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Clover Center
Traffic and Parking Study

Bloomington, MN

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CITY OF
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Table of Contents

List of Figures

List of Tables

1.0 Introduction

Alliant Engineering has completed a traffic and parking study for a proposed redevelopment at the Clover Center located in the northwest quadrant of the 98th Street/Lyndale Avenue intersection in Bloomington, MN (see **Figure 1**). The main objectives of this study are to identify any potential traffic impacts to the adjacent roadway network due to redevelopment generated trips, evaluate the viability of the proposed parking supply, and recommend improvements to address identified issues. The following provides the assumptions, analysis, and study conclusions/recommendations offered for consideration.

2.0 Existing and Year 2024 No Build Conditions

The existing and forecast year 2024 no build conditions were reviewed to establish a baseline for identifying any future impacts associated with the proposed redevelopment (assumed to be complete in the year 2023). The evaluation of existing and forecast year 2024 no build conditions includes field observations, data collection, review of historical traffic volumes, estimates of existing and future traffic volumes, and an intersection operations analysis.

2.1 Study Area Intersections

Via discussion with City of Bloomington staff, the following study intersections were identified:

- 98th Street & I-35W Southbound Offramp/Dupont Avenue
- 98th Street & I-35W Northbound Ramps
- 98th Street & South Access (three-quarter access)
- 98th Street & Lyndale Avenue
- Lyndale Avenue & Southeast Access (right-out only access)
- Lyndale Avenue & Northeast Access (full access)

2.2 Data Collection

2.2.1 Roadway/Intersection Characteristics

Field observations were completed to identify roadway and intersection characteristics within the study area (i.e. geometry, posted speed limits, and traffic controls), which are summarized in **Table 1** and **Table 2**.

Table 1 – Study Area Roadway Characteristics

Roadway	Cross-Section	Speed Limit[1]	Functional Classification
98th Street[2]	4-Lane Divided	35 mph	Minor Arterial
Lyndale Avenue	4-Lane Divided	35 mph	Minor Arterial

(1) mph=miles per hour

(2) The study segment of 98th Street is under the jurisdiction of Hennepin County as State Aid Highway 1 (CSAH 1)

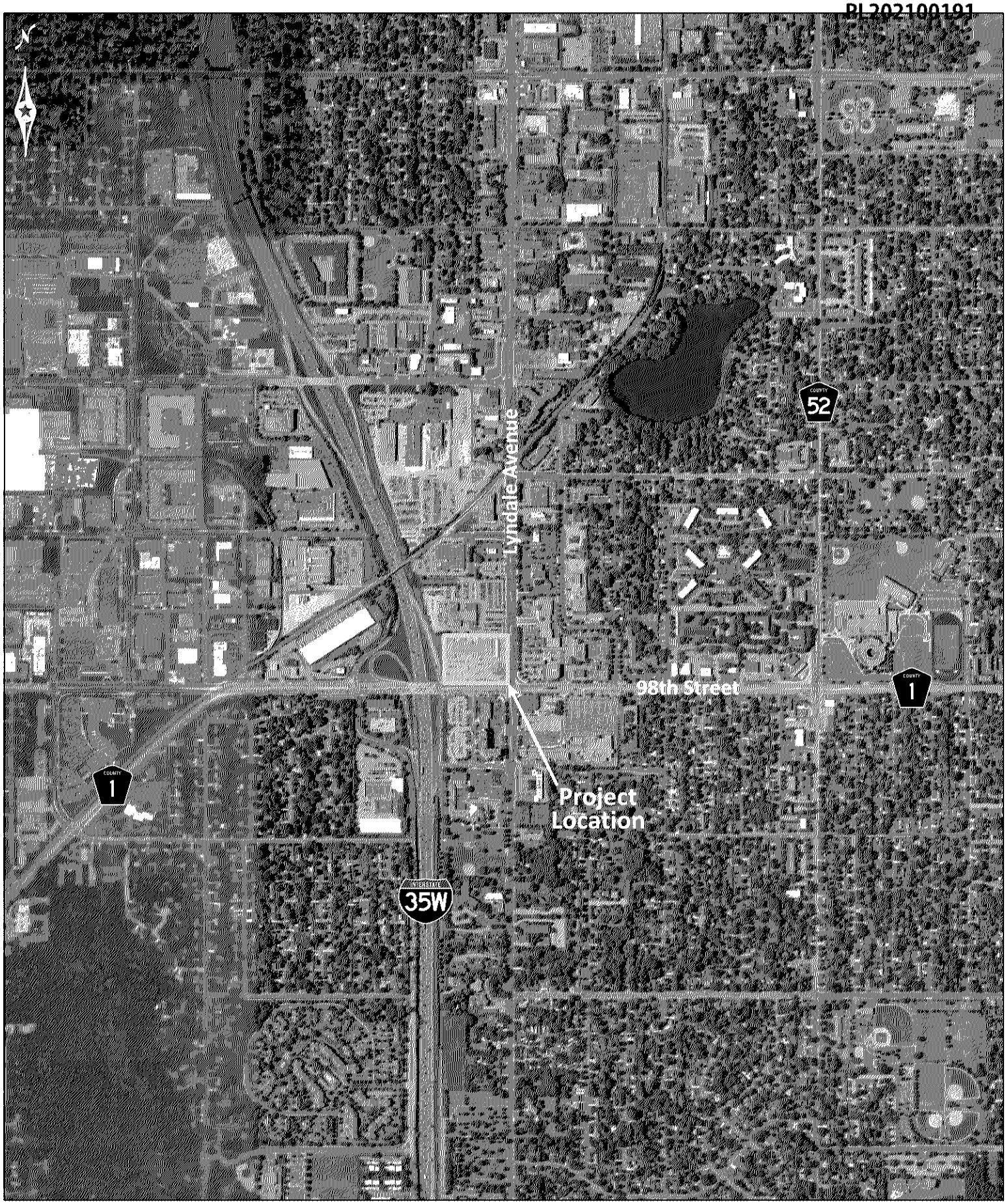

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Figure 1
Project Location

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Table 2 – Study Area Intersection Characteristics

Intersection	Traffic Control	Lane Designations by Approach[1]			
		NB	SB	EB	WB
98th Street/35W SB Offramp	Traffic Signal	L/R	L/T/R[2]	T/T/T/R	L/T/T/T
98th Street/35W NB Ramps	Traffic Signal	L/LTR[2]	–	L/T/T	T/T/TR
98th Street/South Access	Through/Stop	R	R	L/T/T/TR	T/T/TR
98th Street/Lyndale Avenue	Traffic Signal	L/T/T/R	L/T/T/R[2]	L/L/T/T/R[2]	L/L/T/T/R[2]
Lyndale Avenue/SE Access	Through/Stop	T/T/T	T/T	R	–
Lyndale Avenue/NE Access	Through/Stop	L/T/T/T	T/TR	LR	–

(1) L=Left-Turn, T=Through, R=Right-Turn

(2) Channelized Right-Turn

2.2.2 Alternative Transportation Modes

A combination of field observations and online research was completed to document existing alternative transportation modes within the study area. Existing alternative transportation modes include the following:

- The South Bloomington Transit Center, located along the south side of 98th Street opposite the Clover Center, provides access to Metro Transit Bus Routes 18, 465, 535, 539, and 597. These bus routes combine to provide transit service to various parts of Bloomington including the Mall of America, the Burnsville Transit Station, Best Buy headquarters in Richfield, uptown and downtown Minneapolis, the University of Minnesota in Minneapolis, and numerous other transit hubs. Several of these bus routes also have stops along 98th Street and Lyndale Avenue near the Clover Center.
    - The Bus Rapid Transit (BRT) Metro Orange Line is anticipated to begin service later in the year 2021 along I-35W between Burnsville and Minneapolis. The Orange Line will serve the South Bloomington Transit Center and is expected to replace the existing Metro Transit Bus Route 535.
- Limited bicycle accommodations are currently present near the Clover Center, though bike facilities farther south provide access to trails in the Minnesota River Valley.
- Sidewalks line both sides of 98th Street and Lyndale Avenue within the study area. The sidewalk adjacent to the site from the South Access to the west is narrow curb sidewalk and is deficient and in poor condition. The issue is most significant on the west side of the South Access where the sidewalk narrows and abruptly ends with a poor grade transition, which does not meet current Americans with Disabilities Act (ADA) standards. Sidewalk along Lyndale Avenue between the Southeast and Northeast Accesses is also narrow curb sidewalk in poor condition. Transitions to the driveways are similar to the aforementioned sidewalk along 98th Street at the South Access.

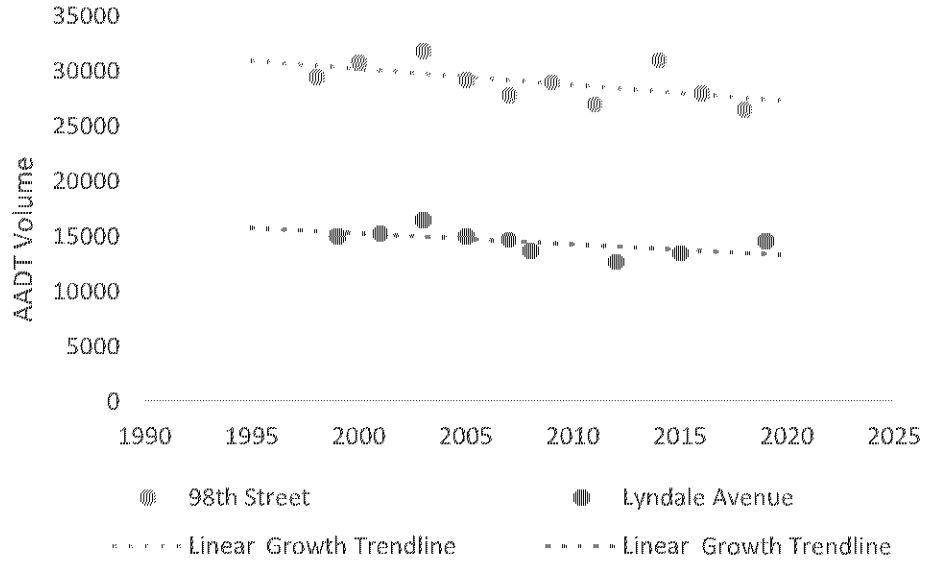
Due to the available surrounding transit connections, non-motorized users may be higher within the study area than in other parts of Bloomington. However, it should be noted that pedestrian and bicycle connections within the study area are deficient and in poor condition.

2.2.3 Traffic Volumes

Existing Conditions

Traffic patterns in the year 2021 have been significantly affected by the response to the ongoing COVID-19 pandemic. Therefore, historical traffic counts served as the basis for estimating typical existing (i.e., pre-pandemic) conditions within the study area. Annual average daily traffic (AADT) volumes, provided by the Minnesota Department of Transportation (MnDOT) via its online *Traffic Mapping Application*, were referenced to understand traffic trends along 98th Street and Lyndale Avenue over a period of approximately 20 years. The study area historical AADT volumes, shown in **Figure 2**, exhibit a long-term declining traffic growth trend of approximately 0.5 percent annually.

Figure 2 – Study Area Historical Traffic Volumes



Considering a long-term declining traffic growth trend within the study area, a year 2017 turning movement count collected by Alliant Engineering at the 98th Street/Lyndale Avenue intersection (presented in **Appendix A**) was selected to provide a conservative representation of typical existing conditions. It should be noted that the following a.m. and p.m. peak hours were observed during the year 2017 turning movement count at the 98th Street/Lyndale Avenue intersection:

- AM Peak Hour: 7:30-8:30 a.m.
- PM Peak Hour: 4:30-5:30 p.m.

These a.m. and p.m. peak hours at the 98th Street/Lyndale Avenue intersection served as the basis for the modeling of typical existing conditions within the study area. The year 2017 peak hour data at the 98th Street/Lyndale Avenue intersection was then supplemented by peak hour data from historical year 2007 MnDOT turning movement counts at the I-35W ramp terminal intersections with 98th Street. In addition to referencing historical traffic volumes, peak period turning movement counts were collected at the three existing Clover Center site access locations during the week of August 9, 2021. Given existing retail vacancies, the collected driveway counts do not provide an appropriate representation of the maximum trip generation potential for the current Clover Center configuration. However, the collected driveway counts do provide an appropriate measure of the origin and destination directionality of Clover Center trips. This observed trip directionality was combined with the historical traffic volume data to derive the Clover Center trip directional distribution shown in **Figure 3**.

To understand the trip generation potential of the current Clover Center under a full occupancy scenario, shopping center and bank trip generation rates were referenced from the *Institute of Transportation Engineers Trip Generation Manual, 10th Edition* (*ITE TGM*). The *ITE TGM* provides peak hour and daily trip generation rates based on studies of various land uses. As shown in **Table 3**, the Clover Center could be expected to generate approximately 225 a.m. peak hour trips, 458 p.m. peak hour trips, and 4,654 daily trips under a full occupancy scenario. While the potential exists for motorists to visit more than one business onsite, a multi-use trip reduction was not applied in order to provide a conservative estimate of the existing Clover Center trip generation potential.

Table 3 – Trip Generation Estimates – Existing Clover Center

Land Use (ITE Code)	Units	Size	AM Peak Hour Trips[1]			PM Peak Hour Trips[1]			Daily Trips
			Trips In	Trips Out	Total Trips	Trips In	Trips Out	Total Trips	
Existing Clover Center Trips - Full Occupancy Scenario									
Shopping Center (820)	Square Feet	58,095[2]	112	69	181	175	189	364	4,156
Drive-In Bank (912)	Square Feet	4,588	25	19	44	47	47	94	498
Total Trips			**137**	**88**	**225**	**222**	**236**	**458**	**4,654**

Source: Institute of Transportation Engineers Trip Generation Manual, 10th Edition

(1) Peak hour of the adjacent roadway network

(2) Square Feet of Leasable Floor Area

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Figure 3
Directional Distribution

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It should be noted that the estimated full occupancy a.m. peak hour trips are comparable to the a.m. peak hour trips observed during the August 2021 data collection period. The majority of the observed a.m. peak hour trips were generated by an existing coffee shop onsite. With most retail stores being closed during the a.m. peak hour of the adjacent roadway network, additional occupied retail space would not be expected to have a significant impact on the a.m. peak hour trip generation of the current Clover Center. However, it should also be noted that the estimated full occupancy p.m. peak hour trips are approximately 50 percent higher than the p.m. peak hour trips observed during the August 2021 data collection period. With most, if not all, retail stores open during the p.m. peak hour of the adjacent roadway network, additional occupied retail space would be expected to have a significant impact on the p.m. peak hour trip generation of the current Clover Center.

The historical intersection turning movement counts and the Clover Center full occupancy trip generation estimates/distribution/assignment were merged to create the estimated typical existing conditions within the study area shown in **Figure 4**.

Year 2024 No Build Conditions

While a definitive timeline for the proposed redevelopment of the Clover Center has not been established, a year 2023 completion was assumed for the purpose of this study. Therefore, year 2024 conditions (i.e., one year after completion of the proposed redevelopment) were evaluated to estimate the potential future impact of Clover Center traffic. Prior to evaluating the proposed redevelopment, year 2024 no build conditions were forecasted and analyzed.

While the previously noted review of historical AADT volumes within the study area revealed a long-term declining traffic growth trend of approximately 0.5 percent annually, the *City of Bloomington 2040 Comprehensive Plan* forecasts modest traffic growth. Therefore, an annual positive growth rate of 0.5 percent was applied to the estimated typical existing traffic volumes to forecast the year 2024 no build conditions shown in **Figure 5**. It should be noted that the forecast year 2024 no build conditions assume no change to intersection geometry, traffic control, or signal timing, and do not include any potential increase in trips generated by the proposed Clover Center redevelopment.

