4	LOS B
Approach		428	0	451	0,0	0,567	16,4	LOS B
East: W Center St								
4	L2	91	0	96	0,0	0,540	23,9	LOS C
5	T1	116	0	122	0,0	0,540	23,9	LOS C
6	R2	19	0	20	0,0	0,540	23,9	LOS C
Approach		226	0	238	0,0	0,540	23,9	LOS C
North: 6th Ave NW								
7	L2	45	0	47	0,0	0,411	19,3	LOS B
8	T1	178	0	187	0,0	0,411	19,3	LOS B
9	R2	8	0	8	0,0	0,411	19,3	LOS B
Approach		231	0	243	0,0	0,411	19,3	LOS B
West: W Center St								
10	L2	37	0	39	0,0	0,544	22,1	LOS C
11	T1	245	0	258	0,0	*0,544	22,1	LOS C
12	R2	18	0	19	0,0	0,544	22,1	LOS C
Approach		300	0	316	0,0	0,544	22,1	LOS C
All Vehicles		1185	0	1247	0,0	0,567	19,9	LOS B

PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	INPUT VOLUMES HV] veh/h	DEMAND FLOWS [Total veh/h	DEMAND FLOWS HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave SW								
1	L2	27	0	28	0,0	0,752	34,9	LOS C
2	T1	295	0	311	0,0	0,752	34,9	LOS C
3	R2	68	0	72	0,0	0,752	34,9	LOS C
Approach		390	0	411	0,0	0,752	34,9	LOS C
East: W Center St								
4	L2	202	0	213	0,0	*0,897	45,6	LOS D
5	T1	237	0	249	0,0	0,897	45,6	LOS D
6	R2	25	0	26	0,0	0,897	45,6	LOS D
Approach		464	0	488	0,0	0,897	45,6	LOS D
North: 6th Ave NW								
7	L2	63	0	66	0,0	0,896	53,3	LOS D
8	T1	283	0	298	0,0	*0,896	53,3	LOS D
9	R2	35	0	37	0,0	0,896	53,3	LOS D
Approach		381	0	401	0,0	0,896	53,3	LOS D
West: W Center St								
10	L2	9	0	9	0,0	0,407	20,3	LOS C
11	T1	272	0	286	0,0	0,407	20,3	LOS C
12	R2	11	0	12	0,0	0,407	20,3	LOS C
Approach		292	0	307	0,0	0,407	20,3	LOS C
All Vehicles		1527	0	1607	0,0	0,897	40,0	LOS D

2nd St NW - 6th Ave NW

The City engineering standards require that the maximum LOS of the intersection is D, maximum LOS of each single movement is E and saturation is less than 0.9.

Existing Condition

AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave NW								
1	L2	4	0	4	0,0	0,216	9,4	LOS A
2	T1	125	4	132	3,2	0,216	9,4	LOS A
3	R2	17	0	18	0,0	0,216	9,4	LOS A
Approach		146	4	154	2,7	0,216	9,4	LOS A
East: 2nd St NW								
4	L2	21	0	22	0,0	0,111	12,2	LOS B
5	T1	14	0	15	0,0	0,111	12,2	LOS B
6	R2	11	0	12	0,0	0,111	12,2	LOS B
Approach		46	0	48	0,0	0,111	12,2	LOS B
North: 6th Ave NW								
7	L2	31	0	33	0,0	0,797	24,1	LOS C
8	T1	518	3	545	0,6	0,797	24,1	LOS C
9	R2	13	0	14	0,0	0,797	24,1	LOS C
Approach		562	3	592	0,5	0,797	24,1	LOS C
West: 2nd St NW								
10	L2	5	2	5	40,0	0,444	33,0	LOS D
11	T1	39	1	41	2,6	0,444	33,0	LOS D
12	R2	45	0	47	0,0	0,444	33,0	LOS D
Approach		89	3	94	3,4	0,444	33,0	LOS D
All Vehicles		843	10	887	1,2	0,797	21,8	LOS C

PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave NW								
1	L2	17	0	18	0,0	0,680	19,4	LOS C
2	T1	388	2	408	0,5	0,680	19,4	LOS C
3	R2	17	0	18	0,0	0,680	19,4	LOS C
Approach		422	2	444	0,5	0,680	19,4	LOS C
East: 2nd St NW								
4	L2	56	0	59	0,0	0,614	20,3	LOS C
5	T1	100	1	105	1,0	0,614	20,3	LOS C
6	R2	148	0	156	0,0	0,614	20,3	LOS C
Approach		304	1	320	0,3	0,614	20,3	LOS C
North: 6th Ave NW								
7	L2	17	0	18	0,0	0,308	13,5	LOS B
8	T1	115	[illegible]	121	3,5	0,308	13,5	LOS B
9	R2	12	1	13	8,3	0,308	13,5	LOS B
Approach		144	5	152	3,5	0,308	13,5	LOS B
West: 2nd St NW								
10	L2	18	0	19	0,0	0,082	9,5	LOS A
11	T1	25	0	26	0,0	0,082	9,5	LOS A
12	R2	4	0	4	0,0	0,082	9,5	LOS A
Approach		47	0	49	0,0	0,082	9,5	LOS A
All Vehicles		917	8	965	0,9	0,680	18,3	LOS C

Reference Scenario

AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave NW								
1	L2	4	0	4	0,0	0,272	10,4	LOS B
2	T1	129	0	136	0,0	0,272	10,4	LOS B
3	R2	38	0	40	0,0	0,272	10,4	LOS B
Approach		171	0	180	0,0	0,272	10,4	LOS B
East: 2nd St NW								
4	L2	27	0	28	0,0	0,162	11,8	LOS B
5	T1	34	0	36	0,0	0,162	11,8	LOS B
6	R2	14	0	15	0,0	0,162	11,8	LOS B
Approach		75	0	79	0,0	0,162	11,8	LOS B
North: 6th Ave NW								
7	L2	54	0	57	0,0	0,906	37,2	LOS E
8	T1	534	0	562	0,0	0,906	37,2	LOS E
9	R2	20	0	21	0,0	0,906	37,2	LOS E
Approach		608	0	640	0,0	0,906	37,2	LOS E
West: 2nd St NW								
10	L2	5	0	5	0,0	0,467	23,6	LOS C
11	T1	83	0	87	0,0	0,467	23,6	LOS C
12	R2	55	0	58	0,0	0,467	23,6	LOS C
Approach		143	0	151	0,0	0,467	23,6	LOS C
All Vehicles		997	0	1049	0,0	0,906	28,8	LOS D

PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave NW								
1	L2	19	0	20	0,0	0,839	31,1	LOS D
2	T1	466	0	491	0,0	0,839	31,1	LOS D
3	R2	24	0	25	0,0	0,839	31,1	LOS D
Approach		509	0	536	0,0	0,839	31,1	LOS D
East: 2nd St NW								
4	L2	19	0	20	0,0	0,696	21,0	LOS C
5	T1	198	0	208	0,0	0,696	21,0	LOS C
6	R2	192	0	202	0,0	0,696	21,0	LOS C
Approach		409	0	431	0,0	0,696	21,0	LOS C
North: 6th Ave NW								
7	L2	28	0	29	0,0	0,436	15,5	LOS C
8	T1	174	0	183	0,0	0,436	15,5	LOS C
9	R2	8	0	8	0,0	0,436	15,5	LOS C
Approach		210	0	221	0,0	0,436	15,5	LOS C
West: 2nd St NW								
10	L2	20	0	21	0,0	0,139	9,1	LOS A
11	T1	63	0	66	0,0	0,139	9,1	LOS A
12	R2	8	0	8	0,0	0,139	9,1	LOS A
Approach		91	0	96	0,0	0,139	9,1	LOS A
All Vehicles		1219	0	1283	0,0	0,839	23,4	LOS C

2nd St NW - 6th Ave NW

The City engineering standards require that the maximum LOS of the intersection is D, maximum LOS of each single movement is E and saturation is less than 0.9.

Project Scenario -Unmitigated

AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave NW								
1	L2	4	0	4	0,0	0,282	10,6	LOS B
2	T1	144	0	152	0,0	0,282	10,6	LOS B
3	R2	28	0	29	0,0	0,282	10,6	LOS B
Approach		176	0	185	0,0	0,282	10,6	LOS B
East: 2nd St NW								
4	L2	45	0	47	0,0	0,304	18,0	LOS C
5	T1	38	0	40	0,0	0,304	18,0	LOS C
6	R2	16	0	17	0,0	0,304	18,0	LOS C
Approach		99	0	104	0,0	0,304	18,0	LOS C
North: 6th Ave NW								
7	L2	57	0	60	0,0	0,756	19,5	LOS C
8	T1	524	0	552	0,0	0,756	19,5	LOS C
9	R2	13	0	14	0,0	0,756	19,5	LOS C
Approach		594	0	625	0,0	0,756	19,5	LOS C
West: 2nd St NW								
10	L2	5	0	5	0,0	0,813	66,2	LOS F
11	T1	119	0	125	0,0	0,813	66,2	LOS F
12	R2	43	0	45	0,0	0,813	66,2	LOS F
Approach		167	0	176	0,0	0,813	66,2	LOS F
All Vehicles		1036	0	1091	0,0	0,813	25,4	LOS D

PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave NW								
1	L2	11	0	12	0,0	0,871	34,7	LOS D
2	T1	487	0	513	0,0	0,871	34,7	LOS D
3	R2	32	0	34	0,0	0,871	34,7	LOS D
Approach		530	0	558	0,0	0,871	34,7	LOS D
East: 2nd St NW								
4	L2	72	0	76	0,0	1,089	95,9	LOS F
5	T1	209	0	220	0,0	1,089	95,9	LOS F
6	R2	195	0	205	0,0	1,089	95,9	LOS F
Approach		476	0	501	0,0	1,089	95,9	LOS F
North: 6th Ave NW								
7	L2	28	0	29	0,0	0,346	12,0	LOS B
8	T1	168	0	177	0,0	0,346	12,0	LOS B
9	R2	4	0	4	0,0	0,346	12,0	LOS B
Approach		200	0	211	0,0	0,346	12,0	LOS B
West: 2nd St NW								
10	L2	18	0	19	0,0	0,191	12,7	LOS B
11	T1	60	0	63	0,0	0,191	12,7	LOS B
12	R2	5	0	5	0,0	0,191	12,7	LOS B
Approach		83	0	87	0,0	0,191	12,7	LOS B
All Vehicles		1289	0	1357	0,0	1,089	52,4	LOS F

Project Scenario - Mitigated

AM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave NW								
1	L2	4	0	4	0,0	0,140	3,4	LOS A
2	T1	144	0	152	0,0	0,140	3,4	LOS A
3	R2	28	0	29	0,0	0,140	3,4	LOS A
Approach		176	0	185	0,0	0,140	3,4	LOS A
East: 2nd St NW								
4	L2	45	0	47	0,0	*0,435	27,0	LOS C
5	T1	38	0	40	0,0	0,435	27,0	LOS C
6	R2	16	0	17	0,0	0,435	27,0	LOS C
Approach		99	0	104	0,0	0,435	27,0	LOS C
North: 6th Ave NW								
7	L2	57	0	60	0,0	*0,483	5,9	LOS A
8	T1	524	0	552	0,0	0,483	5,9	LOS A
9	R2	13	0	14	0,0	0,483	5,9	LOS A
Approach		594	0	625	0,0	0,483	5,9	LOS A
West: 2nd St NW								
10	L2	5	0	5	0,0	0,527	25,4	LOS C
11	T1	119	0	125	0,0	0,527	25,4	LOS C
12	R2	43	0	45	0,0	0,527	25,4	LOS C
Approach		167	0	176	0,0	0,527	25,4	LOS C
All Vehicles		1036	0	1091	0,0	0,527	10,6	LOS B

PM

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service
South: 6th Ave NW								
1	L2	11	0	12	0,0	*0,629	20,3	LOS C
2	T1	487	0	513	0,0	0,629	20,3	LOS C
3	R2	32	0	34	0,0	0,629	20,3	LOS C
Approach		530	0	558	0,0	0,629	20,3	LOS C
East: 2nd St NW								
4	L2	72	0	76	0,0	*0,609	19,1	LOS B
5	T1	209	0	220	0,0	0,609	19,1	LOS B
6	R2	195	0	205	0,0	0,609	19,1	LOS B
Approach		476	0	501	0,0	0,609	19,1	LOS B
North: 6th Ave NW								
7	L2	28	0	29	0,0	0,336	21,9	LOS C
8	T1	168	0	177	0,0	0,336	21,9	LOS C
9	R2	4	0	4	0,0	0,336	21,9	LOS C
Approach		200	0	211	0,0	0,336	21,9	LOS C
West: 2nd St NW								
10	L2	18	0	19	0,0	0,150	19,7	LOS B
11	T1	60	0	63	0,0	0,150	19,7	LOS B
12	R2	5	0	5	0,0	0,150	19,7	LOS B
Approach		83	0	87	0,0	0,150	19,7	LOS B
All Vehicles		1289	0	1357	0,0	0,629	20,1	LOS C

Appendix B -

Synchro Simulation -

Civic Center Drive & 6th Avenue NW

Civic Center Dr - 6th Ave NW - Saturation

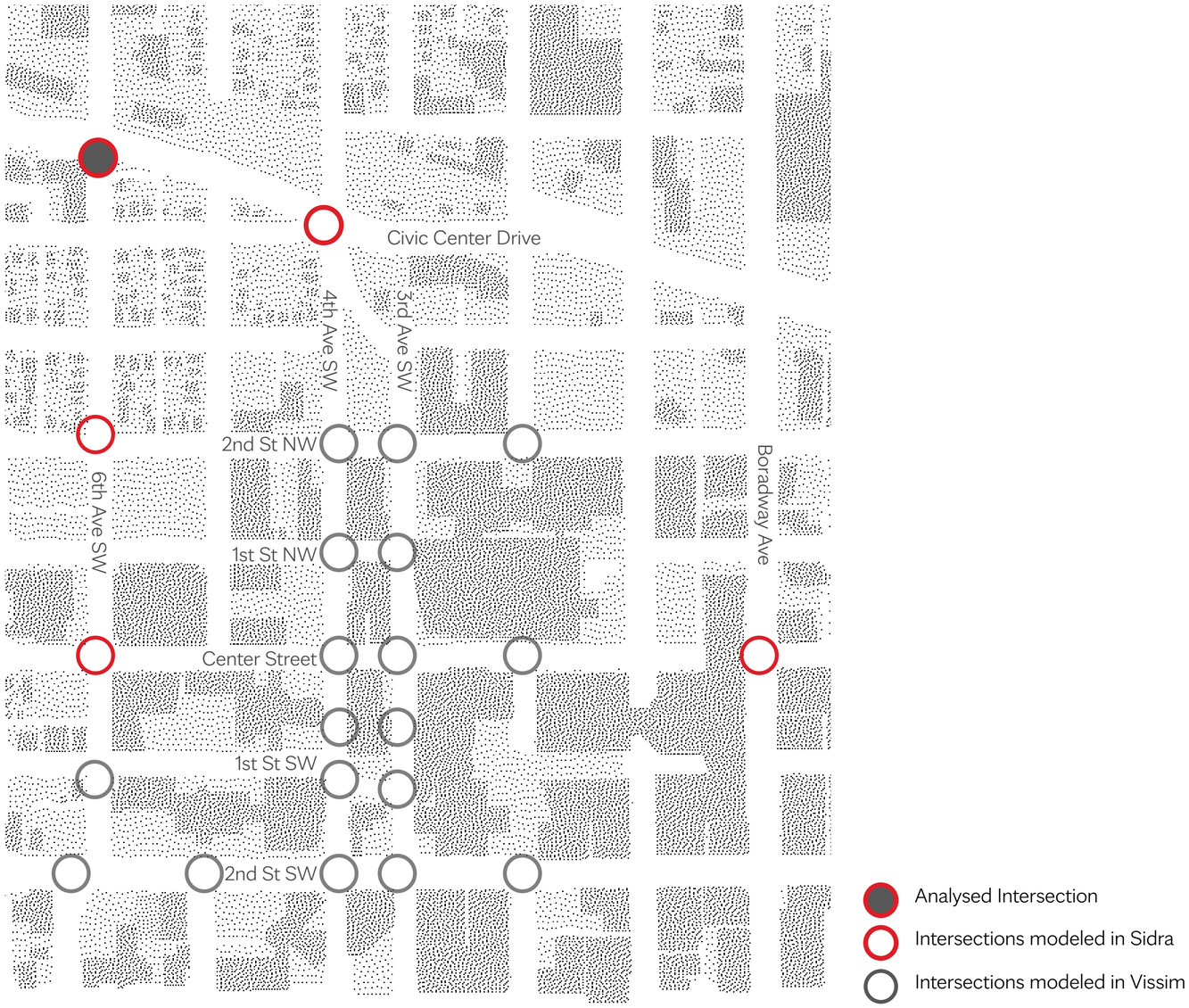
Further checks were performed also using the software Synchro, to determine whether the mitigation measure required at the intersection of Civic Center Drive and 6th Avenue NW is needed.

4 scenarios were simulated for AM and PM scenario and then compared to Sidra.

The recap table below shows that, as in Sidra, both the reference and unmitigated project scenario do not comply with the CIty engineering standard (maximum LOS of the intersection is D, maximum LOS for each single movement is E, saturation is less than 0.9).

In the following pages the results of the Synchro simulations in detail, showing LOS by movement and saturation.

TESTED SCENARIOS	COMPLIANCE WITH CITY ENGINEERING STANDARDS	
MODEL	**SIDRA**	**SYNCHRO**
EXISTING SCENARIO	NO	YES
REFERENCE SCENARIO	NO	NO
PROJECT SCENARIO (UNIMITIGATED)	NO	NO
PROJECT SCENARIO (MITIGATED)	YES	YES



Civic Center Dr - 6th Ave NW - AM Scenario Delays

The City engineering standards require that the maximum LOS of the intersection is D, maximum LOS of each single movement is E and saturation is less than 0.9.