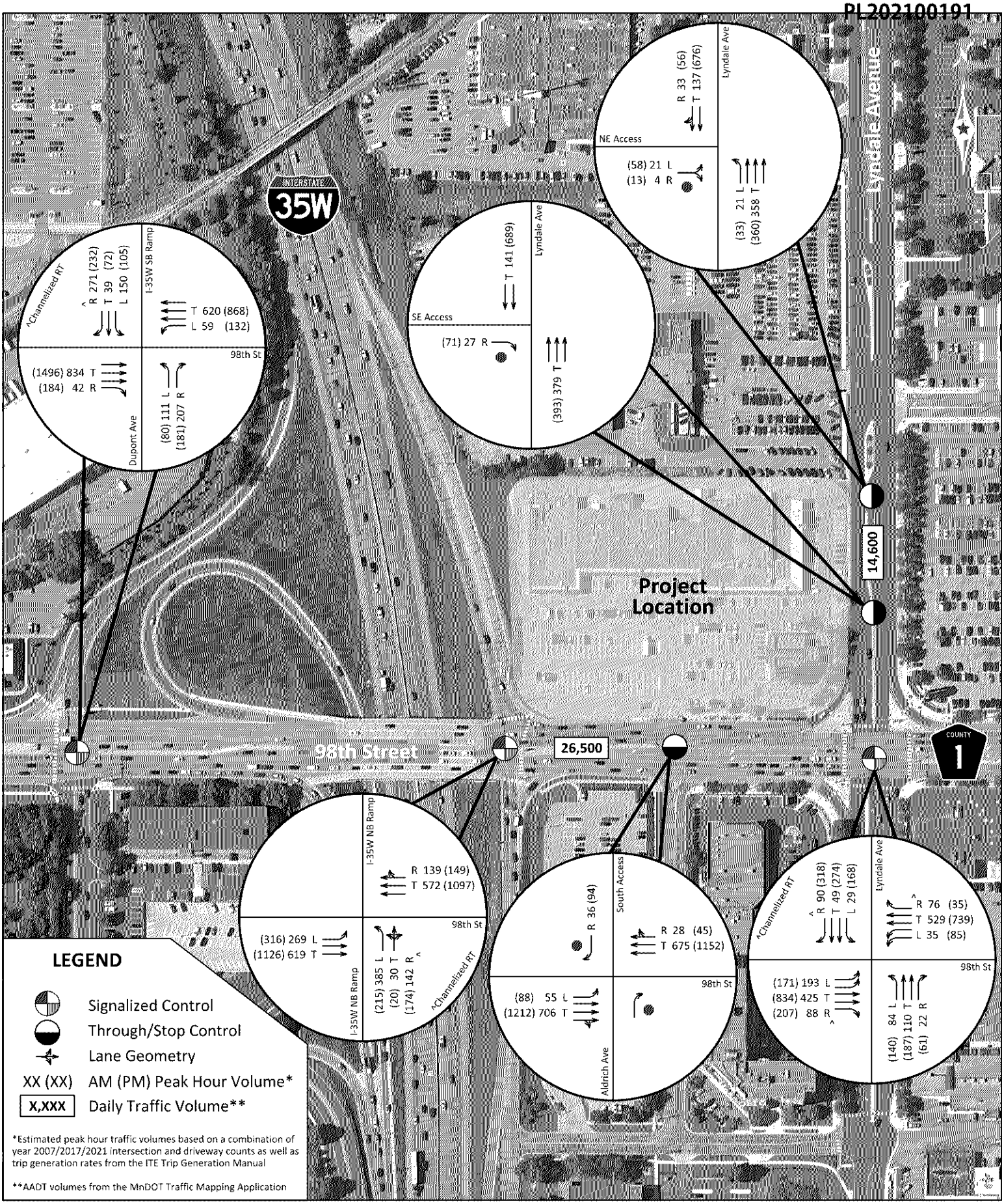

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Figure 4
Typical Existing Conditions

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LEGEND

- Signalized Control
- Through/Stop Control
- Lane Geometry
- XX (XX) AM (PM) Peak Hour Volume*
- X,XXX Daily Traffic Volume*

*Peak hour and daily traffic volume estimates based on a 0.5% annual growth rate from existing conditions

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Figure 5
Forecast Year 2024 No Build Conditions

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2.3 Traffic Operations Analysis

A year 2024 no build conditions traffic operations analysis was completed using Synchro/ SimTraffic software to establish a baseline condition to which build condition traffic operations could be compared. It should be noted that modeling previously completed by Alliant Engineering for a prior City of Bloomington project along 98th Street was utilized for this project. Traffic signals along 98th Street from Lyndale Avenue through the I-35W ramp terminal intersections currently operate coordinated 120-second and 130-second cycles during the a.m. and p.m. peak periods, respectively. These signal timing parameters were utilized in both the year 2024 no build and build conditions models.

Operations analysis results identify a Level of Service (LOS), which indicates the quality of traffic flow through an intersection. Intersections are given a ranking from LOS A through LOS F. LOS A indicates the best traffic operation, with vehicles experiencing minimal delays. LOS F indicates an intersection where demand exceeds capacity, or a breakdown of traffic flow. The LOS D/E boundary for overall operations is often used as the indicator of congestion in an urban area. For through/stop intersections, a key measure of operational effectiveness is the side-street LOS. Long delays and poor LOS can occur on side-street approaches even if the overall intersection is functioning well, making side-street LOS a valuable design criterion. The LOS results are based on average delay per vehicle, which correspond to the delay threshold values presented in **Table 4**.

Table 4 – Level of Service Criteria

Level of Service	Description	Delay per Vehicle (seconds) Signalized Intersection	Delay per Vehicle (seconds) Unsignalized Intersection
A	**Free Flow:** Low volumes and no delays.	0 - 10	0 - 10
B	**Stable Flow:** Speeds restricted by travel conditions, minor delays.	> 10 - 20	> 10 - 15
C	**Stable Flow:** Speeds and maneuverability closely controlled due to higher volumes.	> 20 - 35	> 15 - 25
D	**Stable Flow:** Speeds considerably affected by change in operating conditions. High density traffic restricts maneuverability, volume near capacity.	> 35 - 55	> 25 - 35
E	**Unstable Flow:** Low speeds, considerable delay, volume at or slightly over capacity.	> 55 - 80	> 35 - 50
F	**Forced Flow:** Very low speeds, volume exceed capacity, long delays with stop and go traffic.	> 80	> 50

Source: Highway Capacity Manual, 6th Edition, Transportation Research Board, Exhibits 19-8, 20-2, 21-8, 22-8.

After LOS, the second component of the traffic operations analysis is a study of vehicular queuing, or the lineup of vehicles waiting to pass through an intersection. An intersection can operate with an acceptable LOS, but if queues from the intersection block entrances to turn lanes or adjacent driveways, unsafe operating conditions could result. The 95th percentile queue, or the length of queue with only a five percent probability of being exceeded during an analysis period, is considered the standard for design purposes.

A summary of the year 2024 no build conditions traffic operations analysis is presented in **Table 5**, while the detailed operations and queuing analysis results are presented in **Appendix B**. Results of the traffic operations analysis indicate that all study intersections are expected operate at overall LOS C or better during the a.m. and p.m. peak hours under forecast year 2024 no build conditions.

Table 5 – Traffic Operations Analysis – Year 2024 No Build Conditions

Intersection	AM Peak Hour		PM Peak Hour	
	LOS	Delay (s)	LOS	Delay (s)
98th Street & 35W SB Offramp	B / C	14.1 / 23.6	B / C	18.5 / 29.0
98th Street & 35W NB Ramps	C / D	20.3 / 39.4	B / D	14.6 / 38.0
98th Street & South Access	A / A	2.9 / 6.4	A / B	4.8 / 13.0
98th Street & Lyndale Avenue	B / D	19.0 / 41.7	C / D	26.2 / 45.0
Lyndale Avenue & Southeast Access	A / A	1.4 / 2.6	A / B	2.2 / 11.1
Lyndale Avenue & Northeast Access	A / A	0.6 / 6.4	A / B	1.4 / 14.1

LOS Results: Overall Intersection / Worst Approach Delay Results: Overall Intersection / Worst Approach

Key delay/queuing observations from the year 2024 no build traffic operations analysis follow:

98th Street/I-35W Southbound Offramp Intersection

- Operates at overall LOS B during the a.m. and p.m. peak hours.
  - Moderate queuing (95th percentile queue > 500 feet) was observed in the eastbound through lanes in the p.m. peak hour traffic simulations.

98th Street/I-35W Northbound Ramps Intersection

- Operates at overall LOS C and LOS B during the a.m. and p.m. peak hours, respectively.
  - Moderate queuing (95th percentile queue ≈ 315 feet) was observed in the eastbound left-turn lane in the a.m. peak hour traffic simulations. Moderate queuing (95th percentile queue ≈ 320 feet) was also observed in eastbound left-turn lane in the p.m. peak hour traffic simulations.
  - Moderate queuing (95th percentile queue ≈ 310 feet) was observed on the northbound approach in the a.m. peak hour traffic simulations. Moderate queuing (95th percentile queue ≈ 255 feet) was also observed on the northbound approach in the p.m. peak hour traffic simulations.
  - Moderate queuing (95th percentile queue ≈ 255 feet) was observed on the westbound approach in the a.m. peak hour traffic simulations. Moderate queuing (95th percentile queue ≈ 270 feet) was also observed on the westbound approach in the p.m. peak hour traffic simulations.
    - Field observations revealed that westbound approach queues occasionally extended to or through the 98th Street/South Access intersection, particularly during the p.m. peak hour. However, these occasional obstructions were of short duration and produced limited operational impact on the three-quarter 98th Street/South Access intersection.

98th Street/South Access Intersection

- Operates at overall LOS A during the a.m. and p.m. peak hours.
  - Currently, approximately 100 feet of full-width storage is provided in the eastbound left-turn lane. At approximately 105 feet, 95th percentile queuing was observed to slightly exceed the full-width storage of the eastbound left-turn lane in the p.m. peak hour traffic simulations. However, the last vehicle at this queue length would still be expected to be accommodated within the width of the existing left-turn lane taper.
  - Four hours of peak period field observations at the 98th Street/South Access intersection revealed only one motorist performing a prohibited southbound left-turn maneuver at this three-quarter access. While significant mainline traffic volumes make the prohibited southbound left-turn maneuver difficult to perform during peak periods, there is little to physically prevent motorists from performing this prohibited maneuver during off-peak periods.

98th Street/Lyndale Avenue Intersection

- Operates at overall LOS B and LOS C during the a.m. and p.m. peak hours, respectively.
  - Currently, approximately 95 feet of full-width storage is provided in the northbound left-turn lane. At approximately 160 feet, 95th percentile queuing was observed to exceed the full-width storage of the northbound left-turn lane in the p.m. peak hour traffic simulations. At this queue length, the last left-turning vehicles would be expected to encroach upon the adjacent northbound through lane. However, it should be noted that the duration of this encroachment is short, and that northbound left-turn queues routinely clear the intersection during the allotted protected green arrow time.
  - Currently, approximately 190 feet of full-width storage is provided in the southbound left-turn lane. At approximately 235 feet, 95th percentile queuing was observed to exceed the full-width storage of the southbound left-turn lane in the p.m. peak hour traffic simulations. At this queue length, the last left-turning vehicle would be expected to encroach upon the adjacent southbound through lane. However, it should be noted that the duration of this encroachment is short, and that southbound left-turn queues routinely clear the intersection during the allotted protected green arrow time.

Lyndale Avenue/Southeast Access Intersection

- Operates at overall LOS A during the a.m. and p.m. peak hours.
  - No significant delay or queuing issues were observed in the traffic simulations.

Lyndale Avenue/Northeast Access Intersection

- Operates at overall LOS A during the a.m. and p.m. peak hours.
  - No significant delay or queuing issues were observed in the traffic simulations.
  - It should be noted that the Northeast Access was modeled with one inbound lane and two outbound lanes (i.e., left-turn lane and a short right-turn lane). The existing driveway has the width to accommodate three lanes, though queuing distance is limited.

3.0 Proposed Redevelopment

Currently, the Clover Center site consists of the following land uses:

- 58,095-square-foot strip retail shopping center
- Adjacent 4,588-square-foot bank with three drive-through lanes

The proposed redevelopment, shown in **Figure 6**, is initially anticipated to displace 28,232 square feet of existing retail space on the west side of the Clover Center site. The demolished structure is anticipated to be replaced by a 22,000-square-foot grocery store and 1,800 square feet of new retail space. Thus, the proposed Clover Center site is expected to consist of the following land uses:

- 31,663-square-foot strip retail shopping center
- 22,000-square-foot grocery store
- Adjacent 4,588-square-foot bank with three drive-through lanes

Access to the Clover Center site is expected to remain nearly unchanged:

- South Access – Located along 98th Street approximately 300 feet west of Lyndale Avenue (three-quarter access). The South Access may move east by approximately 10 feet.
- Southeast Access – Located along Lyndale Avenue approximately 200 feet north of 98th Street (right-out only access)
- Northeast Access – Located along Lyndale Avenue approximately 400 feet north of 98th Street (full access)

3.1 Trip Generation

To understand the trip generation potential of the redeveloped Clover Center, trip generation estimates were completed for the weekday a.m. and p.m. peak hours as well as on a daily basis by utilizing the *ITE TGM*. Results of the trip generation estimates shown in **Table 6** indicate the proposed redevelopment is expected to generate approximately 296 a.m. peak hour trips, 578 p.m. peak hour trips, and 6,020 daily trips.

Table 6 – Trip Generation Estimates – Clover Center Redevelopment

Land Use (ITE Code)	Units	Size	AM Peak Hour Trips[1]			PM Peak Hour Trips[1]			Daily Trips
			Trips In	Trips Out	Total Trips	Trips In	Trips Out	Total Trips	
Redeveloped Clover Center Trips - Full Occupancy Scenario									
Shopping Center (820)	Square Feet	31,663[2]	104	64	168	111	121	232	2,750
Supermarket (850)	Square Feet	22,000	50	34	84	128	124	252	2,772
Drive-In Bank (912)	Square Feet	4,588	25	19	44	47	47	94	498
Total Trips			**179**	**117**	**296**	**286**	**292**	**578**	**6,020**
Net New Trips			**42**	**29**	**71**	**64**	**56**	**120**	**1,366**

Source: Institute of Transportation Engineers Trip Generation Manual, 10th Edition

(1) Peak hour of the adjacent roadway network

(2) Square Feet of Leasable Floor Area

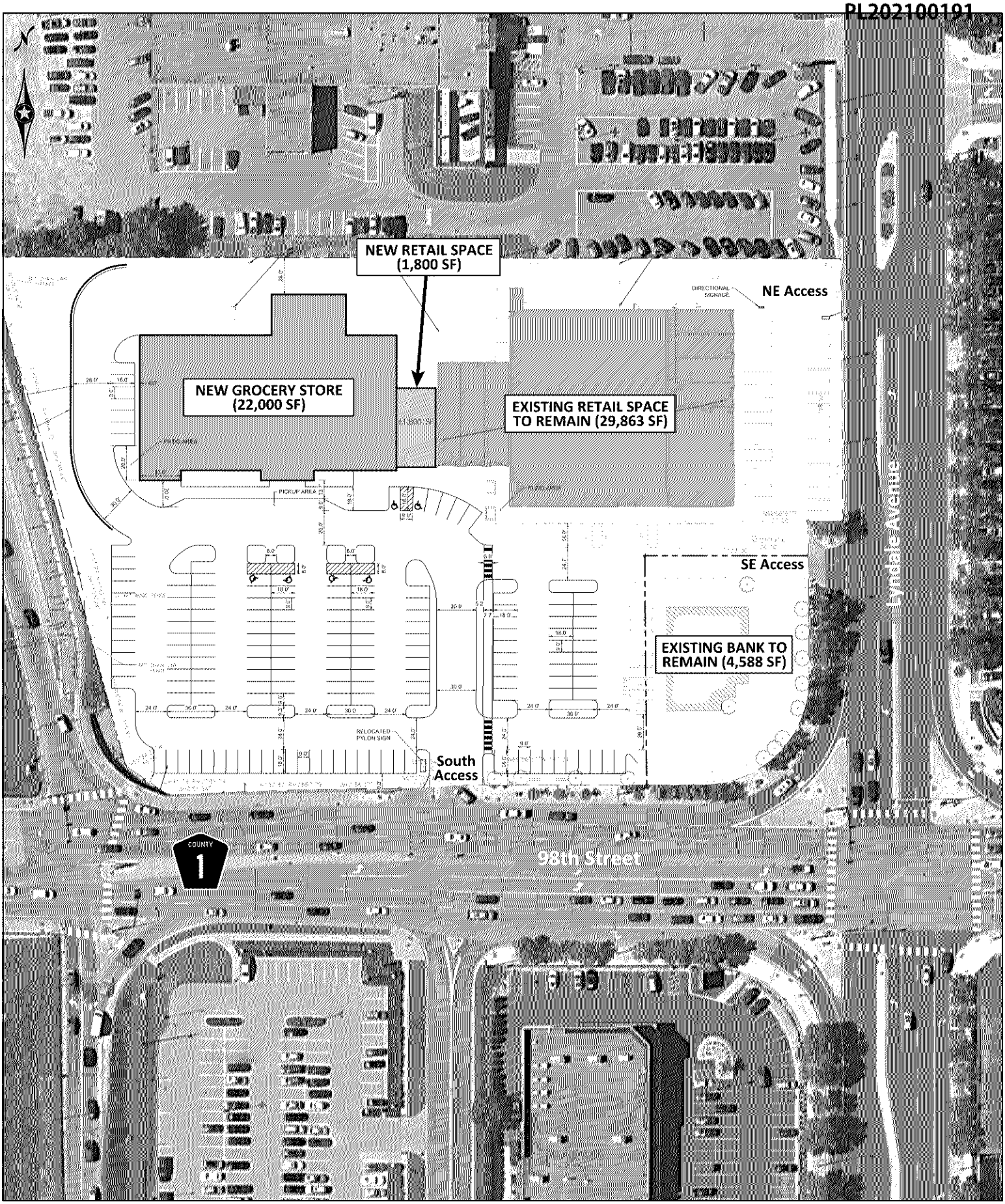

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Figure 6
Proposed Site Plan

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Considering the estimated trip generation of the current Clover Center under a full occupancy scenario, the redeveloped Clover Center is anticipated to generate a net new trip increase of approximately 71 a.m. peak hour trips, 120 p.m. peak hour trips, and 1,366 daily trips. Similar to existing conditions, a multi-use trip reduction was not applied in order to provide a conservative estimate of the proposed Clover Center trip generation potential. With the majority of observed a.m. peak hour trips generated by the existing coffee shop onsite, the displacement of approximately half of the current retail space is expected to have a limited impact on the number of a.m. peak hour trips currently generated by the Clover Center. Limited seasonal variability would be expected in trips generated by the proposed Clover Center. While retail centers typically exhibit a late-year holiday shopping boost, current and anticipated future retail leasers may not necessarily be of the type to receive a significant holiday shopping boost.

The distribution of proposed Clover Center trips was assumed to follow the distribution of trips to/from the existing Clover Center as shown previously in **Figure 3**. These trip distribution percentages were applied to the estimated proposed redevelopment generated trips in the analysis of forecast year 2024 build conditions. The forecast year 2024 build conditions, a combination of general background traffic and trips generated by the proposed Clover Center, are shown in **Figure 7**.

4.0 Year 2024 Build Conditions

To determine potential traffic impacts associated with the proposed Clover Center, forecast future year 2024 build conditions (i.e., one year after completion of the proposed redevelopment) were evaluated using Synchro/SimTraffic software.

4.1 Traffic Operations Analysis

A summary of the year 2024 build conditions traffic operations analysis is presented in **Table 7**, while the detailed operations and queuing analysis results are presented in **Appendix B**. Results of the traffic operations analysis indicate that all study intersections are expected to continue operating at overall LOS C or better during the a.m. and p.m. peak hours under forecast year 2024 build conditions.