Existing Condition

Intersection		Appr	Forecast Volumes				Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)	
Control	Location		L	T	R	Total	L	T	R	L	T	R	Delay	LOS	Delay	LOS
Signalized	6th Ave NW & Civic Center Dr	NB	97	59	18	174	38	34	20	D	C	C	35	D	23	C
		WB	15	417	8	440	32	12	3	C	B	A	13	B		
		SB	3	129	14	146	53	47	30	D	D	C	45	D		
		EB	35	1083	525	1643	22	24	22	C	C	C	23	C		

Reference Scenario

Intersection		Appr	Forecast Volumes				Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)	
Control	Location		L	T	R	Total	L	T	R	L	T	R	Delay	LOS	Delay	LOS
Signalized	6th Ave NW & Civic Center Dr	NB	106	98	21	225	31	27	19	C	C	B	28	C	28	C
		WB	15	583	16	614	50	13	3	D	B	A	14	B		
		SB	3	179	5	187	32	33	19	C	C	B	33	C		
		EB	31	1216	593	1840	32	32	33	C	C	C	32	C		

Project Scenario - Unmitigated

Intersection		Appr	Forecast Volumes				Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)	
Control	Location		L	T	R	Total	L	T	R	L	T	R	Delay	LOS	Delay	LOS
Signalized	6th Ave NW & Civic Center Dr	NB	122	100	24	246	29	23	13	C	C	B	25	C	26	C
		WB	19	662	11	692	45	14	4	D	B	A	15	B		
		SB	2	207	11	220	61	35	21	E	D	C	35	D		
		EB	20	1196	549	1765	27	30	28	C	C	C	29	C		

Project Scenario - Mitigated

Intersection		Appr	Forecast Volumes				Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)	
Control	Location		L	T	R	Total	L	T	R	L	T	R	Delay	LOS	Delay	LOS
Signalized	6th Ave NW & Civic Center Dr	NB	122	100	24	246	40	35	24	D	D	C	36	D	21	C
		WB	19	662	11	692	45	13	6	D	B	A	14	B		
		SB	2	207	11	220	33	50	46	C	D	D	50	D		
		EB	20	1196	549	1765	24	19	17	C	B	B	18	B		

Civic Center Dr - 6th Ave NW - PM Scenario Delays

The City engineering standards require that the maximum LOS of the intersection is D and each single movement should not be worse than E. Highlighted in red and yellow the movements with LOS F or E.

Existing Condition

Intersection		Appr	Forecast Volumes				Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)	
Control	Location		L	T	R	Total	L	T	R	L	T	R	Delay	LOS	Delay	LOS
Signalized	6th Ave NW & Civic Center Dr	NB	439	132	51	622	43	34	25	D	C	C	40	D	28	C
		WB	24	926	25	975	24	25	9	C	C	A	25	C		
		SB	16	57	29	102	31	43	25	C	D	C	36	D		
		EB	59	687	107	853	32	23	7	C	C	A	22	C		

Reference Scenario

Intersection		Appr	Forecast Volumes				Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)	
Control	Location		L	T	R	Total	L	T	R	L	T	R	Delay	LOS	Delay	LOS
Signalized	6th Ave NW & Civic Center Dr	NB	586	217	128	931	81	74	66	F	E	E	77	E	40	D
		WB	25	1081	19	1125	37	23	9	D	C	A	23	C		
		SB	16	70	59	145	23	37	23	C	D	C	30	C		
		EB	28	913	222	1163	56	30	10	E	C	B	27	C		

Project Scenario - Unmitigated

Intersection		Appr	Forecast Volumes				Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)	
Control	Location		L	T	R	Total	L	T	R	L	T	R	Delay	LOS	Delay	LOS
Signalized	6th Ave NW & Civic Center Dr	NB	509	254	157	920	57	47	44	E	D	D	52	D	32	C
		WB	27	1095	47	1169	39	19	8	D	B	A	19	B		
		SB	3	79	75	157	22	42	29	C	D	C	35	D		
		EB	23	991	193	1207	59	33	14	E	C	B	30	C		

Project Scenario - Mitigated

Intersection		Appr	Forecast Volumes				Total Delay by Movement			LOS by Movement			LOS by Approach (Sec/Veh)		LOS by Intersection (Sec/Veh)	
Control	Location		L	T	R	Total	L	T	R	L	T	R	Delay	LOS	Delay	LOS
Signalized	6th Ave NW & Civic Center Dr	NB	509	254	157	920	42	36	29	D	D	C	38	D	22	C
		WB	27	1095	47	1169	30	13	7	C	B	A	13	B		
		SB	3	79	75	157	49	44	30	D	D	C	37	D		
		EB	23	991	193	1207	38	19	7	D	B	A	17	B		

Civic Center Dr - 6th Ave NW - Saturation

The City engineering standards require that the maximum LOS of the intersection is D and each single movement should not be worse than E. Highlighted in red and yellow the movements with LOS F or E.

Existing Condition

Intersection		Appr	V/C Ratio by Movement		
Time	Location		L	T	R
AM	6th Ave NW & Civic Center Dr	NB	0.28	0.14	
		WB	0.07	0.25	0.01
		SB	0.01	0.37	
		EB	0.07	0.61	0.60
PM	6th Ave NW & Civic Center Dr	NB	0.85	0.29	
		WB	0.09	0.66	0.04
		SB	0.04	0.20	
		EB	0.32	0.47	0.15

Project Scenario - Unmitigated

Intersection		Appr	V/C Ratio by Movement		
Time	Location		L	T	R
AM	6th Ave NW & Civic Center Dr	NB	0.38	0.21	
		WB	0.13	0.41	0.01
		SB	0.00	0.47	
		EB	0.07	0.73	0.67
PM	6th Ave NW & Civic Center Dr	NB	0.90	0.55	
		WB	0.20	0.87	0.07
		SB	0.01	0.37	
		EB	0.18	0.78	0.29

Reference Scenario

Intersection		Appr	V/C Ratio by Movement		
Time	Location		L	T	R
AM	6th Ave NW & Civic Center Dr	NB	0.30	0.21	
		WB	0.10	0.37	0.02
		SB	0.01	0.40	
		EB	0.10	0.75	0.72
PM	6th Ave NW & Civic Center Dr	NB	0.98	0.46	
		WB	0.17	0.92	0.03
		SB	0.04	0.28	
		EB	0.20	0.78	0.35

Project Scenario - Mitigated

(with two NB left turn lanes at 6th Ave NW)

Intersection		Appr	V/C Ratio by Movement		
Time	Location		L	T	R
AM	6th Ave NW & Civic Center Dr	NB	0.33	0.31	
		WB	0.09	0.34	0.01
		SB	0.01	0.73	
		EB	0.06	0.61	0.58
PM	6th Ave NW & Civic Center Dr	NB	0.86	0.87	
		WB	0.11	0.63	0.06
		SB	0.02	0.48	
		EB	0.14	0.56	0.23

Appendix C -

2nd Street SW Sensitivity Test

Sensitivity Test

After having identified a possible underestimation in the flows of 2nd Street in the project scenario, the City has asked to perform additional checks on the intersection between 6th Avenue Sw and 2nd Street SW.

The three reasons for lower flows on 2nd Street are the following:

- introduction of BRT lanes which decrease capacity
- redistribution of the flows related to Unbound which are more concentrated towards the north due to the new configuration of the hospital.
- The use of asbsolute numbers in the extraction of the delta (instead of % Delta) applied to the background traffic of 2nd Street.

In the diagrams below we compare different scenarios simulated. On the right the sensitivity test with additional flows on 2nd Street through movements. Only PM values are shown as worst case, but in the next page both results for AM and PM are shown

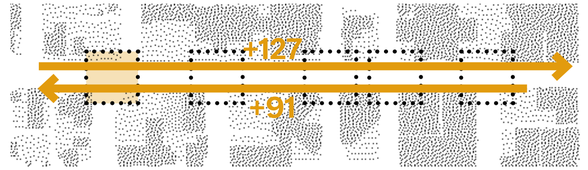
SENSITIVITY TEST

The simulated traffic flows for through movements on 2nd Street have been increased applying the % delta. The additional flows are:

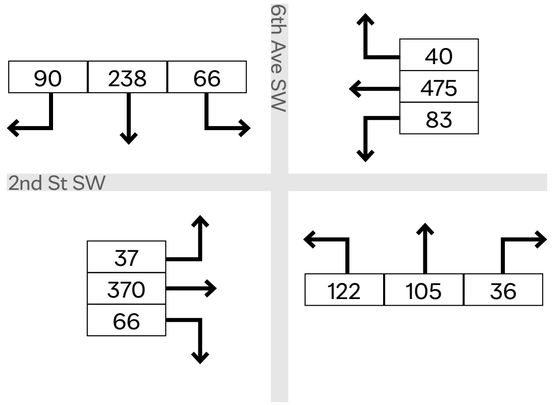
+127 veh/h EB

+91 veh/h WB

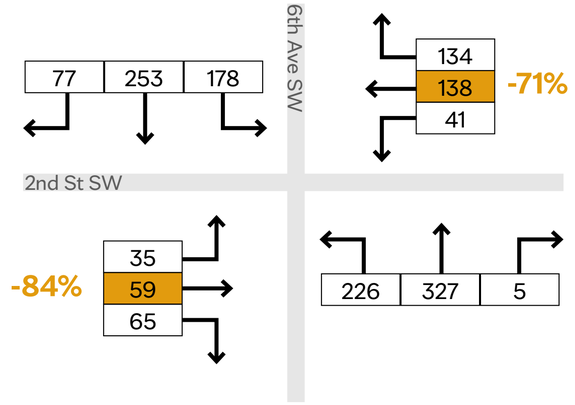
For the sensitivity test these flows are then applied to all the through traffic from 6th Avenue SW to 2nd Ave SW, for the most conservative scenario.



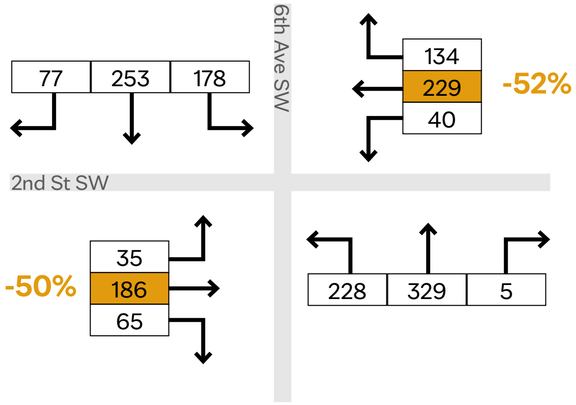
EXISTING PM SCENARIO (TRAFFIC COUNTS)



PROJECT PM SCENARIO (AS TESTED)



PROJECT PM SCENARIO (SENSITIVITY)

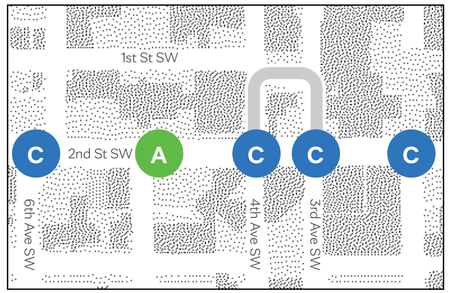


Sensitivity Test - 2nd Street SW

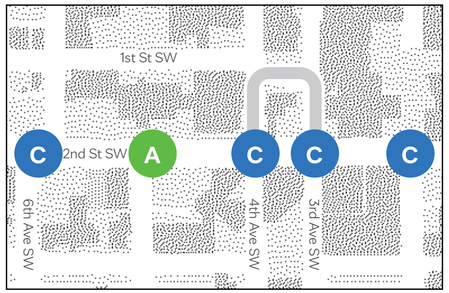
The maps below compare the level of service for the 5 intersections of 2nd Street SW included in the Vissim model. It can be seen that even with the additional flows the results are still compliant with the City engineering standards.

On the right the LOS by movement shows that all intersections have as a maximum LOS E.

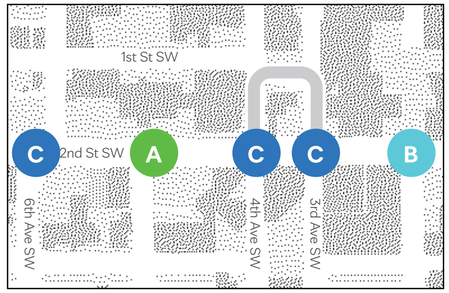
AM (PROJECT SCENARIO)



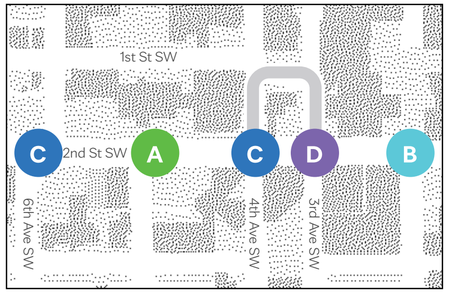
AM (SENSITIVITY TEST)



PM (PROJECT SCENARIO)



PM (SENSITIVITY TEST)