Table 7 – Traffic Operations Analysis – Year 2024 Build Conditions

Intersection	AM Peak Hour		PM Peak Hour	
	LOS	Delay (s)	LOS	Delay (s)
98th Street & 35W SB Offramp	B / C	14.3 / 24.5	B / C	18.5 / 29.0
98th Street & 35W NB Ramps	C / D	20.3 / 39.4	B / D	15.0 / 38.0
98th Street & South Access	A / A	2.9 / 6.4	A / C	5.5 / 18.2
98th Street & Lyndale Avenue	B / D	19.7 / 42.9	C / D	27.3 / 45.7
Lyndale Avenue & Southeast Access	A / A	1.5 / 2.7	A / B	2.2 / 11.1
Lyndale Avenue & Northeast Access	A / A	0.7 / 6.4	A / C	2.1 / 18.2

LOS Results: Overall Intersection / Worst Approach Delay Results: Overall Intersection / Worst Approach

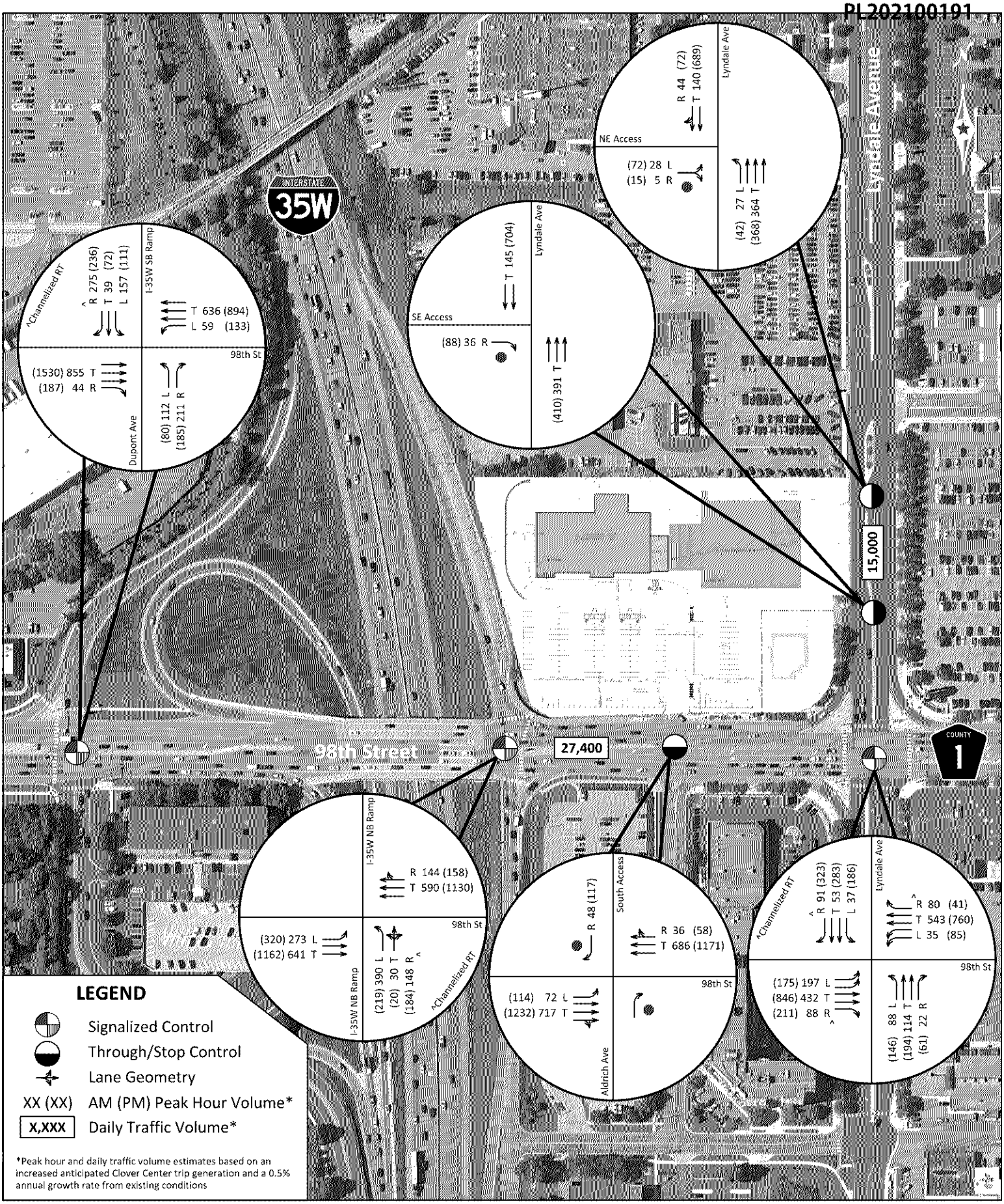

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Figure 7
Forecast Year 2024 Build Conditions

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Key delay/queuing observations from the year 2024 build traffic operations analysis follow:

98th Street/I-35W Southbound Offramp Intersection

- Operates at overall LOS B during the a.m. and p.m. peak hours.
  - Negligible operational differences observed from year 2024 no build conditions.

98th Street/I-35W Northbound Ramps Intersection

- Operates at overall LOS C and LOS B during the a.m. and p.m. peak hours, respectively.
  - Negligible operational differences observed from year 2024 no build conditions.

98th Street/South Access Intersection

- Operates at overall LOS A during the a.m. and p.m. peak hours.
  - A slight increase in eastbound left-turn lane queuing (95th percentile queue ≈ 110 feet) was observed in the p.m. peak hour traffic simulations. The last vehicle at this queue length would still be expected to be accommodated within the width of the existing left-turn lane taper. However, as the Clover Center South Access is reconstructed under the proposed redevelopment, maximizing the length of the full-width eastbound left-turn lane should be considered for additional ingress vehicle storage.

98th Street/Lyndale Avenue Intersection

- Operates at overall LOS B and LOS C during the a.m. and p.m. peak hours, respectively.
  - Negligible operational differences observed from year 2024 no build conditions.

Lyndale Avenue/Southeast Access Intersection

- Operates at overall LOS A during the a.m. and p.m. peak hours.
  - Negligible operational differences observed from year 2024 no build conditions.

Lyndale Avenue/Northeast Access Intersection

- Operates at overall LOS A during the a.m. and p.m. peak hours.
  - Negligible operational differences observed from year 2024 no build conditions.

4.1.1 Traffic Operations Conclusions – Proposed Clover Center

Generally, the proposed Clover Center redevelopment is expected to have minimal impact on study area traffic operations. However, as the Clover Center South Access is reconstructed under the proposed redevelopment, maximizing the length of the full-width eastbound left-turn lane should be considered for additional ingress vehicle storage.

5.0 Site Plan/Access Review

A review of the proposed site plan was completed to identify any issues and recommended potential improvements regarding vehicle ingress/egress, internal traffic circulation, pedestrian/ bicycle connectivity, and parking layout/capacity. The following assessment is offered for consideration:

5.1.1 Vehicle Ingress/Egress

As noted previously, access to the Clover Center site is expected to remain nearly unchanged under the proposed redevelopment:

- South Access – Three-quarter access located along 98th Street
  - According to the proposed site plan, the South Access may move east by approximately 10 feet.
- Southeast Access – Right-out only access located along Lyndale Avenue
- Northeast Access – Full access located along Lyndale Avenue

Several recommendations related to vehicle ingress/egress are offered for consideration:

- Continue to utilize proper signing and pavement markings to enforce vehicle movement restrictions at the three-quarter South Access and right-out only Southeast Access.
- At the Northeast Access, sign for two outbound lanes (i.e., left-turn and right-turn lanes). While potential queuing distance is limited, such signing would indicate that two outbound motorists are allowed to align themselves side-by-side while exiting the Clover Center at the Northeast Access.
- At the South Access:
  - Maximize the length of the full-width eastbound left-turn lane for additional ingress vehicle storage.
  - On the southbound approach to 98th Street, install a channelizing raised median to physically guide motorists into making an outbound right-turn maneuver.
  - Extend or adjust the 98th Street raised medians as appropriate to minimize the potential for prohibited outbound (i.e., southbound) left-turn maneuvers from the Clover Center.

Safety Considerations at the 98th Street/South Access Intersection

Converting the 98th Street/South Access intersection to a right-in/right-out access has previously been considered at a high level. However, the 98th Street/South Access intersection is expected to perform acceptably from a traffic operations perspective under forecast year 2024 build conditions. In addition to the evaluated traffic operations, a detailed crash analysis was also performed at the 98th Street/South Access intersection to ensure no significant crash issues are present. Historical crash data at the 98th Street/South Access intersection for the ten-year period from 2011 through 2020 was obtained from the Minnesota Crash Mapping Analysis Tool (MnCMAT) and the City of Bloomington. Based on available crash data, 10 crashes were reported at the 98th Street/ South Access intersection over the analysis period. It should be noted that seven (7) of 10 total crashes at the 98th Street/South Access intersection involved an eastbound left-turning vehicle colliding with a westbound through vehicle. A detailed collision diagram for the 98th Street/ South Access intersection highlighting crash type and severity is illustrated in **Figure 8**.

Crash Rate

History has proven that crashes are a function of exposure. Roadways with higher traffic volumes experience more crashes than similar roadways with lower volumes. Rather than simply documenting the number of crashes that occur at an intersection, the crash rate must be considered. Crash rates normalize different locations with varying traffic volumes, providing a useful tool in comparing the locations with respect to safety. Actual crash rates at specific locations can also be compared to average or typical values for an intersection type. Intersection crash rates are defined by the number of crashes occurring per million entering vehicles (MEV).

Crash occurrence is somewhat random by nature. Identifying every intersection with a crash rate above the average value in an analysis could produce a large amount of data that may not be statistically relevant with respect to safety deficiencies. The critical crash rate identifies locations that have a crash rate higher than similar facilities by a statistically significant amount. The critical crash rate is calculated by adjusting the systemwide average based on the amount of exposure and a statistical constant indicating level of confidence[1]. At locations where the observed crash rate exceeds the critical crash rate, it is 99.5 percent certain that an intersection design deficiency exists, or there are hazardous characteristics present at the location. Additionally, the critical index is the ratio of the observed crash rate to the critical crash rate. A critical index exceeding 1.00 indicates a potential safety concern. A critical index of 1.00 or less indicates performance within expectations without deviation from statewide trends. **Table 8** summarizes the observed crash rates for the 98th Street/South Access intersection compared to the statewide averages for similar urban through/stop intersections.

[1] MnDOT Traffic Safety Fundamentals Handbook, August 2015.

PL202100191

Mn/DOT 2942 (rev 9-11-92)

Collision Diagram

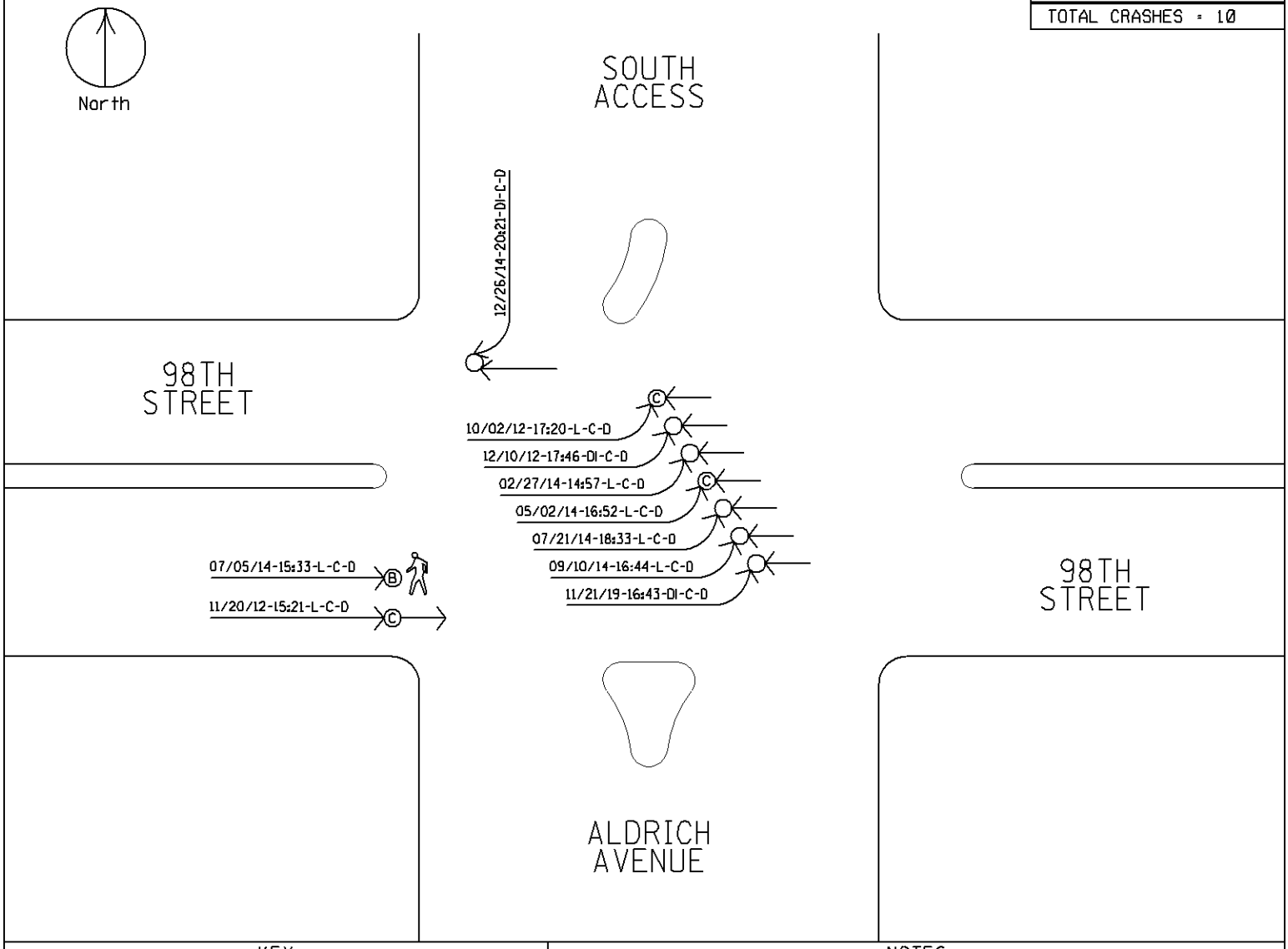
Minnesota Department of Transportation

Location: 98th Street & Clover Center South Access

Time Period: 2011-2020 Date: 9/1/2021

Prepared By: JJS

No. of Crashes
Fatal = 0
A Injury = 0
B Injury = 1
C Injury = 3
Injury Total = 4
Property Damage = 6
TOTAL CRASHES = 10



KEY

- Motor Vehicle Out of Control
- Motor Vehicle Backing Up
- Motor Vehicle Rollover
- Motor Vehicle Sideswipe
- Fixed Object
- Fatal Crash
- (A) A Injury Crash
- (B) B Injury Crash
- (C) C Injury Crash
- Property Damage Crash
- Pedestrian
- B Bicycle
- M Motorcycle
- Parked Vehicle
- Rear End Property Damage
- (B) Right Angle B Injury
- (C) Head on C Injury

NOTES

[1]

[2]

Light:	Weather:	Surface:
L = Daylight (1)	C = Clear or Cloudy (1 or 2)	D = Dry (1)
DN = Dawn (2)	R = Rain (3)	W = Wet (2)
Du = Dusk (3)	S = Snow or Sleet (4 or 5)	S = Snow or Ice (3 or 4)
Dl = Dark, Lighted (4)	F = Fog, Smog, Smoke (6)	M = Muddy (5)
Do = Dark, Lights Off (5)	B = Blowing Sand/Dust/Snow (7)	Db = Debris (6)
D = Dark, Unlighted (6)	W = Severe Crosswinds (8)	O = Oily (7)
X = Unknown (99)	X = Other or Unknown (99)	X = Other or Unknown (99)

(X) = Number of Vehicles in Crash (X) Other Vehicle Injury Type [Date]-[Time (hrs)]-[Light-Weather-Surface]

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Figure 8
Collision Diagram
98th Street @ South Access

Table 8 – 98th Street / South Access Intersection Crash Analysis Summary

Intersection	Traffic Control	Total Crashes[1]	Total Entering Volume[2]	Crash Rate per MEV	State Average Crash Rate[3]	Crash Critical Rate[4,5]	Crash Rate Critical Index	Crash Severity Rate[6]	State Average Severity Rate[3]	Crash Severity Critical Rate[4,5]	Crash Severity Critical Index
98th Street & South Access	Through/Stop	10	108,131,250	0.09	0.19	0.30	0.31	0.14	0.28	0.42	0.33

[1] Crash Data obtained from MnCMAT & the City of Bloomington.
[2] Mainline AADT volume obtained from MnDOT Traffic Mapping Application. Side-street daily volume esimates based on 2021 turning movement counts.
[3] MnDOT's 2015 Green Sheets were used to determine the state average crash rates.
[4] The critical rate is a statistically adjusted crash rate to account for random nature of crashes
[5] A 99.5% confidence level was assumed for critical crash and severity rates.
[6] Severity rate factors: 5 for Fatal Crashes, 4 for A type, 3 for B type, 2 for C type, and 1 for Property Damage

The observed crash rate at the 98th Street/South Access intersection (0.09 crashes/MEV) is below both the statewide average crash rate and the corresponding critical crash rate. Therefore, the number of reported crashes would not indicate a statistically significant safety concern.

Crash Severity

The severity of reported crashes was also investigated. The purpose for analyzing this factor is to identify locations that experience a low crash rate but have a high percentage of injury or fatal crashes. Conversely, locations with high crash rates and a large proportion of non-injury crashes may not warrant as much priority when deficiencies are being addressed. It should be noted that one (1) Type B non-incapacitating injury crash occurred on 98th Street at the South Access intersection when an eastbound through motorist collided with a crossing pedestrian. Three (3) Type C possible injury crashes also occurred, while six (6) crashes were property damage only.