AM (SENSITIVITY TEST)

Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
SIG	2nd St SW - 2nd Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	177	19.7	B
		2nd St SW East to 2nd Ave SW South	E-S	WBL	129	43.0	D
		2nd Ave SW South to 2nd St SW East	S-E	NBR	54	10.9	B
		2nd Ave SW South to 2nd St SW West	S-W	NBL	38	32.3	C
		2nd St SW West to 2nd Ave SW South	W-S	EBR	31	14.2	B
		2nd St SW West to 2nd St SW East	W-E	EBT	253	13.5	B
		--	**Total**		**682**	**21.6**	**C**
SIG	2nd St SW - 3rd Ave SW	2nd St SW East to 3rd Ave SW North	E-N	WBR	53	22.3	C
		2nd St SW East to 2nd St SW West	E-W	WBT	162	32.8	C
		3rd Ave SW South to 2nd St SW West	S-W	NBL	139	66.5	E
		3rd Ave SW South to 3rd Ave SW North	S-N	NBT	70	49.1	D
		3rd Ave SW South to 2nd St SW East	S-E	NBR	38	31.0	C
		2nd St SW West to 3rd Ave SW North	W-N	EBL	57	5.0	A
		2nd St SW West to 2nd St SW East	W-E	EBT	249	2.5	A
		--	**Total**		**767**	**27.9**	**C**
SIG	2nd St SW - 4th Ave SW	4th Ave NW North to 2nd St SW West	N-W	SBR	38	44.7	D
		4th Ave NW North to 4th Ave NW South	N-S	SBT	136	49.9	D
		4th Ave NW North to 2nd St SW East	N-E	SBL	6	52.1	D
		2nd St SW East to 2nd St SW West	E-W	WBT	178	6.8	A
		2nd St SW East to 4th Ave NW South	E-S	WBL	124	11.1	B
		2nd St SW West to 2nd St SW East	W-E	EBT	297	30.4	C
		2nd St SW West to 4th Ave NW South	W-S	EBR	203	13.0	B
		--	**Total**		**983**	**23.5**	**C**
UNS	2nd St SW - 5th Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	218	0.2	A
		5th Ave SW South to 2nd St SW East	S-E	NBR	140	2.9	A
		2nd St SW West to 5th Ave SW South	W-S	EBR	168	1.2	A
		2nd St SW West to 2nd St SW East	W-E	EBT	300	0.3	A
		--	**Total**		**826**	**0.9**	**A**
SIG	2nd St SW - 6th Ave SW	6th Ave SW North to 2nd St SW West	N-W	SBR	34	11.5	B
		6th Ave SW North to 6th Ave SW South	N-SW	SBT	132	21.2	C
		6th Ave SW North to 2nd St SW East	N-E	SBL	237	26.8	C
		2nd St SW East to 6th Ave SW North	E-N	WBR	56	17.4	B
		2nd St SW East to 2nd St SW West	E-W	WBT	156	38.8	D
		2nd St SW East to 6th Ave SW South	E-SW	WBL	7	43.2	D
		6th Ave SW South to 2nd St SW West	SW-W	NBL	43	34.8	C
		6th Ave SW South to 6th Ave SW North	SW-N	NBT	275	39.4	D
		6th Ave SW South to 2nd St SW East	SW-E	NBR	7	33.0	C
		2nd St SW West to 6th Ave SW North	W-N	EBL	110	45.9	D
		2nd St SW West to 2nd St SW East	W-E	EBT	225	25.1	C
		2nd St SW West to 6th Ave SW South Bypass	W-S	EBR	66	2.5	A
		--	**Total**		**1348**	**29.9**	**C**

PM (SENSITIVITY TEST)

Type: Signalized or Unsignaliz.	Street Name	Movement	Direction	Movem.	Volume (veh/h)	Average Delay (sec)	LOS
SIG	2nd St SW - 2nd Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	304	19.7	B
		2nd St SW East to 2nd Ave SW South	E-S	WBL	3	36.5	D
		2nd Ave SW South to 2nd St SW East	S-E	NBR	187	18.3	B
		2nd Ave SW South to 2nd St SW West	S-W	NBL	31	39.7	D
		2nd St SW West to 2nd Ave SW South	W-S	EBR	140	17.0	B
		2nd St SW West to 2nd St SW East	W-E	EBT	247	12.5	B
		--	**Total**		**911**	**17.8**	**B**
SIG	2nd St SW - 3rd Ave SW	2nd St SW East to 3rd Ave SW North	E-N	WBR	49	35.7	D
		2nd St SW East to 2nd St SW West	E-W	WBT	286	47.1	D
		3rd Ave SW South to 2nd St SW West	S-W	NBL	170	79.5	E
		3rd Ave SW South to 3rd Ave SW North	S-N	NBT	44	42.0	D
		3rd Ave SW South to 2nd St SW East	S-E	NBR	122	29.0	C
		2nd St SW West to 3rd Ave SW North	W-N	EBL	135	22.2	C
		2nd St SW West to 2nd St SW East	W-E	EBT	267	4.5	A
		--	**Total**		**1072**	**35.9**	**D**
SIG	2nd St SW - 4th Ave SW	4th Ave NW North to 2nd St SW West	N-W	SBR	60	52.7	D
		4th Ave NW North to 4th Ave NW South	N-S	SBT	150	58.5	E
		4th Ave NW North to 2nd St SW East	N-E	SBL	18	55.3	E
		2nd St SW East to 2nd St SW West	E-W	WBT	342	14.6	B
		2nd St SW East to 4th Ave NW South	E-S	WBL	116	19.7	B
		2nd St SW West to 2nd St SW East	W-E	EBT	385	45.9	D
		2nd St SW West to 4th Ave NW South	W-S	EBR	219	25.8	C
		--	**Total**		**1289**	**33.7**	**C**
UNS	2nd St SW - 5th Ave SW	2nd St SW East to 2nd St SW West	E-W	WBT	403	0.3	A
		5th Ave SW South to 2nd St SW East	S-E	NBR	220	19.0	C
		2nd St SW West to 5th Ave SW South	W-S	EBR	73	1.1	A
		2nd St SW West to 2nd St SW East	W-E	EBT	296	3.4	A
		--	**Total**		**993**	**5.7**	**A**
SIG	2nd St SW - 6th Ave SW	6th Ave SW North to 2nd St SW West	N-W	SBR	77	12.4	B
		6th Ave SW North to 6th Ave SW South	N-SW	SBT	253	15.3	B
		6th Ave SW North to 2nd St SW East	N-E	SBL	177	16.4	B
		2nd St SW East to 6th Ave SW North	E-N	WBR	132	24.0	C
		2nd St SW East to 2nd St SW West	E-W	WBT	229	37.6	D
		2nd St SW East to 6th Ave SW South	E-SW	WBL	40	45.4	D
		6th Ave SW South to 2nd St SW West	SW-W	NBL	228	65.0	E
		6th Ave SW South to 6th Ave SW North	SW-N	NBT	329	54.3	D
		6th Ave SW South to 2nd St SW East	SW-E	NBR	5	50.2	D
		2nd St SW West to 6th Ave SW North	W-N	EBL	35	32.3	C
		2nd St SW West to 2nd St SW East	W-E	EBT	186	29.4	C
		2nd St SW West to 6th Ave SW South Bypass	W-S	EBR	65	2.5	A
		--	**Total**		**1757**	**34.8**	**C**