The calculated severity rate (0.14) at the 98th Street/South Access intersection is below both the statewide average severity rate and the corresponding critical severity rate. Therefore, the severity of reported crashes would not indicate a statistically significant safety concern.

Safety Conclusions

Based on the detailed crash analysis at the 98th Street/South Access intersection, the existing three-quarter access does not have a statistically significant safety concern.

Safety Considerations at the Lyndale Avenue/Southeast Access Intersection

Sight distance for outbound (i.e., eastbound) right-turning motorists can be obstructed by parked cars at the Lyndale Avenue/Southeast Access intersection. However, these motorists are able to pull forward to avoid sight obstructions from the parked cars and still be protected from approaching southbound traffic by an extended curb to the north. Furthermore, it should be noted that no crashes were confirmed at this intersection over the ten-year period from 2011 through 2020. Maintaining the existing right-out only condition at the South Access is recommended, as it may be difficult for outbound motorists to distinguish between a southbound vehicle turning right into the Clover Center versus a southbound vehicle continuing on to turn right at 98th Street.

5.1.2 Internal Traffic Circulation

- The proposed internal roadways appear to adequately accommodate typical passenger vehicles. However, truck turning movements should be reviewed to ensure design vehicles such as delivery trucks have adequate accommodations to negotiate internal roadways.
    - The site developer has proposed for large trucks to enter via the Northeast Access along Lyndale Avenue, exit via the South Access along 98th Street, and traverse the site in a westbound direction behind the Clover Center. It should be noted that the existing internal roadway behind the Clover Center, which is too narrow in spots to effectively allow two-way traffic flow, is currently oriented for one-way traffic in the eastbound direction. A loading dock and a Salvation Army family store drop-off area behind the retail structure to remain are currently oriented for one-way traffic in the eastbound direction. The site developer should consider maintaining one-way traffic flow in the eastbound direction behind the Clover Center, and also orienting the loading dock behind the proposed grocery store for one-way traffic in the eastbound direction.
        - Maintaining one-way traffic flow in the eastbound direction behind the Clover Center has the benefit of funneling more outbound traffic toward the full access Northeast Access intersection.
        - Large trucks may be able to access the site from I-35W via an eastbound left-turn at the South Access along 98th Street without running over a recommended channelizing raised median promoting three-quarter access.
- Large deliveries should be prioritized outside peak periods to minimize conflicts onsite.
- Ensure the installation of proper wayfinding signing, particularly for those motorists who may need to enter or exit via Lyndale Avenue.
- To allow free movement of inbound vehicular traffic at the 98th Street/South Access intersection, install "Do Not Block Intersection" signing on the southbound approach at the first internal driveway intersection.

5.1.3 Pedestrian/Bicycle Connectivity

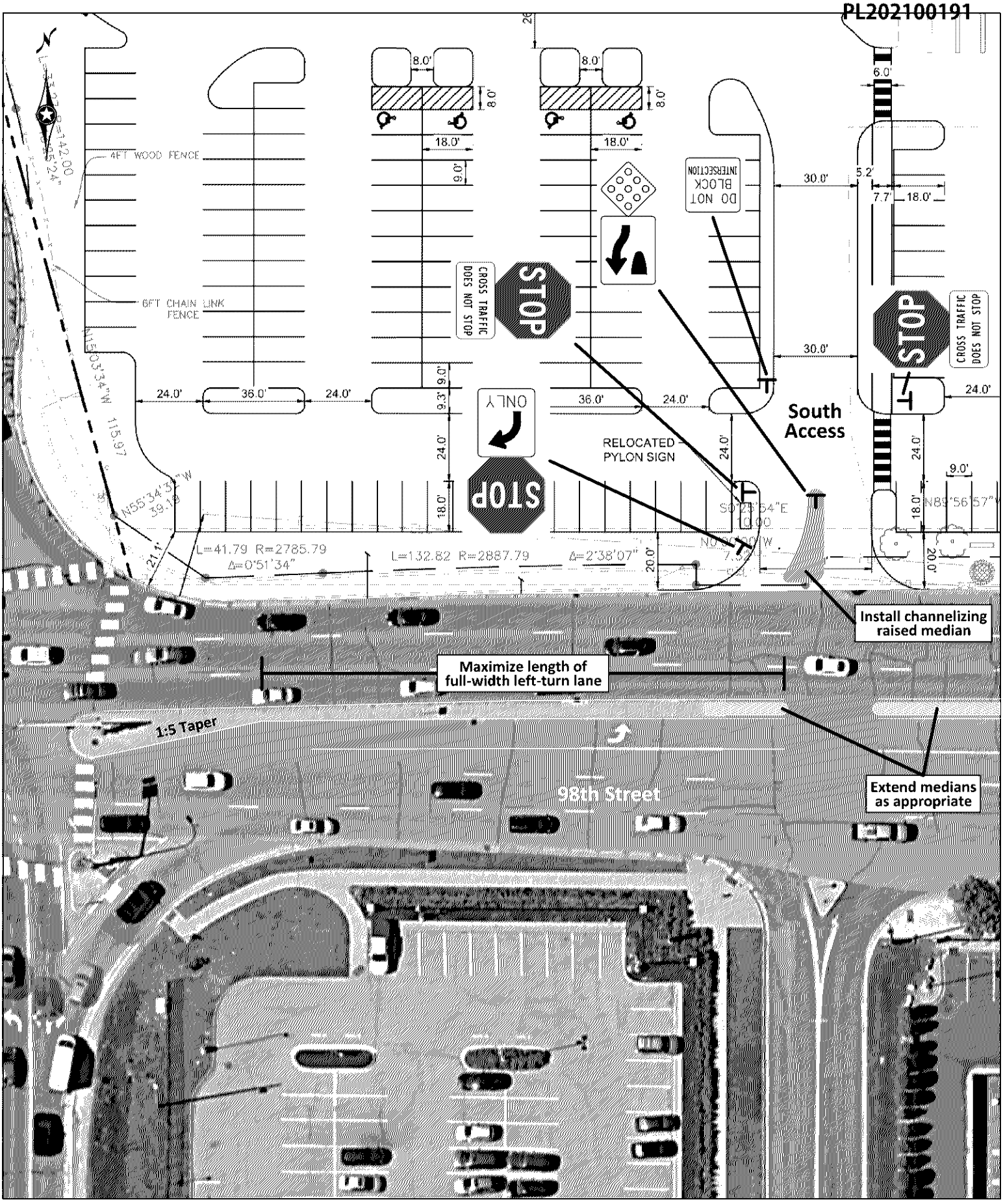
- The proposed site plan shows good pedestrian connections to existing sidewalks.

5.1.4 Parking Layout/Capacity

Parking Layout

- The proposed site plan shows well organized parking aisles with appropriate end caps.
    - The proposed site plan eliminates existing offset parking lot aisles along the South Access driveway.
- Install appropriate traffic control (i.e., stop signs) at higher volume internal parking lot intersections to properly establish right-of-way and minimize motorist confusion.

An illustration of recommended improvements at the South Access is shown in **Figure 9**.



Clover Center Traffic and Parking Study

Figure 9
Recommended Site Plan Improvements

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Parking Capacity

Under the current redevelopment proposal, a total of 230 parking stalls would be provided onsite.

Bloomington Zoning Code Requirement

The Bloomington Zoning Code (Section 21.301.06 Parking and Loading) regulates the minimum off-street parking supply for various land uses. Relevant land uses in this case include Retail, Grocery, and Bank. Parking requirements based on the zoning code were obtained from City of Bloomington staff. Code required parking for the proposed Clover Center redevelopment is provided in **Table 9**.

Table 9 – Bloomington Zoning Code Parking Requirement

Land Use	Parking Rate [1]	Proposed Development	Required Parking Stalls
Retail	55 stalls + 1 additional stall / 220 SF GFA over 10,000 SF GFA	32,800 SF GFA [2]	158.6
Grocery	1 stall / 225 SF GFA	22,000 SF GFA	97.8
Bank	1 stall / 240 SF GFA	4,588 SF GFA	19.1
		Total Parking Requirement	**276**

SF GFA = Square Feet of Gross Floor Area

(1) Section 21.301.06 of the Bloomington City Code

(2) Approximately 31,663 Square Feet of Leasable Floor Area

Based on the Bloomington Zoning Code, the proposed redevelopment would be required to provide 276 off-street parking stalls. Based on this requirement, the proposed parking supply of 230 stalls represents a 46-stall deficiency. Therefore, a parking demand data driven approach is necessary to estimate the adequacy of the proposed parking supply.

Parking Demand Analysis

Parking demand for the proposed redevelopment was estimated based on applicable parking rates in the *Institute of Transportation Engineers Parking Generation Manual, 5th Edition* (*ITE PGM*). The *ITE PGM* is an industry standard resource for estimating the parking demand of numerous land uses. **Table 10** documents the *ITE PGM* estimated peak parking demand for each component and the whole of the proposed redevelopment. The *ITE PGM* based peak parking demand estimates of 143 vehicles on a weekday and 186 vehicles on a Saturday are below the proposed parking supply of 230 stalls. Based on the peak parking demand estimates, the proposed redevelopment would be expected to exhibit at least a 20 percent parking surplus over all time periods.

Table 10 – Parking Demand Analysis Summary

Land Use (ITE Code)	Units	Size	Weekday Peak Parking Demand [1] (vehicles)	Saturday Peak Parking Demand [1] (vehicles)	Proposed Parking Supply (stalls)	Weekday Parking Surplus (stalls)	Saturday Parking Surplus (stalls)
Shopping Center (820)	Square Feet	31,663	62	92	230	87	44
Supermarket (850)	Square Feet	22,000	64	80			
Drive-In Bank (912)	Square Feet	4,588	17	14			
		Totals	**143**	**186**			

Setting Assumption: General Urban/Suburban

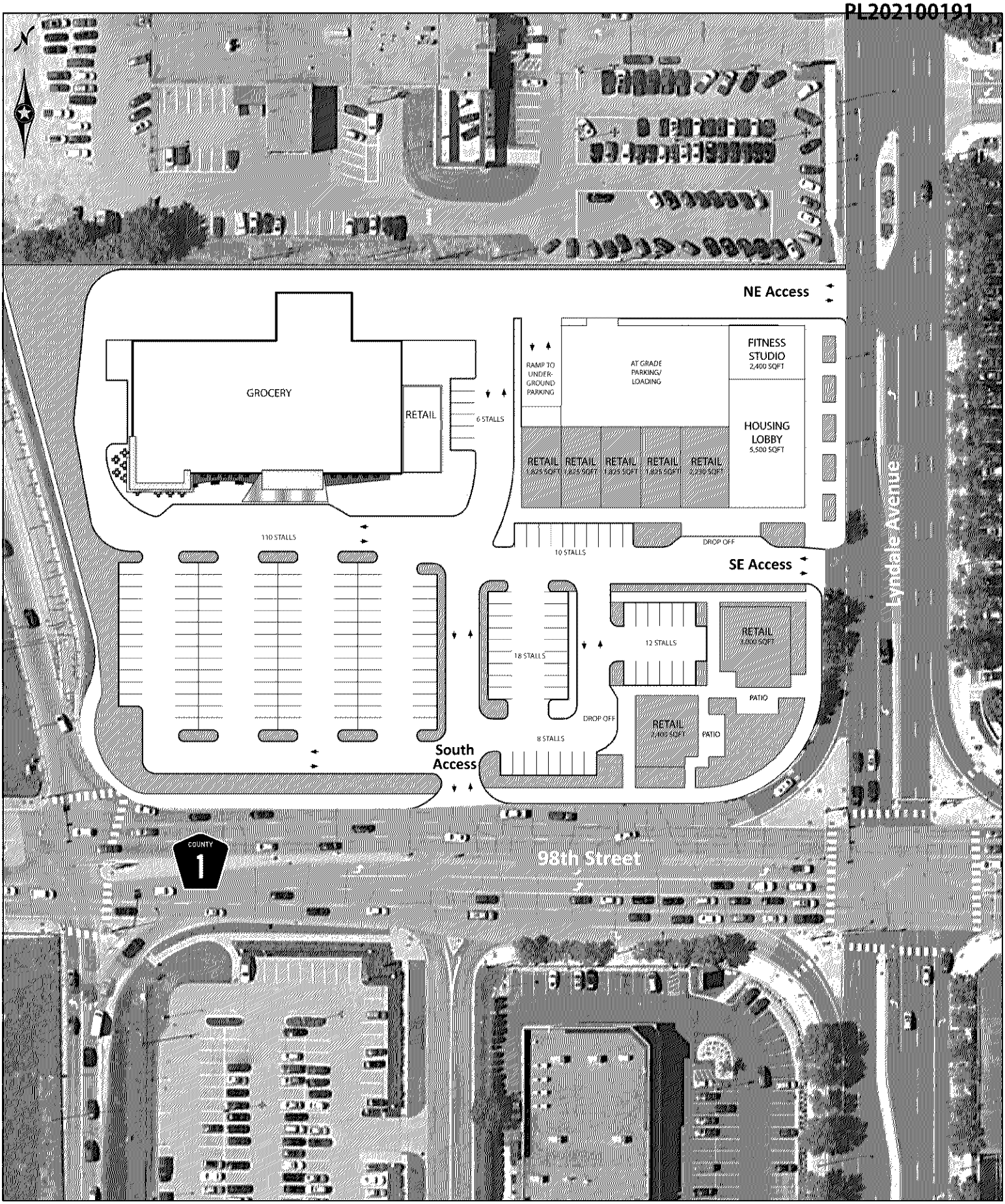
(1) Estimated peak parking demand based on applicable rates from the ITE Parking Generation Manual, 5th Edition.

It should be noted that the Clover Center peak parking demand would be expected to occur in the late afternoon/early evening hours on weekdays and in the early afternoon on weekends. As with the anticipated trip generation, limited seasonal variability would be expected in parking generated by the proposed Clover Center. As noted earlier, while retail centers typically exhibit a late-year holiday shopping boost, current and anticipated future retail leasers may not necessarily be of the type to receive a significant holiday shopping boost. Given the proposed redevelopment parking demand is expected to be adequately accommodated onsite, no impacts to surrounding properties or roadways are anticipated.

5.1.5 Future Full Redevelopment

The currently proposed grocery and retail redevelopment may only be an initial phase of a future full Clover Center redevelopment. As shown in **Figure 10**, a future full redevelopment site plan could consist of additional reconstructed retail space as well as potential multifamily residential apartments. The potential future site plan would provide more of a continuous internal roadway between the 98th Street/South Access intersection and the Lyndale Avenue/Northeast Access intersection. This internal roadway would provide convenient access to underground parking below a new structure in the northeastern quadrant of the site, presumably reserved for residential parking. Much of the remainder of the potential future site plan would function similar to the currently proposed redevelopment site plan.

One concern related to the potential future full redevelopment site plan is a 12-stall parking lot with only one internal access near the southeastern limits of the site. Such a lot will undoubtably experience the occasional issue in which a motorist enters the lot when already full. Reversing out of the lot for these motorists could then become problematic. Reconfiguring the 12-stall parking lot to provide a second access would be recommended if the full redevelopment comes to fruition.



Clover Center Traffic and Parking Study

Figure 10
Future Full Redevelopment Site Plan

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6.0 Conclusions and Recommendations

The following study conclusions and recommendations are offered for consideration:

- Results of the forecast year 2024 no build conditions traffic operations analysis indicate that all study intersections are expected operate at overall LOS C or better during the a.m. and p.m. peak hours. No significant delay issues were observed at study intersections in the traffic simulations, though moderate queueing was observed in several locations.
    - Currently, approximately 100 feet of full-width storage is provided in the eastbound left-turn lane at the 98th Street/South Access intersection. At approximately 105 feet, 95th percentile queuing was observed to slightly exceed the full-width storage of the eastbound left-turn lane in the p.m. peak hour traffic simulations. However, the last vehicle at this queue length would still be expected to be accommodated within the width of the existing left-turn lane taper.
- The Clover Center, located in the northwest quadrant of the 98th Street/Lyndale Avenue intersection in Bloomington, is proposed to be partially redeveloped. The proposed redevelopment is initially anticipated to displace 28,232 square feet of existing retail space on the west side of the Clover Center site. The demolished structure is anticipated to be replaced by a 22,000-square-foot grocery store and 1,800 square feet of new retail space. Access to the Clover Center site is expected to remain nearly unchanged, with a three-quarter access available along 98th Street, and full and right-in only accesses along Lyndale Avenue.
    - The proposed redevelopment is expected to generate approximately 296 a.m. peak hour trips, 578 p.m. peak hour trips, and 6,020 daily trips. Considering the estimated trip generation of the current Clover Center under a full occupancy scenario, the redeveloped Clover Center is anticipated to generate a net new trip increase of approximately 71 a.m. peak hour trips, 120 p.m. peak hour trips, and 1,366 daily trips.
- Results of the year 2024 build conditions traffic operations analysis indicate that all study intersections are expected to continue operating at overall LOS C or better during the a.m. and p.m. peak hours. Generally, the proposed Clover Center redevelopment is expected to have minimal impact on study area traffic operations.
    - However, as the Clover Center South Access is reconstructed under the proposed redevelopment, maximizing the length of the full-width eastbound left-turn lane should be considered for additional ingress vehicle storage.
- A review of the proposed site plan was completed to identify any issues and recommended potential improvements regarding vehicle ingress/egress, internal traffic circulation, pedestrian/bicycle connectivity, and parking layout/capacity. The key points on the following page are offered for consideration:

- Continue to utilize proper signing and pavement markings to enforce vehicle movement restrictions at the three-quarter South Access and right-out only Southeast Access.
- At the Northeast Access, sign for two outbound lanes (i.e., left-turn and right-turn lanes).
- At the South Access on the southbound approach to 98th Street, install a channelizing raised median to physically guide motorists into making an outbound right-turn maneuver. Extend or adjust the 98th Street raised medians as appropriate to minimize the potential for prohibited outbound (i.e., southbound) left-turn maneuvers from the Clover Center.
- Based on a detailed crash analysis at the 98th Street/South Access intersection, the existing three-quarter access does not have a statistically significant safety concern.
- Truck turning movements should be reviewed to ensure design vehicles such as delivery trucks have adequate accommodations to negotiate internal roadways.
  - The site developer has proposed for large trucks to enter via the Northeast Access along Lyndale Avenue, exit via the South Access along 98th Street, and traverse the site in a westbound direction behind the Clover Center. It should be noted that the existing internal roadway behind the Clover Center, which is too narrow in spots to effectively allow two-way traffic flow, is currently oriented for one-way traffic in the eastbound direction. A loading dock and a Salvation Army family store drop-off area behind the retail structure to remain are currently oriented for one-way traffic in the eastbound direction. The site developer should consider maintaining one-way traffic flow in the eastbound direction behind the Clover Center, and also orienting the loading dock behind the proposed grocery store for one-way traffic in the eastbound direction.
    - Maintaining one-way traffic flow in the eastbound direction behind the Clover Center has the benefit of funneling more outbound traffic toward the full access Northeast Access intersection.
    - Large trucks may be able to access the site from I-35W via an eastbound left-turn at the South Access along 98th Street without running over a recommended channelizing raised median promoting three-quarter access.
- Large deliveries should be prioritized outside peak periods to minimize conflicts onsite.
- Ensure the installation of proper wayfinding signing, particularly for those motorists who may need to enter or exit via Lyndale Avenue.
- To allow free movement of inbound vehicular traffic at the 98th Street/South Access intersection, install "Do Not Block Intersection" signing on the southbound approach at the first internal driveway intersection.
- Install appropriate traffic control (i.e., stop signs) at higher volume internal parking lot intersections to properly establish right-of-way and minimize motorist confusion.
- The peak parking demand for the proposed Clover Center is estimated to be 186 vehicles. At this peak parking demand, the proposed parking supply of 230 stalls would exhibit at least a 20 percent parking surplus.