Appendix D - Trip Generation Memo

ROCOG Trip Generation

From the ROCOG Model Methodology Memo the three different user-types used from the trip generation;

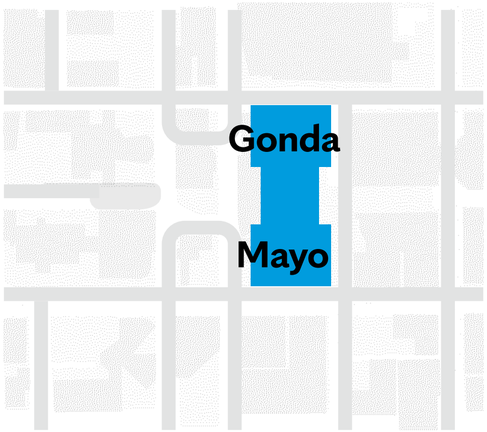
- Home-Based Work (HBW)
- Home-Based Other (HBO)
- Non-Home Based (NHB)

STAFF

HOSPITAL AND CLINIC VISITORS

*Our assumption, to be formally confirmed by ROCOG

ROCOG Trip Generation - Mayo/Gonda



Trip generation based on GFA:

the example of Mayo/ Gonda complex

CLINIC GFA

Mayo Building: **1,090,180 sf**

Gonda Building: **1,567,590 sf**

Trip generation Rates

	Daily trips generated per 1000 sf	Mayo medical center
HBW	PROD	0
	ATTR	4.97
HBO	PROD	0
	ATTR	3.69
NHB	PROD	1.42
	ATTR	1.42

*These rates are applied to the GFA to calculate the daily trips attracted and produced by a single zone. These trips include all modes: car, transit, walking, bike etc...

Daily Trips (All Modes) IN&OUT

MAYO+GONDA	
daily trips	all modes
HBW	12,371
HBO	9,724
NHB	7,573

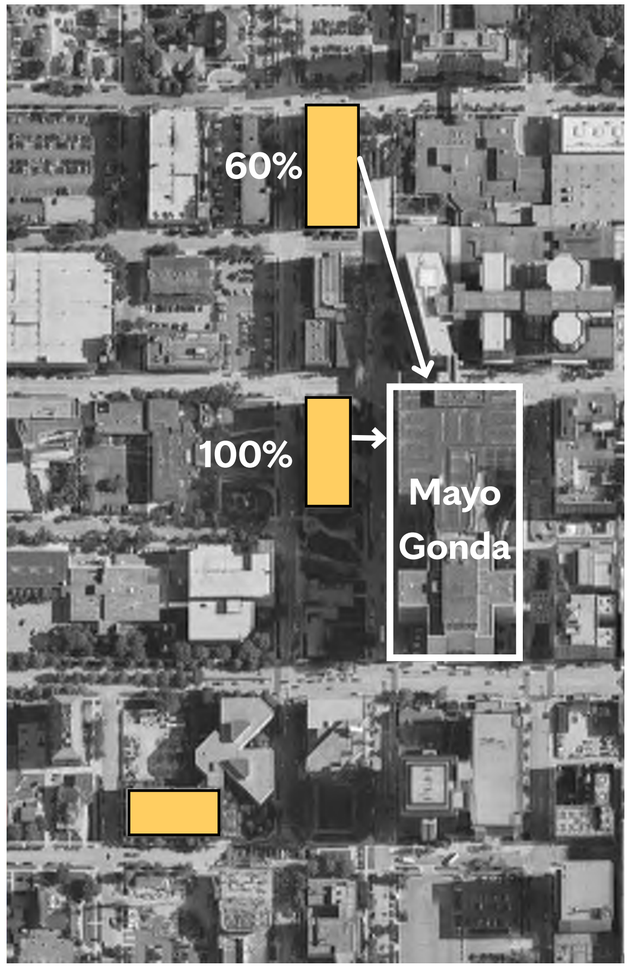
*Daily trips (all modes) calculated for the 3 user types

Daily Trips (Motorized Modes) IN&OUT

MAYO+GONDA		
	motorized	& of motorized
HBW	12,371	96%
HBO	9,469	97%
NHB	4,779	63%

*Daily trips (only motorized modes: NO transit, walking, bike etc...) calculated for the 3 user types

Observed Data and Counts - Visitors (no staff)



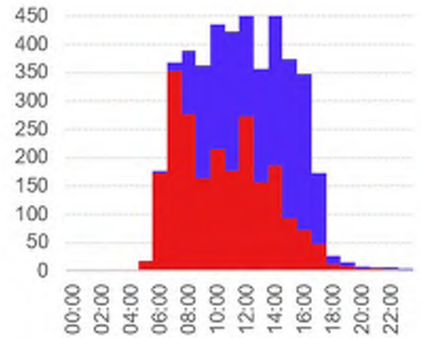
Downtown Visitors parking facilities **(Damon 770 cps, Graham 926 cps, Baldwin 151cps)** serve the downtown Hospitals and Clinics.
Total bidirectional traffic generated by the 3 parkings is 8,100 veh/day.
The estimated Mayo/Gonda parking Demand is estimated to be 100% Damon + 60% Graham = 6,150 veh/day (In+out)