Appendix A – 98th Street/Lyndale Avenue 2017 Turning Movement Count

98th Street/Lyndale Avenue Intersection Turning Movement Count (Alliant Engineering - December 2017)

Time	SB Utrn	SB Left	SB Thru	SB Right	Peds/ Bikes	WB Utrn	WB Left	WB Thru	WB Right	Peds/ Bikes	NB Utrn	NB Left	NB Thru	NB Right	Peds/ Bikes	EB Utrn	EB Left	EB Thru	EB Right	Peds/ Bikes
6:00	0	1	4	10	0	0	3	68	19	0	0	11	13	5	0	1	22	33	10	0
6:15	0	1	6	15	0	0	7	81	19	0	0	7	14	3	0	0	12	56	6	0
6:30	0	1	10	13	0	0	7	114	13	0	0	11	20	11	0	0	20	72	11	0
6:45	0	2	12	11	0	0	6	130	13	0	0	21	26	3	0	0	27	72	16	0
7:00	0	5	13	18	0	0	7	136	17	0	0	11	17	4	0	0	46	79	7	1
7:15	0	4	13	18	0	0	14	123	12	0	0	10	27	14	0	0	34	110	15	0
7:30	0	10	14	19	0	0	10	136	21	0	0	23	35	5	0	0	52	130	17	0
7:45	0	4	17	17	2	0	8	143	21	0	0	17	35	5	0	0	43	107	30	0
8:00	0	8	8	26	0	0	9	128	20	0	0	17	15	8	0	0	42	92	17	0
8:15	0	7	10	28	0	0	8	122	14	0	0	27	25	4	0	0	56	96	24	0
8:30	0	14	12	26	0	0	12	119	23	0	0	16	27	8	0	0	43	87	27	0
8:45	0	4	14	34	0	0	10	100	10	0	0	20	27	7	0	0	42	100	26	1
9:00	2	7	24	36	0	0	13	114	14	0	0	22	35	5	0	0	43	83	20	0
9:15	0	7	17	34	0	0	9	102	10	0	0	22	24	6	0	0	42	85	23	2
9:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	16	28	33	0	0	10	97	15	0	0	27	38	14	0	0	56	116	21	1
10:45	0	19	20	48	0	0	24	115	9	0	0	32	32	10	1	0	40	110	36	0
11:00	0	17	32	50	1	0	14	95	7	3	0	36	32	17	0	0	43	101	26	1
11:15	0	26	48	58	6	0	8	109	5	1	0	33	45	13	0	0	53	125	44	1
11:30	0	37	40	57	3	0	8	121	13	0	1	39	45	6	0	0	48	110	51	0
11:45	0	23	31	56	0	0	18	136	12	1	0	48	40	12	0	0	61	119	33	0
12:00	1	34	32	53	3	0	9	139	5	2	0	38	47	7	0	0	62	110	47	1
12:15	0	30	34	65	0	0	7	144	9	0	0	54	48	18	0	0	65	126	43	0
12:30	0	33	40	59	0	0	20	120	13	2	0	44	55	11	0	0	68	123	38	2
12:45	0	28	30	73	0	0	17	120	8	1	0	40	28	16	0	0	63	105	47	0
13:00	0	25	32	69	1	0	11	149	11	3	0	34	31	9	0	0	72	132	47	1
13:15	0	39	42	52	0	0	21	125	17	3	0	43	51	8	0	0	58	96	46	5
13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	24	38	62	0	0	22	152	11	3	0	48	46	10	0	0	44	133	57	3
14:45	0	30	39	43	1	0	21	145	5	0	0	42	45	14	0	0	46	147	43	1
15:00	0	22	57	50	0	0	19	142	16	1	0	48	40	8	0	0	36	129	42	0
15:15	0	29	38	64	0	0	20	167	25	1	0	48	39	14	0	0	46	130	50	2
15:30	0	36	55	58	0	0	15	169	18	2	0	31	35	11	1	0	32	172	48	5
15:45	0	17	54	66	0	0	18	165	11	0	0	47	31	14	0	0	39	159	60	2
16:00	0	40	61	84	1	0	14	145	9	2	0	48	30	14	0	0	45	199	47	1
16:15	0	57	66	59	3	0	14	164	9	3	0	31	39	11	0	0	46	202	49	2
16:30	0	47	74	74	0	0	25	195	8	0	0	37	36	18	0	0	44	211	49	0
16:45	0	41	64	73	0	0	18	200	5	0	0	33	39	14	0	0	41	201	67	1
17:00	0	34	78	100	0	0	28	153	13	0	0	36	60	17	0	0	51	224	39	0
17:15	0	46	58	71	0	0	14	191	9	0	0	34	52	12	0	0	35	198	52	0
17:30	0	24	57	63	0	0	31	170	18	0	0	32	49	2	0	0	50	199	52	0
17:45	0	42	43	64	0	0	25	184	7	0	0	42	31	8	0	0	32	199	50	0

Appendix B – Detailed Operations and Queuing Analysis

2024 No Build Conditions - AM Peak Hour

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Traffic Signal	38th Street & I-35W SB Offramp/ Dupont Avenue	Movement Delay (sec/veh)	0.0	13.3	4.5	50.0	4.1	0.0	46.4	0.0	11.1	46.9	41.1	1.8	14.1
		Movement LOS	A	B	A	D	A	A	D	A	B	D	D	A	B
		Movement 95th Queue (ft)	0	205	39	96	98	0	153	0	123	191	74	19	
		Approach Delay (sec/veh)		12.8			7.8			23.6			19.1		
		Approach LOS		B			A			C			B		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Traffic Signal	38th Street & I-35W NB Ramps	Movement Delay (sec/veh)	37.9	3.6	0.0	0.0	13.3	11.0	48.8	46.5	14.0	0.0	0.0	0.0	20.3
		Movement LOS	D	A	A	A	B	B	D	D	B	A	A	A	C
		Movement 95th Queue (ft)	316	118	0	0	157	240	282	309	309	0	0	0	
		Approach Delay (sec/veh)		14.3			12.8			39.4			0.0		
		Approach LOS		B			B			D			A		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Through/Stop	38th Street & South Access	Movement Delay (sec/veh)	10.9	2.2	0.0	0.0	2.9	1.9	0.0	0.0	0.0	0.0	0.0	6.4	2.9
		Movement LOS	B	A	A	A	A	A	A	A	A	A	A	A	A
		Movement 95th Queue (ft)	58	16	0	0	11	16	0	0	0	0	0	56	
		Approach Delay (sec/veh)		2.8			2.9			0.0			6.4		
		Approach LOS		A			A			A			A		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Traffic Signal	38th Street & Lyndale Avenue	Movement Delay (sec/veh)	38.9	5.9	1.3	54.0	15.7	1.3	50.1	42.5	3.8	55.6	44.1	0.9	19.0
		Movement LOS	D	A	A	D	B	A	D	D	A	E	D	A	B
		Movement 95th Queue (ft)	132	90	0	35	176	0	117	91	41	74	61	0	
		Approach Delay (sec/veh)		14.0			15.9			41.7			23.9		
		Approach LOS		B			B			D			C		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Through/Stop	Lyndale Avenue & Southeast Access	Movement Delay (sec/veh)	0.0	0.0	2.6	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.6	0.0	1.4
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A	A
		Movement 95th Queue (ft)	0	0	40	0	0	0	0	0	0	0	0	0	
		Approach Delay (sec/veh)		2.6			0.0			1.7			0.6		
		Approach LOS		A			A			A			A		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Through/Stop	Lyndale Avenue & Northeast Access	Movement Delay (sec/veh)	7.1	0.0	2.9	0.0	0.0	0.0	2.9	0.3	0.0	0.0	0.2	0.2	0.6
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A	A
		Movement 95th Queue (ft)	46	0	23	0	0	0	21	0	0	0	3	3	
		Approach Delay (sec/veh)		6.4			0.0			0.4			0.2		
		Approach LOS		A			A			A			A		

2024 No Build Conditions - PM Peak Hour

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Traffic Signal	38th Street & I-35W SB Offramp/ Dupont Avenue	Movement Delay (sec/veh)	0.0	23.6	9.9	52.0	1.8	0.0	53.6	0.0	18.4	53.1	45.6	1.7	18.5
		Movement LOS	A	C	A	D	A	A	D	A	B	D	D	A	B
		Movement 95th Queue (ft)	0	587	121	163	72	0	120	0	126	155	116	0	
		Approach Delay (sec/veh)		22.1			8.2			29.0			22.6		
		Approach LOS		C			A			C			C		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Traffic Signal	38th Street & I-35W NB Ramps	Movement Delay (sec/veh)	32.1	2.3	0.0	0.0	13.5	14.5	57.0	64.5	11.4	0.0	0.0	0.0	14.6
		Movement LOS	C	A	A	A	B	B	E	E	B	A	A	A	B
		Movement 95th Queue (ft)	321	82	0	0	197	245	225	255	255	0	0	0	
		Approach Delay (sec/veh)		8.7			13.6			38.0			0.0		
		Approach LOS		A			B			D			A		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Through/Stop	38th Street & South Access	Movement Delay (sec/veh)	28.8	3.3	0.0	0.0	3.8	3.1	0.0	0.0	0.0	0.0	0.0	13.0	4.8
		Movement LOS	D	A	A	A	A	A	A	A	A	A	A	B	A
		Movement 95th Queue (ft)	104	31	0	0	15	23	0	0	0	0	0	82	
		Approach Delay (sec/veh)		5.2			3.8			0.0			13.0		
		Approach LOS		A			A			A			B		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Traffic Signal	38th Street & Lyndale Avenue	Movement Delay (sec/veh)	39.3	14.4	1.8	59.8	27.3	1.2	52.5	50.8	9.5	47.9	48.8	1.1	26.2
		Movement LOS	D	B	A	E	C	A	D	D	A	D	D	A	C
		Movement 95th Queue (ft)	114	204	55	89	293	0	162	158	60	202	177	0	
		Approach Delay (sec/veh)		16.0			29.2			45.0			28.8		
		Approach LOS		B			C			D			C		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Through/Stop	Lyndale Avenue & Southeast Access	Movement Delay (sec/veh)	0.0	0.0	11.1	0.0	0.0	0.0	0.0	1.9	0.0	0.0	1.6	0.0	2.2
		Movement LOS	A	A	B	A	A	A	A	A	A	A	A	A	A
		Movement 95th Queue (ft)	0	0	59	0	0	0	0	5	0	0	33	0	
		Approach Delay (sec/veh)		11.1			0.0			1.9			1.6		
		Approach LOS		B			A			A			A		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Through/Stop	Lyndale Avenue & Northeast Access	Movement Delay (sec/veh)	15.3	0.0	4.8	0.0	0.0	0.0	7.4	0.3	0.0	0.0	0.7	0.6	1.4
		Movement LOS	C	A	A	A	A	A	A	A	A	A	A	A	A
		Movement 95th Queue (ft)	64	0	39	0	0	0	54	0	0	0	9	9	
		Approach Delay (sec/veh)		14.1			0.0			0.9			0.7		
		Approach LOS		B			A			A			A		

100: 98th St & South Access Performance by movement

Movement	EBL	EBT	WBT	WBR	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.0
Total Delay (hr)	0.2	0.4	0.6	0.0	0.1	1.3
Total Del/Veh (s)	10.9	2.2	2.9	1.9	6.4	2.9
Stop Delay (hr)	0.1	0.2	0.0	0.0	0.1	0.4
Stop Del/Veh (s)	8.6	1.0	0.1	0.1	6.0	1.0
Total Stops	36	39	8	1	39	123
Stop/Veh	0.68	0.05	0.01	0.03	1.00	0.08
Travel Dist (mi)	2.6	35.9	47.8	2.1	1.6	90.0
Travel Time (hr)	0.3	1.6	2.1	0.1	0.2	4.2
Avg Speed (mph)	10	22	23	19	10	21
Fuel Used (gal)	0.1	1.8	2.5	0.1	0.0	4.6
Fuel Eff. (mpg)	23.7	19.6	19.2	26.2	36.4	19.8
HC Emissions (g)	1	32	39	1	0	73
CO Emissions (g)	26	1128	1484	31	6	2675
NOx Emissions (g)	3	104	136	4	1	247
Vehicles Entered	53	722	701	30	39	1545
Vehicles Exited	53	723	701	31	39	1547
Hourly Exit Rate	53	723	701	31	39	1547
Input Volume	55	717	686	28	36	1522
% of Volume	96	101	102	111	108	102
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Density (ft/veh)						560
Occupancy (veh)	0	2	2	0	0	4

105: Lyndale Ave & Southeast Access Performance by movement

Movement	EBR	NBT	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.0	0.0	0.0
Total Delay (hr)	0.0	0.2	0.0	0.2
Total Del/Veh (s)	2.6	1.7	0.6	1.4
Stop Delay (hr)	0.0	0.0	0.0	0.0
Stop Del/Veh (s)	2.6	0.2	0.0	0.3
Total Stops	28	1	0	29
Stop/Veh	1.00	0.00	0.00	0.05
Travel Dist (mi)	1.2	16.3	6.5	24.1
Travel Time (hr)	0.1	0.9	0.2	1.2
Avg Speed (mph)	15	18	30	20
Fuel Used (gal)	0.0	1.3	0.1	1.5
Fuel Eff. (mpg)	45.9	12.3	59.1	16.5
HC Emissions (g)	0	20	2	22
CO Emissions (g)	6	845	38	888
NOx Emissions (g)	0	73	4	78
Vehicles Entered	28	366	153	547
Vehicles Exited	28	366	152	546
Hourly Exit Rate	28	366	152	546
Input Volume	27	385	144	556
% of Volume	104	95	106	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0
Density (ft/veh)				1315
Occupancy (veh)	0	1	0	1

110: Lyndale Ave & Northeast Access Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	3.7	0.0	0.0	0.1	0.2	0.1
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Del/Veh (s)	7.1	2.9	2.9	0.3	0.2	0.2	0.6
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stop Del/Veh (s)	5.3	3.1	0.8	0.0	0.0	0.0	0.2
Total Stops	21	4	4	0	0	0	29
Stop/Veh	1.00	1.00	0.24	0.00	0.00	0.00	0.05
Travel Dist (mi)	1.0	0.2	0.6	13.4	17.5	4.1	36.9
Travel Time (hr)	0.1	0.0	0.0	0.4	0.5	0.2	1.2
Avg Speed (mph)	12	15	16	32	34	27	30
Fuel Used (gal)	0.0	0.0	0.0	0.8	0.5	0.1	1.4
Fuel Eff. (mpg)	44.1	34.1	27.6	16.8	35.8	43.6	25.7
HC Emissions (g)	0	0	0	16	8	1	26
CO Emissions (g)	4	1	9	733	176	36	959
NOx Emissions (g)	0	0	1	46	25	4	76
Vehicles Entered	21	4	17	349	149	35	575
Vehicles Exited	21	4	17	349	149	35	575
Hourly Exit Rate	21	4	17	349	149	35	575
Input Volume	21	4	21	364	140	33	582
% of Volume	100	100	81	96	106	106	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							2057
Occupancy (veh)	0	0	0	0	1	0	1

824: Lyndale Ave & 98th St Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	2.8	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	2.1	0.7	0.0	0.5	2.4	0.0	1.2	1.2	0.0	0.5	0.7	0.0
Total Del/Veh (s)	38.9	5.9	1.3	54.0	15.7	1.3	50.1	42.5	3.8	55.6	44.1	0.9
Stop Delay (hr)	1.9	0.6	0.0	0.4	1.8	0.0	1.1	1.1	0.0	0.5	0.6	0.0
Stop Del/Veh (s)	36.2	4.7	0.0	51.6	11.7	0.0	47.1	38.2	4.0	53.9	41.4	0.1
Total Stops	166	83	0	29	243	0	74	83	17	31	40	0
Stop/Veh	0.86	0.19	0.00	0.94	0.44	0.00	0.87	0.81	0.81	0.91	0.74	0.00
Travel Dist (mi)	11.7	26.9	4.4	7.3	128.5	16.4	8.8	10.7	2.2	1.2	1.8	2.0
Travel Time (hr)	2.5	1.5	0.2	0.7	6.2	0.5	1.5	1.5	0.1	0.6	0.7	0.1
Avg Speed (mph)	5	18	24	10	21	31	6	7	21	2	3	18
Fuel Used (gal)	0.7	0.9	0.1	0.3	4.1	0.4	0.5	0.6	0.1	0.1	0.2	0.0
Fuel Eff. (mpg)	16.1	28.4	59.8	23.3	31.6	40.9	16.3	18.5	31.4	8.2	9.4	43.6
HC Emissions (g)	6	15	1	4	49	6	3	4	2	1	1	0
CO Emissions (g)	157	407	37	103	1323	130	171	204	72	17	33	9
NOx Emissions (g)	13	43	2	11	155	17	10	11	6	1	3	1
Vehicles Entered	191	439	93	31	547	74	84	102	21	33	54	93
Vehicles Exited	191	439	93	31	550	74	84	101	21	33	54	93
Hourly Exit Rate	191	439	93	31	550	74	84	101	21	33	54	93
Input Volume	197	432	88	35	537	76	84	112	22	29	52	90
% of Volume	97	102	106	89	102	97	100	90	95	114	103	103
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												
Occupancy (veh)	3	1	0	1	6	1	1	2	0	1	1	0

824: Lyndale Ave & 98th St Performance by movement

Movement	All
Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.1
Total Delay (hr)	9.4
Total Del/Veh (s)	19.0
Stop Delay (hr)	8.1
Stop Del/Veh (s)	16.5
Total Stops	766
Stop/Veh	0.43
Travel Dist (mi)	222.0
Travel Time (hr)	16.1
Avg Speed (mph)	14
Fuel Used (gal)	8.1
Fuel Eff. (mpg)	27.4
HC Emissions (g)	92
CO Emissions (g)	2661
NOx Emissions (g)	273
Vehicles Entered	1762
Vehicles Exited	1764
Hourly Exit Rate	1764
Input Volume	1754
% of Volume	101
Denied Entry Before	0
Denied Entry After	0
Density (ft/veh)	657
Occupancy (veh)	16

2823: 98th St & 35W West Ramps Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.3	0.4
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.2	0.3	3.5	1.0	3.5	0.7
Total Delay (hr)	3.2	0.1	0.8	0.7	1.5	0.7	1.9	0.4	0.1	9.4
Total Del/Veh (s)	13.3	4.5	50.0	4.1	46.4	11.1	46.9	41.1	1.8	14.2
Stop Delay (hr)	1.9	0.0	0.7	0.3	1.4	0.6	1.8	0.4	0.0	7.0
Stop Del/Veh (s)	8.0	1.6	47.1	1.7	42.4	9.5	43.5	37.3	0.0	10.7
Total Stops	344	16	54	119	101	171	129	30	1	965
Stop/Veh	0.40	0.38	0.98	0.19	0.86	0.80	0.88	0.83	0.00	0.41
Travel Dist (mi)	203.0	9.8	3.7	42.2	12.3	22.6	28.5	7.0	52.1	381.1
Travel Time (hr)	9.0	0.4	0.9	1.9	2.0	1.6	3.1	0.7	2.2	21.7
Avg Speed (mph)	22	27	4	22	6	15	10	11	27	18
Fuel Used (gal)	7.5	0.3	0.3	1.3	0.8	0.8	1.3	0.3	1.4	14.0
Fuel Eff. (mpg)	26.9	29.7	14.5	31.4	15.7	28.4	22.5	24.4	36.4	27.2
HC Emissions (g)	104	3	1	19	9	9	11	3	15	174
CO Emissions (g)	3355	123	28	557	275	311	285	72	377	5383
NOx Emissions (g)	343	11	2	62	24	28	29	7	42	549
Vehicles Entered	850	41	54	620	116	212	145	36	279	2353
Vehicles Exited	851	41	54	618	116	212	145	36	281	2354
Hourly Exit Rate	851	41	54	618	116	212	145	36	281	2354
Input Volume	848	42	59	630	112	211	153	39	275	2370
% of Volume	100	98	92	98	104	100	95	92	102	99
Denied Entry Before	0	0	0	0	0	0	0	0	1	1
Denied Entry After	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)										490
Occupancy (veh)	9	0	1	2	2	2	3	1	2	21

4824: 35W East Ramps & 98th St Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.3
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	1.0	3.1	3.3	0.5
Total Delay (hr)	3.0	0.6	2.2	0.5	5.2	0.5	0.6	12.6
Total Del/Veh (s)	37.9	3.6	13.3	11.0	48.8	46.5	14.0	20.3
Stop Delay (hr)	2.6	0.3	1.7	0.4	4.7	0.4	0.4	10.5
Stop Del/Veh (s)	32.9	1.9	10.1	8.3	44.1	40.3	10.3	17.0
Total Stops	231	93	220	61	337	33	63	1038
Stop/Veh	0.81	0.15	0.37	0.39	0.87	0.87	0.41	0.46
Travel Dist (mi)	21.6	45.8	29.2	7.8	67.9	6.7	24.6	203.6
Travel Time (hr)	3.8	1.9	3.1	0.8	7.8	0.7	1.6	19.7
Avg Speed (mph)	6	24	10	10	9	9	17	10
Fuel Used (gal)	1.1	1.4	1.4	0.3	3.1	0.3	0.8	8.6
Fuel Eff. (mpg)	18.9	32.6	20.2	24.1	21.6	21.6	29.2	23.6
HC Emissions (g)	6	20	16	2	28	4	12	88
CO Emissions (g)	157	485	494	61	723	88	301	2309
NOx Emissions (g)	15	64	51	8	77	9	30	254
Vehicles Entered	284	624	585	155	383	38	152	2221
Vehicles Exited	283	624	585	155	382	38	151	2218
Hourly Exit Rate	283	624	585	155	382	38	151	2218
Input Volume	273	628	582	141	390	30	144	2188
% of Volume	104	99	100	110	98	127	105	101
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0
Density (ft/veh)								204
Occupancy (veh)	4	2	3	1	8	1	1	19

Total Zone Performance

Denied Delay (hr)	0.8
Denied Del/Veh (s)	1.2
Total Delay (hr)	32.9
Total Del/Veh (s)	1742.2
Stop Delay (hr)	26.2
Stop Del/Veh (s)	1386.3
Total Stops	2950
Stop/Veh	43.38
Travel Dist (mi)	957.6
Travel Time (hr)	64.3
Avg Speed (mph)	15
Fuel Used (gal)	38.2
Fuel Eff. (mpg)	25.1
HC Emissions (g)	474
CO Emissions (g)	14875
NOx Emissions (g)	1477
Vehicles Entered	2296
Vehicles Exited	12
Hourly Exit Rate	12
Input Volume	8974
% of Volume	0
Denied Entry Before	1
Denied Entry After	0
Density (ft/veh)	495
Occupancy (veh)	63

Intersection: 100: 98th St & South Access

Movement	EB	EB	EB	WB	WB	SB
Directions Served	L	T	T	T	TR	R
Maximum Queue (ft)	65	33	16	12	36	68
Average Queue (ft)	24	2	1	0	2	25
95th Queue (ft)	58	20	12	6	16	56
Link Distance (ft)		202	202	266	266	212
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	100					
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 105: Lyndale Ave & Southeast Access

Movement	EB
Directions Served	R
Maximum Queue (ft)	52
Average Queue (ft)	16
95th Queue (ft)	40
Link Distance (ft)	231
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 110: Lyndale Ave & Northeast Access

Movement	EB	EB	NB	SB
Directions Served	L	R	L	TR
Maximum Queue (ft)	59	30	43	4
Average Queue (ft)	18	4	3	0
95th Queue (ft)	46	23	21	3
Link Distance (ft)	259			618
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		25	95	
Storage Blk Time (%)	3	0		
Queuing Penalty (veh)	0	0		

Intersection: 824: Lyndale Ave & 98th St

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	T	L	L	T	T	L	T	T	R
Maximum Queue (ft)	160	147	94	120	29	77	165	260	138	140	92	54
Average Queue (ft)	83	72	39	46	2	22	56	129	64	60	24	14
95th Queue (ft)	139	124	78	102	15	55	123	229	117	112	70	41
Link Distance (ft)	266	266	266	266			1227	1227		499	499	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)					150	150			100			550
Storage Blk Time (%)							0		5	3		
Queuing Penalty (veh)							0		3	2		

Intersection: 824: Lyndale Ave & 98th St

Movement	SB	SB	SB
Directions Served	L	T	T
Maximum Queue (ft)	86	95	70
Average Queue (ft)	32	33	16
95th Queue (ft)	74	75	46
Link Distance (ft)	142	142	142
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2823: 98th St & 35W West Ramps

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	T	T	T	R	L	T	T	T	L	R	L	T
Maximum Queue (ft)	398	208	192	58	116	171	144	100	183	165	213	95
Average Queue (ft)	115	91	83	12	46	45	30	21	76	57	103	29
95th Queue (ft)	281	173	160	39	96	127	97	69	153	123	191	74
Link Distance (ft)	1113	1113	1113			222	222	222	552	552		1034
Upstream Blk Time (%)						0	0					
Queuing Penalty (veh)						0	0					
Storage Bay Dist (ft)				250	175						270	
Storage Blk Time (%)						0					0	
Queuing Penalty (veh)						0					0	

Intersection: 2823: 98th St & 35W West Ramps

Movement	SB
Directions Served	R
Maximum Queue (ft)	26
Average Queue (ft)	1
95th Queue (ft)	19
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	270
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4824: 35W East Ramps & 98th St

Movement	EB	EB	EB	WB	WB	WB	NB	NB
Directions Served	L	T	T	T	T	TR	L	LTR
Maximum Queue (ft)	349	140	182	116	201	271	296	366
Average Queue (ft)	194	32	57	39	55	130	162	178
95th Queue (ft)	316	97	138	90	140	240	255	309
Link Distance (ft)	315	315	315	202	202	202	932	
Upstream Blk Time (%)	1				0	2		
Queuing Penalty (veh)	3				0	5		
Storage Bay Dist (ft)								400
Storage Blk Time (%)							0	0
Queuing Penalty (veh)							0	0

Zone Summary

Zone wide Queuing Penalty: 14

100: 98th St & South Access Performance by movement

Movement	EBL	EBT	WBT	WBR	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.2	0.0
Total Delay (hr)	0.8	1.1	1.3	0.0	0.3	3.5
Total Del/Veh (s)	28.8	3.3	3.8	3.1	13.0	4.8
Stop Delay (hr)	0.7	0.7	0.0	0.0	0.3	1.8
Stop Del/Veh (s)	26.8	2.2	0.1	0.2	12.4	2.5
Total Stops	89	96	43	5	94	327
Stop/Veh	0.94	0.08	0.04	0.11	1.00	0.12
Travel Dist (mi)	4.6	59.8	79.1	2.9	3.8	150.2
Travel Time (hr)	1.0	3.0	3.9	0.2	0.5	8.5
Avg Speed (mph)	5	20	20	16	7	18
Fuel Used (gal)	0.3	2.8	4.6	0.1	0.2	8.0
Fuel Eff. (mpg)	16.1	21.5	17.0	23.1	22.6	18.8
HC Emissions (g)	1	42	57	1	1	103
CO Emissions (g)	48	1568	2356	42	30	4044
NOx Emissions (g)	5	140	225	5	3	378
Vehicles Entered	95	1212	1174	44	94	2619
Vehicles Exited	93	1209	1177	44	93	2616
Hourly Exit Rate	93	1209	1177	44	93	2616
Input Volume	88	1232	1171	45	94	2630
% of Volume	106	98	100	98	99	99
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Density (ft/veh)						279
Occupancy (veh)	1	3	4	0	1	9

105: Lyndale Ave & Southeast Access Performance by movement

Movement	EBR	NBT	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.0	0.0	0.0
Total Delay (hr)	0.2	0.2	0.3	0.7
Total Del/Veh (s)	11.1	1.9	1.6	2.2
Stop Delay (hr)	0.2	0.0	0.0	0.3
Stop Del/Veh (s)	11.0	0.2	0.2	0.8
Total Stops	62	1	13	76
Stop/Veh	0.98	0.00	0.02	0.06
Travel Dist (mi)	2.8	18.9	30.4	52.1
Travel Time (hr)	0.3	1.0	1.2	2.5
Avg Speed (mph)	8	19	25	21
Fuel Used (gal)	0.1	1.5	0.6	2.2
Fuel Eff. (mpg)	25.7	12.3	50.9	23.2
HC Emissions (g)	0	20	7	27
CO Emissions (g)	18	949	234	1201
NOx Emissions (g)	2	80	19	100
Vehicles Entered	62	413	710	1185
Vehicles Exited	63	413	710	1186
Hourly Exit Rate	63	413	710	1186
Input Volume	71	401	699	1172
% of Volume	89	103	102	101
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0
Density (ft/veh)				625
Occupancy (veh)	0	1	1	3

110: Lyndale Ave & Northeast Access Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.2	4.1	0.0	0.0	0.2	0.3	0.2
Total Delay (hr)	0.2	0.0	0.1	0.0	0.1	0.0	0.5
Total Del/Veh (s)	15.6	4.8	7.4	0.3	0.7	0.6	1.5
Stop Delay (hr)	0.2	0.0	0.1	0.0	0.0	0.0	0.3
Stop Del/Veh (s)	13.5	5.0	5.6	0.0	0.0	0.0	0.8
Total Stops	54	9	22	0	0	1	86
Stop/Veh	1.00	1.00	0.63	0.00	0.00	0.02	0.07
Travel Dist (mi)	2.6	0.5	1.3	14.4	82.3	6.5	107.7
Travel Time (hr)	0.3	0.0	0.1	0.5	2.6	0.3	3.8
Avg Speed (mph)	8	13	10	32	33	26	29
Fuel Used (gal)	0.1	0.0	0.0	0.8	2.4	0.2	3.5
Fuel Eff. (mpg)	25.5	28.3	28.4	18.4	34.6	39.9	30.9
HC Emissions (g)	1	0	0	13	27	2	43
CO Emissions (g)	20	3	9	644	890	73	1639
NOx Emissions (g)	2	0	1	39	88	7	136
Vehicles Entered	54	9	35	375	701	56	1230
Vehicles Exited	54	9	34	374	701	55	1227
Hourly Exit Rate	54	9	34	374	701	55	1227
Input Volume	58	13	33	365	686	56	1211
% of Volume	93	69	103	102	102	98	101
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							678
Occupancy (veh)	0	0	0	0	3	0	4

824: Lyndale Ave & 98th St Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	2.5	0.2	0.2	0.0	0.0	0.0	0.0	0.1	0.0
Total Delay (hr)	2.0	3.3	0.1	1.4	5.8	0.0	2.1	2.8	0.2	2.3	3.8	0.1
Total Del/Veh (s)	39.3	14.4	1.8	59.8	27.3	1.2	52.5	50.8	9.5	47.9	48.8	1.1
Stop Delay (hr)	1.8	2.7	0.0	1.3	4.5	0.0	1.9	2.5	0.2	2.2	3.5	0.0
Stop Del/Veh (s)	36.8	11.8	0.0	55.9	21.0	0.0	48.1	45.7	9.4	45.6	44.9	0.1
Total Stops	144	268	1	77	443	0	129	174	58	138	233	0
Stop/Veh	0.80	0.32	0.00	0.93	0.57	0.00	0.91	0.87	0.91	0.79	0.83	0.00
Travel Dist (mi)	11.0	50.5	9.7	19.0	176.9	8.2	14.8	21.0	6.6	6.1	9.8	7.1
Travel Time (hr)	2.4	4.8	0.4	2.0	11.0	0.3	2.6	3.5	0.4	2.6	4.1	0.4
Avg Speed (mph)	5	11	22	10	16	32	6	6	16	2	2	18
Fuel Used (gal)	0.7	2.1	0.2	0.8	6.2	0.2	0.9	1.2	0.2	0.7	1.2	0.1
Fuel Eff. (mpg)	16.3	23.7	47.1	22.4	28.7	41.8	16.5	17.1	29.1	8.5	8.3	51.4
HC Emissions (g)	4	21	3	6	62	3	5	8	3	2	5	1
CO Emissions (g)	120	538	98	212	1876	73	223	382	139	67	143	26
NOx Emissions (g)	9	65	8	19	197	10	15	23	8	5	14	3
Vehicles Entered	180	826	203	81	754	37	141	200	63	172	282	323
Vehicles Exited	181	829	203	82	758	37	138	195	63	169	275	322
Hourly Exit Rate	181	829	203	82	758	37	138	195	63	169	275	322
Input Volume	175	846	211	85	750	35	143	191	61	172	278	323
% of Volume	103	98	96	96	101	106	97	102	103	98	99	100
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												
Occupancy (veh)	2	5	0	2	11	0	3	3	0	3	4	0

824: Lyndale Ave & 98th St Performance by movement

Movement	All
Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.1
Total Delay (hr)	24.0
Total Del/Veh (s)	26.2
Stop Delay (hr)	20.7
Stop Del/Veh (s)	22.6
Total Stops	1665
Stop/Veh	0.51
Travel Dist (mi)	340.6
Travel Time (hr)	34.5
Avg Speed (mph)	10
Fuel Used (gal)	14.6
Fuel Eff. (mpg)	23.3
HC Emissions (g)	123
CO Emissions (g)	3896
NOx Emissions (g)	377
Vehicles Entered	3262
Vehicles Exited	3252
Hourly Exit Rate	3252
Input Volume	3271
% of Volume	99
Denied Entry Before	0
Denied Entry After	0
Density (ft/veh)	308
Occupancy (veh)	34