The Gonda drop-offs have a traffic of about 208 veh/h during peak, which translates into **2,000 veh/day** (considering that the peak hour is about 10% of the daily)

IN
OUT

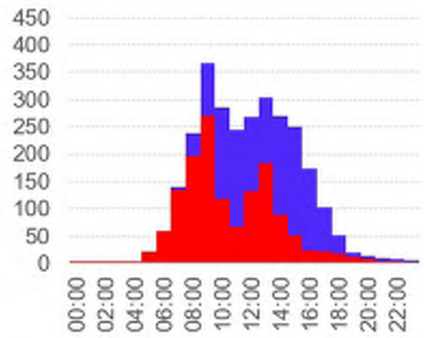
4,440 veh/day

DAMON PARKING RAMP



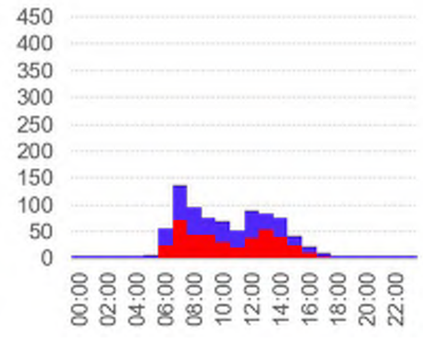
2,832 veh/day

GRAHAM PARKING RAMP



826 veh/day

BALDWIN PARKING RAMP



Comparison Observed vs Model Trip Gen

TRAFFIC FROM RATES (ROCOG)

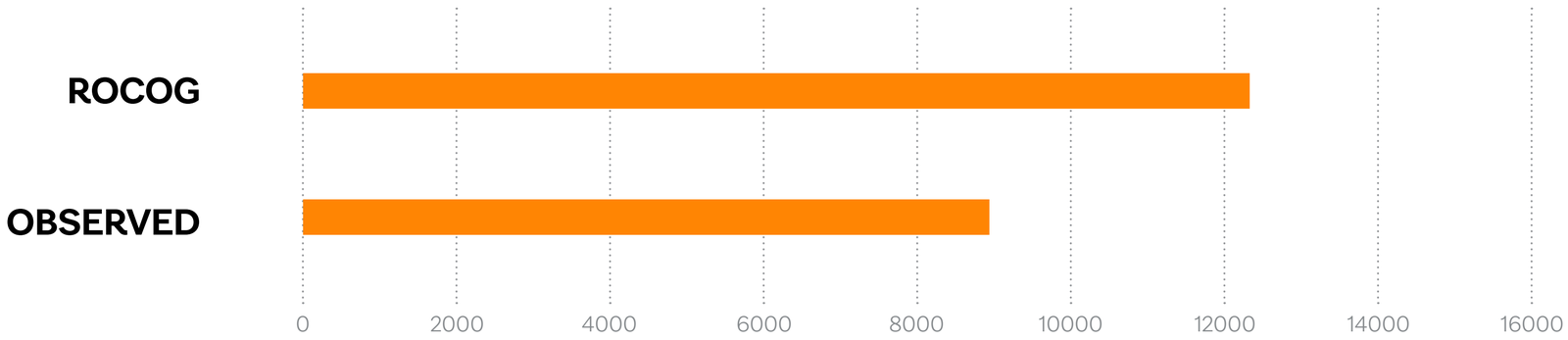
Traffic calculated with ROCOG rates for only the Gonda and Mayo buildings

TRAFFIC OBSERVED

Observed traffic at visitors downtown parking (Damon+60% Graham) + Gonda Drop-off

14,150 veh/day → 8,950 veh/day

Traffic observed for Mayo/Gonda is **40% less** compared to the traffic estimated with the rates.



Comparison Observed vs Model Trip Gen

TRAFFIC FROM RATES (ROCOG)

Traffic calculated with ROCOG rates for only the Gonda and Mayo buildings

14,150 veh/day

5,630 veh/day (parking)

8,520 veh/day (non-parking)

The amount of cars going to parking is very similar **(8% difference)** in the model and in the observed numbers

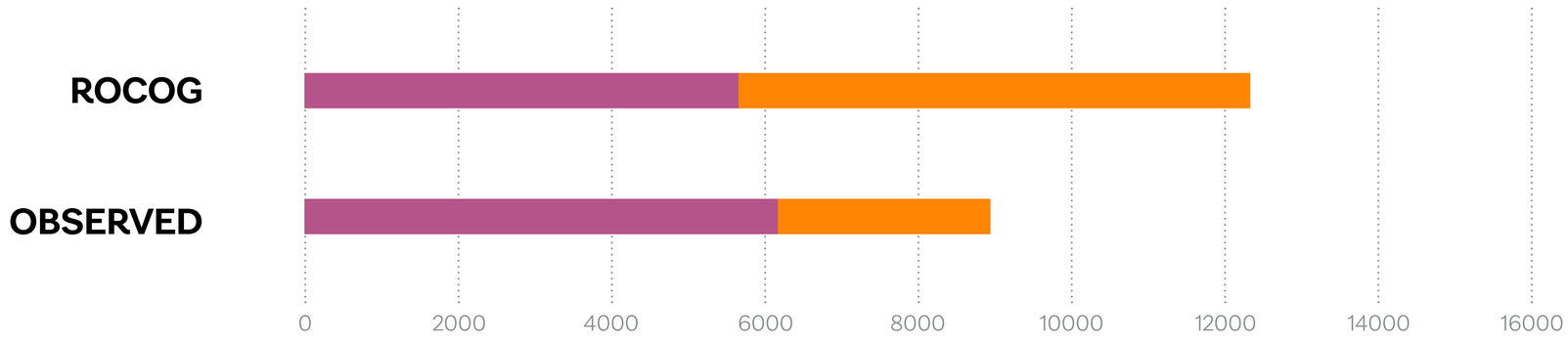
TRAFFIC OBSERVED

Observed traffic at visitors downtown parking (Damon+60% Graham) + Gonda Drop-off

8,950 veh/day

6,150 veh/day (parking)

2,000 veh/day (drop-off)



Comparison Observed vs Model Trip Gen

ROCOG has carried out a specific study on parking traffic, balancing the traffic demand with the actual parking capacity. This is probably the reason why the observed and model parking traffic match.

Inconcistency between the model and observed flows could be due to two factors:

- Non-parking motorized flows are overestimated
- Ped/bike shuttle component is underestimated