2823: 98th St & 35W West Ramps Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.4
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.2	0.2	3.5	0.8	3.6	0.4
Total Delay (hr)	10.2	0.5	1.8	0.4	1.1	0.9	1.6	0.8	0.1	17.5
Total Del/Veh (s)	23.6	9.9	52.0	1.8	53.6	18.4	53.1	45.6	1.7	18.6
Stop Delay (hr)	5.9	0.2	1.7	0.1	1.1	0.8	1.5	0.8	0.0	12.1
Stop Del/Veh (s)	13.6	3.5	49.0	0.5	50.2	16.9	50.0	41.5	0.0	12.8
Total Stops	845	89	128	59	71	145	93	53	0	1483
Stop/Veh	0.54	0.46	1.01	0.07	0.92	0.81	0.88	0.79	0.00	0.44
Travel Dist (mi)	363.0	45.3	8.5	59.6	8.1	19.1	20.3	13.0	41.8	578.7
Travel Time (hr)	20.6	2.0	2.2	2.2	1.5	1.7	2.4	1.3	1.8	35.5
Avg Speed (mph)	18	23	4	28	6	11	9	10	27	16
Fuel Used (gal)	15.3	1.7	0.6	2.0	0.5	0.8	0.9	0.6	1.2	23.6
Fuel Eff. (mpg)	23.7	26.7	13.4	30.3	14.8	24.4	21.5	23.5	34.8	24.5
HC Emissions (g)	188	19	2	25	3	7	7	5	11	266
CO Emissions (g)	6389	745	77	833	138	272	185	121	306	9068
NOx Emissions (g)	650	69	7	84	11	23	18	13	31	906
Vehicles Entered	1516	191	127	874	77	179	104	66	225	3359
Vehicles Exited	1536	190	120	874	74	178	103	64	225	3364
Hourly Exit Rate	1536	190	120	874	74	178	103	64	225	3364
Input Volume	1520	187	132	884	80	185	105	72	236	3402
% of Volume	101	102	91	99	92	96	98	89	95	99
Denied Entry Before	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)										296
Occupancy (veh)	21	2	2	2	1	2	2	1	2	35

4824: 35W East Ramps & 98th St Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.3
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	1.1	3.5	3.5	0.3
Total Delay (hr)	2.8	0.7	4.2	0.7	3.5	0.3	0.6	12.8
Total Del/Veh (s)	32.1	2.3	13.5	14.5	57.0	64.5	11.4	14.6
Stop Delay (hr)	2.4	0.2	3.4	0.5	3.2	0.3	0.4	10.4
Stop Del/Veh (s)	26.9	0.6	10.8	12.1	53.1	58.4	8.2	11.9
Total Stops	249	58	331	62	205	18	56	979
Stop/Veh	0.79	0.05	0.30	0.38	0.93	0.95	0.32	0.31
Travel Dist (mi)	23.9	83.4	55.3	8.0	38.9	3.4	28.4	241.4
Travel Time (hr)	3.7	3.2	5.9	1.0	5.0	0.5	1.7	20.8
Avg Speed (mph)	7	26	9	8	8	8	19	12
Fuel Used (gal)	1.2	3.1	3.0	0.4	1.9	0.2	1.0	10.7
Fuel Eff. (mpg)	20.7	27.3	18.4	20.2	20.2	18.8	29.6	22.6
HC Emissions (g)	5	40	27	4	13	1	12	101
CO Emissions (g)	148	1220	1011	93	387	28	340	3227
NOx Emissions (g)	14	143	95	12	35	2	34	335
Vehicles Entered	315	1142	1109	161	220	19	176	3142
Vehicles Exited	311	1138	1108	160	212	19	173	3121
Hourly Exit Rate	311	1138	1108	160	212	19	173	3121
Input Volume	320	1145	1113	152	219	20	178	3147
% of Volume	97	99	100	105	97	95	97	99
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0
Density (ft/veh)								193
Occupancy (veh)	4	3	6	1	5	0	2	21

Total Zone Performance

Denied Delay (hr)	0.8
Denied Del/Veh (s)	1.0
Total Delay (hr)	59.0
Total Del/Veh (s)	1516.8
Stop Delay (hr)	45.5
Stop Del/Veh (s)	1170.2
Total Stops	4616
Stop/Veh	32.97
Travel Dist (mi)	1470.7
Travel Time (hr)	105.7
Avg Speed (mph)	14
Fuel Used (gal)	62.6
Fuel Eff. (mpg)	23.5
HC Emissions (g)	663
CO Emissions (g)	23075
NOx Emissions (g)	2232
Vehicles Entered	2927
Vehicles Exited	16
Hourly Exit Rate	16
Input Volume	14832
% of Volume	0
Denied Entry Before	0
Denied Entry After	0
Density (ft/veh)	300
Occupancy (veh)	105

Intersection: 100: 98th St & South Access

Movement	EB	EB	EB	EB	WB	WB	SB
Directions Served	L	T	T	T	T	TR	R
Maximum Queue (ft)	124	123	27	29	14	45	98
Average Queue (ft)	55	11	1	1	1	3	44
95th Queue (ft)	104	64	16	14	8	23	82
Link Distance (ft)		202	202	202	266	266	212
Upstream Blk Time (%)		0					
Queuing Penalty (veh)		0					
Storage Bay Dist (ft)	100						
Storage Blk Time (%)	2	1					
Queuing Penalty (veh)	9	1					

Intersection: 105: Lyndale Ave & Southeast Access

Movement	EB	NB	NB	SB	SB	SB
Directions Served	R	T	T	T	T	T
Maximum Queue (ft)	91	10	6	60	98	51
Average Queue (ft)	29	0	0	5	5	2
95th Queue (ft)	59	5	5	29	41	29
Link Distance (ft)	231	142	142		159	159
Upstream Blk Time (%)					0	0
Queuing Penalty (veh)					0	0
Storage Bay Dist (ft)				1		
Storage Blk Time (%)				0	0	
Queuing Penalty (veh)				0	0	

Intersection: 110: Lyndale Ave & Northeast Access

Movement	EB	EB	NB	SB
Directions Served	L	R	L	TR
Maximum Queue (ft)	74	47	72	14
Average Queue (ft)	33	11	19	1
95th Queue (ft)	64	39	54	9
Link Distance (ft)	259			618
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		25	95	
Storage Blk Time (%)	17	1	0	
Queuing Penalty (veh)	2	1	0	

Intersection: 824: Lyndale Ave & 98th St

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	L	T	T
Maximum Queue (ft)	134	126	213	243	104	75	173	348	399	159	237	147
Average Queue (ft)	72	62	111	125	4	15	58	151	200	105	111	75
95th Queue (ft)	119	109	195	213	55	53	125	265	320	162	183	133
Link Distance (ft)	266	266	266	266				1227	1227		499	499
Upstream Blk Time (%)			0	0	0							
Queuing Penalty (veh)			0	0	0							
Storage Bay Dist (ft)					230	150	150			100		
Storage Blk Time (%)				0			0	8		17	15	
Queuing Penalty (veh)				1			0	7		16	21	

Intersection: 824: Lyndale Ave & 98th St

Movement	NB	SB	SB	SB
Directions Served	R	L	T	T
Maximum Queue (ft)	71	199	209	171
Average Queue (ft)	32	126	127	101
95th Queue (ft)	60	202	192	161
Link Distance (ft)		142	142	142
Upstream Blk Time (%)		11	8	3
Queuing Penalty (veh)		21	15	5
Storage Bay Dist (ft)	550			
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2823: 98th St & 35W West Ramps

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	T	T	T	R	L	T	T	T	L	R	L	T
Maximum Queue (ft)	972	1009	795	214	192	215	112	75	129	152	175	141
Average Queue (ft)	266	314	181	45	103	31	13	11	60	65	87	55
95th Queue (ft)	591	688	482	121	163	120	51	45	120	126	155	116
Link Distance (ft)	1113	1113	1113			222	222	222	552	552		1034
Upstream Blk Time (%)	0	0	0		0	0						
Queuing Penalty (veh)	0	0	0		0	1						
Storage Bay Dist (ft)				250	175						270	
Storage Blk Time (%)			1		1	1						
Queuing Penalty (veh)			3		3	1						

Intersection: 4824: 35W East Ramps & 98th St

Movement	EB	EB	EB	WB	WB	WB	NB	NB
Directions Served	L	T	T	T	T	TR	L	LTR
Maximum Queue (ft)	379	62	191	186	222	263	247	299
Average Queue (ft)	201	12	39	82	99	148	113	134
95th Queue (ft)	321	44	120	153	194	245	195	255
Link Distance (ft)	315	315	315	202	202	202	932	
Upstream Blk Time (%)	1			0	0	3		
Queuing Penalty (veh)	6			1	2	15		
Storage Bay Dist (ft)								400
Storage Blk Time (%)								
Queuing Penalty (veh)								

Zone Summary

Zone wide Queuing Penalty: 131

2024 Build Conditions - AM Peak Hour

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Traffic Signal	98th Street & I-35W SB Offramp/ Dupont Avenue	Movement Delay (sec/veh)	0.0	13.1	4.9	51.8	4.0	0.0	50.8	0.0	9.4	47.6	38.6	1.9	14.3
		Movement LOS	A	B	A	D	A	A	D	A	A	D	D	A	B
		Movement 95th Queue (ft)	0	172	39	109	101	0	154	0	93	203	66	21	
		Approach Delay (sec/veh)		12.7			7.9			24.5			20.0		
		Approach LOS		B			A			C			B		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Traffic Signal	98th Street & I-35W NB Ramps	Movement Delay (sec/veh)	37.5	2.8	0.0	0.0	11.8	9.7	47.5	51.2	14.2	0.0	0.0	0.0	19.0
		Movement LOS	D	A	A	A	B	A	D	D	B	A	A	A	B
		Movement 95th Queue (ft)	288	96	0	0	138	212	274	299	299	0	0	0	
		Approach Delay (sec/veh)		13.1			11.5			38.9			0.0		
		Approach LOS		B			B			D			A		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Through/Stop	98th Street & South Access	Movement Delay (sec/veh)	11.0	2.1	0.0	0.0	2.8	2.0	0.0	0.0	0.0	0.0	0.0	6.3	2.9
		Movement LOS	B	A	A	A	A	A	A	A	A	A	A	A	A
		Movement 95th Queue (ft)	72	26	0	0	12	12	0	0	0	0	0	54	
		Approach Delay (sec/veh)		2.8			2.8			0.0			6.3		
		Approach LOS		A			A			A			A		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Traffic Signal	98th Street & Lyndale Avenue	Movement Delay (sec/veh)	39.1	6.4	1.3	57.3	15.3	1.3	50.7	44.7	4.5	56.1	45.4	0.8	19.7
		Movement LOS	D	A	A	E	B	A	D	D	A	E	D	A	B
		Movement 95th Queue (ft)	134	90	0	37	180	0	119	106	42	78	66	0	
		Approach Delay (sec/veh)		14.9			15.8			42.9			24.8		
		Approach LOS		B			B			D			C		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Through/Stop	Lyndale Avenue & Southeast Access	Movement Delay (sec/veh)	0.0	0.0	2.7	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.6	0.0	1.5
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A	A
		Movement 95th Queue (ft)	0	0	40	0	0	0	0	2	0	0	0	0	
		Approach Delay (sec/veh)		2.7			0.0			1.7			0.6		
		Approach LOS		A			A			A			A		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Through/Stop	Lyndale Avenue & Northeast Access	Movement Delay (sec/veh)	6.8	0.0	3.1	0.0	0.0	0.0	2.7	0.3	0.0	0.0	0.4	0.4	0.7
		Movement LOS	A	A	A	A	A	A	A	A	A	A	A	A	A
		Movement 95th Queue (ft)	45	0	28	0	0	0	24	0	0	0	3	3	
		Approach Delay (sec/veh)		6.2			0.0			0.4			0.4		
		Approach LOS		A			A			A			A		

2024 Build Conditions - PM Peak Hour

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Traffic Signal	98th Street & I-35W SB Offramp/ Dupont Avenue	Movement Delay (sec/veh)	0.0	23.6	10.0	53.0	1.8	0.0	52.9	0.0	18.2	50.2	44.4	1.7	18.3
		Movement LOS	A	C	A	D	A	A	D	A	B	D	D	A	B
		Movement 95th Queue (ft)	0	502	137	168	88	0	123	0	131	162	118	0	
		Approach Delay (sec/veh)		22.1			8.4			28.4			21.0		
		Approach LOS		C			A			C			C		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Traffic Signal	98th Street & I-35W NB Ramps	Movement Delay (sec/veh)	31.2	2.5	0.0	0.0	15.4	15.6	54.3	59.5	11.6	0.0	0.0	0.0	15.0
		Movement LOS	C	A	A	A	B	B	D	E	B	A	A	A	B
		Movement 95th Queue (ft)	308	76	0	0	213	254	224	280	260	0	0	0	
		Approach Delay (sec/veh)		8.3			15.4			36.5			0.0		
		Approach LOS		A			B			D			A		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Through/Stop	98th Street & South Access	Movement Delay (sec/veh)	29.4	3.7	0.0	0.0	4.1	3.6	0.0	0.0	0.0	0.0	0.0	18.2	5.5
		Movement LOS	D	A	A	A	A	A	A	A	A	A	A	C	A
		Movement 95th Queue (ft)	110	35	0	0	32	36	0	0	0	0	0	113	
		Approach Delay (sec/veh)		5.7			4.1			0.0			18.2		
		Approach LOS		A			A			A			C		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Traffic Signal	98th Street & Lyndale Avenue	Movement Delay (sec/veh)	40.3	16.7	2.0	59.7	29.3	1.2	51.2	54.2	8.4	48.1	49.2	1.0	27.3
		Movement LOS	D	B	A	E	C	A	D	D	A	D	D	A	C
		Movement 95th Queue (ft)	115	230	109	99	303	0	166	177	58	204	176	0	
		Approach Delay (sec/veh)		17.3			31.1			45.7			29.3		
		Approach LOS		B			C			D			C		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Through/Stop	Lyndale Avenue & Southeast Access	Movement Delay (sec/veh)	0.0	0.0	10.3	0.0	0.0	0.0	0.0	1.9	0.0	0.0	1.4	0.0	2.2
		Movement LOS	A	A	B	A	A	A	A	A	A	A	A	A	A
		Movement 95th Queue (ft)	0	0	59	0	0	0	0	0	0	0	24	0	
		Approach Delay (sec/veh)		10.3			0.0			1.9			1.4		
		Approach LOS		B			A			A			A		

Traffic Control	Intersection	MOE	Eastbound Approach			Westbound Approach			Northbound Approach			Southbound Approach			Intersection
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Total
Through/Stop	Lyndale Avenue & Northeast Access	Movement Delay (sec/veh)	20.5	0.0	3.1	0.0	0.0	0.0	7.3	0.3	0.0	0.0	0.8	0.6	2.1
		Movement LOS	C	A	A	A	A	A	A	A	A	A	A	A	A
		Movement 95th Queue (ft)	81	0	47	0	0	0	48	0	0	0	6	6	
		Approach Delay (sec/veh)		18.2			0.0			1.0			0.8		
		Approach LOS		C			A			A			A		

100: 98th St & South Access Performance by movement

Movement	EBL	EBT	WBT	WBR	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.1	0.0
Total Delay (hr)	0.2	0.4	0.6	0.0	0.1	1.3
Total Del/Veh (s)	11.0	2.1	2.8	2.0	6.3	3.0
Stop Delay (hr)	0.2	0.2	0.0	0.0	0.1	0.5
Stop Del/Veh (s)	8.7	0.9	0.1	0.1	5.9	1.0
Total Stops	47	32	6	1	50	136
Stop/Veh	0.66	0.05	0.01	0.03	1.00	0.09
Travel Dist (mi)	3.5	35.1	47.9	2.4	2.0	90.9
Travel Time (hr)	0.4	1.5	2.1	0.1	0.2	4.3
Avg Speed (mph)	10	23	23	18	10	21
Fuel Used (gal)	0.1	1.7	2.5	0.1	0.1	4.5
Fuel Eff. (mpg)	23.8	20.3	19.3	25.0	36.1	20.2
HC Emissions (g)	2	29	37	3	0	70
CO Emissions (g)	41	1032	1428	59	8	2568
NOx Emissions (g)	5	95	130	8	1	239
Vehicles Entered	71	707	703	35	50	1566
Vehicles Exited	71	707	702	35	50	1565
Hourly Exit Rate	71	707	702	35	50	1565
Input Volume	72	717	686	36	48	1559
% of Volume	99	99	102	97	104	100
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Density (ft/veh)						551
Occupancy (veh)	0	2	2	0	0	4

105: Lyndale Ave & Southeast Access Performance by movement

Movement	EBR	NBT	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.0	0.0	0.0
Total Delay (hr)	0.0	0.2	0.0	0.2
Total Del/Veh (s)	2.7	1.7	0.6	1.5
Stop Delay (hr)	0.0	0.0	0.0	0.0
Stop Del/Veh (s)	2.7	0.2	0.0	0.3
Total Stops	34	1	0	35
Stop/Veh	1.00	0.00	0.00	0.06
Travel Dist (mi)	1.5	17.4	5.9	24.9
Travel Time (hr)	0.1	1.0	0.2	1.3
Avg Speed (mph)	14	18	30	20
Fuel Used (gal)	0.0	1.4	0.1	1.6
Fuel Eff. (mpg)	43.6	12.3	51.6	15.9
HC Emissions (g)	0	20	2	22
CO Emissions (g)	9	890	50	949
NOx Emissions (g)	1	76	5	81
Vehicles Entered	34	390	139	563
Vehicles Exited	34	391	139	564
Hourly Exit Rate	34	391	139	564
Input Volume	36	391	145	572
% of Volume	94	100	96	99
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0
Density (ft/veh)				1250
Occupancy (veh)	0	1	0	1

110: Lyndale Ave & Northeast Access Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	4.2	0.0	0.0	0.1	0.2	0.1
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Del/Veh (s)	6.8	3.1	2.7	0.3	0.4	0.4	0.7
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stop Del/Veh (s)	4.9	3.4	0.8	0.0	0.0	0.0	0.3
Total Stops	25	5	4	0	0	0	34
Stop/Veh	1.00	1.00	0.18	0.00	0.00	0.00	0.06
Travel Dist (mi)	1.2	0.2	0.8	14.1	15.7	6.1	38.3
Travel Time (hr)	0.1	0.0	0.1	0.4	0.5	0.2	1.3
Avg Speed (mph)	12	15	16	32	34	27	29
Fuel Used (gal)	0.0	0.0	0.0	0.8	0.4	0.1	1.5
Fuel Eff. (mpg)	39.9	34.1	28.6	17.0	35.2	41.5	25.6
HC Emissions (g)	0	0	0	16	6	2	25
CO Emissions (g)	5	1	8	760	149	59	983
NOx Emissions (g)	1	0	1	47	20	5	75
Vehicles Entered	25	5	22	368	134	52	606
Vehicles Exited	25	5	22	368	134	52	606
Hourly Exit Rate	25	5	22	368	134	52	606
Input Volume	28	5	27	364	140	44	608
% of Volume	89	100	81	101	96	118	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							1921
Occupancy (veh)	0	0	0	0	0	0	1

824: Lyndale Ave & 98th St Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	2.7	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	2.1	0.8	0.0	0.6	2.4	0.0	1.2	1.4	0.0	0.5	0.7	0.0
Total Del/Veh (s)	39.1	6.4	1.3	57.3	15.3	1.3	50.7	44.7	4.5	56.1	45.4	0.8
Stop Delay (hr)	2.0	0.6	0.0	0.5	1.8	0.0	1.1	1.3	0.0	0.5	0.6	0.0
Stop Del/Veh (s)	36.4	5.2	0.0	55.0	11.3	0.0	47.5	40.3	4.6	54.5	42.6	0.1
Total Stops	171	86	0	34	242	0	77	95	19	32	42	0
Stop/Veh	0.86	0.20	0.00	0.97	0.43	0.00	0.89	0.84	0.83	0.97	0.81	0.00
Travel Dist (mi)	12.0	26.1	4.0	8.2	131.9	17.7	9.1	11.8	2.4	1.2	1.8	1.9
Travel Time (hr)	2.6	1.5	0.2	0.8	6.2	0.6	1.5	1.8	0.1	0.6	0.7	0.1
Avg Speed (mph)	5	17	24	10	21	31	6	7	20	2	2	18
Fuel Used (gal)	0.8	0.9	0.1	0.4	4.2	0.4	0.6	0.6	0.1	0.1	0.2	0.0
Fuel Eff. (mpg)	16.0	28.4	61.6	23.3	31.4	40.5	16.3	18.2	31.0	8.0	9.1	42.0
HC Emissions (g)	5	13	1	3	53	5	4	6	2	1	1	0
CO Emissions (g)	145	363	37	96	1412	130	176	261	59	18	31	10
NOx Emissions (g)	12	39	3	9	166	17	11	16	4	1	3	1
Vehicles Entered	197	426	84	35	562	80	87	113	23	33	52	88
Vehicles Exited	196	427	84	35	561	80	87	113	23	33	51	88
Hourly Exit Rate	196	427	84	35	561	80	87	113	23	33	51	88
Input Volume	197	432	88	35	543	80	86	114	22	36	55	90
% of Volume	99	99	95	100	103	100	101	99	105	92	93	98
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												
Occupancy (veh)	3	2	0	1	6	1	2	2	0	1	1	0

824: Lyndale Ave & 98th St Performance by movement

Movement	All
Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.1
Total Delay (hr)	9.8
Total Del/Veh (s)	19.7
Stop Delay (hr)	8.5
Stop Del/Veh (s)	17.1
Total Stops	798
Stop/Veh	0.45
Travel Dist (mi)	228.1
Travel Time (hr)	16.8
Avg Speed (mph)	14
Fuel Used (gal)	8.4
Fuel Eff. (mpg)	27.1
HC Emissions (g)	94
CO Emissions (g)	2739
NOx Emissions (g)	281
Vehicles Entered	1780
Vehicles Exited	1778
Hourly Exit Rate	1778
Input Volume	1778
% of Volume	100
Denied Entry Before	0
Denied Entry After	0
Density (ft/veh)	632
Occupancy (veh)	17

2823: 98th St & 35W West Ramps Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.3	0.4
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.2	0.2	3.5	0.9	3.5	0.7
Total Delay (hr)	3.1	0.1	0.8	0.7	1.7	0.5	2.0	0.4	0.1	9.5
Total Del/Veh (s)	13.1	4.9	51.8	4.0	50.8	9.4	47.6	38.6	1.9	14.3
Stop Delay (hr)	1.9	0.0	0.8	0.3	1.5	0.4	1.9	0.4	0.0	7.2
Stop Del/Veh (s)	7.9	1.9	48.9	1.7	46.8	7.8	44.0	35.2	0.0	10.9
Total Stops	334	16	57	121	101	162	137	28	2	958
Stop/Veh	0.39	0.40	0.98	0.19	0.86	0.80	0.89	0.72	0.01	0.40
Travel Dist (mi)	199.8	9.5	3.8	43.4	12.3	21.6	29.9	7.5	50.5	378.3
Travel Time (hr)	8.8	0.4	1.0	2.0	2.1	1.4	3.3	0.7	2.2	21.8
Avg Speed (mph)	23	26	4	22	6	16	10	11	27	18
Fuel Used (gal)	7.4	0.3	0.3	1.4	0.8	0.7	1.3	0.3	1.4	14.0
Fuel Eff. (mpg)	27.1	29.8	14.0	30.9	14.9	29.1	22.4	25.2	35.9	27.1
HC Emissions (g)	108	8	2	20	7	8	15	4	17	189
CO Emissions (g)	3339	202	43	583	247	277	352	92	420	5554
NOx Emissions (g)	351	23	4	65	22	24	38	10	47	583
Vehicles Entered	836	40	57	637	116	202	152	39	272	2351
Vehicles Exited	833	40	57	637	116	203	152	38	272	2348
Hourly Exit Rate	833	40	57	637	116	203	152	38	272	2348
Input Volume	857	42	59	636	112	211	157	39	275	2389
% of Volume	97	95	97	100	104	96	97	97	99	98
Denied Entry Before	0	0	0	0	0	0	1	0	0	1
Denied Entry After	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)										489
Occupancy (veh)	9	0	1	2	2	1	3	1	2	21

4824: 35W East Ramps & 98th St Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.3
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	1.0	3.4	3.3	0.4
Total Delay (hr)	2.8	0.5	2.0	0.4	5.0	0.4	0.6	11.7
Total Del/Veh (s)	37.5	2.9	11.9	9.7	47.6	51.2	14.2	19.0
Stop Delay (hr)	2.4	0.3	1.5	0.3	4.5	0.4	0.4	9.8
Stop Del/Veh (s)	32.8	1.5	8.9	7.2	42.8	45.2	10.4	15.9
Total Stops	209	81	198	51	335	26	63	963
Stop/Veh	0.79	0.13	0.32	0.34	0.89	0.90	0.43	0.43
Travel Dist (mi)	20.0	46.4	30.1	7.5	66.6	5.2	23.7	199.4
Travel Time (hr)	3.5	1.8	2.9	0.7	7.5	0.6	1.5	18.6
Avg Speed (mph)	6	25	10	10	9	9	17	11
Fuel Used (gal)	1.0	1.4	1.5	0.3	3.0	0.2	0.8	8.3
Fuel Eff. (mpg)	19.2	33.6	20.2	24.1	21.8	21.3	28.9	23.9
HC Emissions (g)	6	18	15	2	29	3	11	84
CO Emissions (g)	149	439	498	66	716	64	286	2219
NOx Emissions (g)	14	58	52	8	75	7	29	243
Vehicles Entered	263	632	604	149	374	29	146	2197
Vehicles Exited	262	633	606	150	375	29	146	2201
Hourly Exit Rate	262	633	606	150	375	29	146	2201
Input Volume	273	642	591	144	390	30	148	2218
% of Volume	96	99	102	104	96	97	99	99
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0
Density (ft/veh)								216
Occupancy (veh)	3	2	3	1	7	1	1	18

Total Zone Performance

Denied Delay (hr)	0.8
Denied Del/Veh (s)	1.2
Total Delay (hr)	32.6
Total Del/Veh (s)	1504.1
Stop Delay (hr)	26.0
Stop Del/Veh (s)	1199.7
Total Stops	2924
Stop/Veh	37.49
Travel Dist (mi)	959.9
Travel Time (hr)	64.1
Avg Speed (mph)	15
Fuel Used (gal)	38.3
Fuel Eff. (mpg)	25.1
HC Emissions (g)	484
CO Emissions (g)	15013
NOx Emissions (g)	1502
Vehicles Entered	2313
Vehicles Exited	14
Hourly Exit Rate	14
Input Volume	9124
% of Volume	0
Denied Entry Before	1
Denied Entry After	0
Density (ft/veh)	497
Occupancy (veh)	63

Intersection: 100: 98th St & South Access

Movement	EB	EB	WB	WB	SB
Directions Served	L	T	T	TR	R
Maximum Queue (ft)	89	45	10	26	67
Average Queue (ft)	31	3	1	1	29
95th Queue (ft)	72	26	11	12	54
Link Distance (ft)		202	266	266	212
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	100				
Storage Blk Time (%)	0	0			
Queuing Penalty (veh)	1	0			

Intersection: 105: Lyndale Ave & Southeast Access

Movement	EB	NB	NB	NB
Directions Served	R	T	T	T
Maximum Queue (ft)	43	6	14	12
Average Queue (ft)	18	0	0	0
95th Queue (ft)	40	0	6	0
Link Distance (ft)	231	142	142	142
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 110: Lyndale Ave & Northeast Access

Movement	EB	EB	NB	SB
Directions Served	L	R	L	TR
Maximum Queue (ft)	52	38	44	4
Average Queue (ft)	17	6	4	0
95th Queue (ft)	45	28	24	3
Link Distance (ft)	259			618
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		25	95	
Storage Blk Time (%)	3	0		
Queuing Penalty (veh)	0	0		

Intersection: 824: Lyndale Ave & 98th St

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	NB
Directions Served	L	L	T	T	L	L	T	T	L	T	T	R
Maximum Queue (ft)	160	140	99	105	26	76	152	277	138	131	108	46
Average Queue (ft)	86	73	38	46	3	23	61	129	67	66	34	16
95th Queue (ft)	142	125	80	99	17	57	126	234	119	119	92	42
Link Distance (ft)	266	266	266	266			1227	1227		499	499	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)					150	150			100			550
Storage Blk Time (%)							0		7	4		
Queuing Penalty (veh)							0		4	4		

Intersection: 824: Lyndale Ave & 98th St

Movement	SB	SB	SB
Directions Served	L	T	T
Maximum Queue (ft)	97	97	78
Average Queue (ft)	33	34	17
95th Queue (ft)	78	79	52
Link Distance (ft)	142	142	142
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2823: 98th St & 35W West Ramps

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	T	T	T	R	L	T	T	T	L	R	L	T
Maximum Queue (ft)	256	192	162	51	132	184	194	107	177	112	259	88
Average Queue (ft)	108	92	76	12	51	47	31	20	81	49	107	27
95th Queue (ft)	204	170	142	39	109	131	102	69	154	93	203	66
Link Distance (ft)	1113	1113	1113			222	222	222	552	552		1034
Upstream Blk Time (%)							0					
Queuing Penalty (veh)							0					
Storage Bay Dist (ft)				250	175						270	
Storage Blk Time (%)					0	0					0	
Queuing Penalty (veh)					1	0					1	

Intersection: 2823: 98th St & 35W West Ramps

Movement	SB
Directions Served	R
Maximum Queue (ft)	28
Average Queue (ft)	1
95th Queue (ft)	21
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	270
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4824: 35W East Ramps & 98th St

Movement	EB	EB	EB	WB	WB	WB	NB	NB
Directions Served	L	T	T	T	T	TR	L	LTR
Maximum Queue (ft)	329	98	121	104	171	262	288	344
Average Queue (ft)	175	32	48	36	48	107	158	176
95th Queue (ft)	288	82	110	83	119	212	248	299
Link Distance (ft)	315	315	315	202	202	202	932	
Upstream Blk Time (%)	1			0	0	1		
Queuing Penalty (veh)	2			0	0	3		
Storage Bay Dist (ft)								400
Storage Blk Time (%)								0
Queuing Penalty (veh)								1

Zone Summary

Zone wide Queuing Penalty: 17

Clover Center TPS
2024 BUILD PM

Average of 5 Runs

100: 98th St & South Access Performance by movement

Movement	EBL	EBT	WBT	WBR	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.6	0.0
Total Delay (hr)	0.9	1.3	1.3	0.1	0.6	4.1
Total Del/Veh (s)	29.4	3.7	4.1	3.6	18.2	5.6
Stop Delay (hr)	0.8	0.8	0.1	0.0	0.6	2.3
Stop Del/Veh (s)	27.2	2.5	0.2	0.3	17.7	3.1
Total Stops	105	99	59	6	119	388
Stop/Veh	0.99	0.08	0.05	0.09	0.98	0.14
Travel Dist (mi)	5.2	60.6	78.2	4.4	4.9	153.3
Travel Time (hr)	1.1	3.1	3.9	0.3	0.9	9.3
Avg Speed (mph)	5	19	20	16	6	16
Fuel Used (gal)	0.3	2.8	4.6	0.2	0.3	8.2
Fuel Eff. (mpg)	15.5	21.4	17.1	22.6	17.9	18.7
HC Emissions (g)	1	35	55	2	1	94
CO Emissions (g)	54	1483	2282	55	37	3911
NOx Emissions (g)	6	125	218	7	4	360
Vehicles Entered	106	1227	1162	66	121	2682
Vehicles Exited	106	1225	1163	66	122	2682
Hourly Exit Rate	106	1225	1163	66	122	2682
Input Volume	114	1232	1171	58	117	2692
% of Volume	93	99	99	114	104	100
Denied Entry Before	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0
Density (ft/veh)						255
Occupancy (veh)	1	3	4	0	1	9

105: Lyndale Ave & Southeast Access Performance by movement

Movement	EBR	NBT	SBT	All
Denied Delay (hr)	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.1	0.0	0.0	0.0
Total Delay (hr)	0.3	0.2	0.3	0.7
Total Del/Veh (s)	10.3	1.9	1.4	2.3
Stop Delay (hr)	0.2	0.0	0.0	0.3
Stop Del/Veh (s)	9.9	0.2	0.1	0.9
Total Stops	89	0	7	96
Stop/Veh	1.00	0.00	0.01	0.08
Travel Dist (mi)	4.0	17.7	29.7	51.4
Travel Time (hr)	0.5	0.9	1.1	2.5
Avg Speed (mph)	9	19	26	20
Fuel Used (gal)	0.2	1.5	0.6	2.2
Fuel Eff. (mpg)	26.1	12.1	48.4	23.1
HC Emissions (g)	1	19	7	27
CO Emissions (g)	39	874	258	1171
NOx Emissions (g)	4	75	21	100
Vehicles Entered	89	388	695	1172
Vehicles Exited	89	388	694	1171
Hourly Exit Rate	89	388	694	1171
Input Volume	88	410	701	1200
% of Volume	101	95	99	98
Denied Entry Before	0	0	0	0
Denied Entry After	0	0	0	0
Density (ft/veh)				620
Occupancy (veh)	0	1	1	3

110: Lyndale Ave & Northeast Access Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Denied Del/Veh (s)	0.2	3.9	0.0	0.0	0.2	0.3	0.2
Total Delay (hr)	0.4	0.0	0.1	0.0	0.2	0.0	0.7
Total Del/Veh (s)	20.5	6.1	7.3	0.3	0.8	0.6	2.2
Stop Delay (hr)	0.4	0.0	0.1	0.0	0.0	0.0	0.5
Stop Del/Veh (s)	18.4	5.8	5.4	0.0	0.0	0.0	1.4
Total Stops	75	14	26	0	0	1	116
Stop/Veh	0.99	1.00	0.68	0.00	0.00	0.01	0.09
Travel Dist (mi)	3.7	0.7	1.4	13.3	79.9	8.6	107.6
Travel Time (hr)	0.6	0.1	0.1	0.4	2.5	0.3	4.1
Avg Speed (mph)	6	12	10	32	33	26	27
Fuel Used (gal)	0.2	0.0	0.0	0.7	2.3	0.2	3.6
Fuel Eff. (mpg)	19.7	23.6	29.7	17.8	34.1	41.1	30.2
HC Emissions (g)	1	0	0	12	29	3	45
CO Emissions (g)	33	6	8	616	942	88	1693
NOx Emissions (g)	3	1	1	37	91	8	141
Vehicles Entered	75	14	38	345	680	74	1226
Vehicles Exited	75	14	38	343	681	74	1225
Hourly Exit Rate	75	14	38	343	681	74	1225
Input Volume	72	15	42	365	686	72	1252
% of Volume	104	93	90	94	99	103	98
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0
Density (ft/veh)							632
Occupancy (veh)	1	0	0	0	2	0	4

824: Lyndale Ave & 98th St Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Denied Delay (hr)	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Denied Del/Veh (s)	0.0	0.0	0.0	2.6	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (hr)	1.9	3.9	0.1	1.5	6.3	0.0	2.1	2.8	0.1	2.5	3.9	0.1
Total Del/Veh (s)	40.3	16.7	2.0	59.7	29.3	1.2	51.2	54.2	8.4	48.1	49.2	1.0
Stop Delay (hr)	1.8	3.2	0.0	1.4	4.9	0.0	1.9	2.5	0.1	2.4	3.5	0.0
Stop Del/Veh (s)	37.8	13.6	0.1	55.6	22.8	0.0	46.9	48.9	8.3	45.8	45.3	0.1
Total Stops	140	301	3	83	466	0	128	170	53	145	240	0
Stop/Veh	0.81	0.36	0.01	0.94	0.61	0.00	0.86	0.92	0.84	0.78	0.85	0.00
Travel Dist (mi)	10.5	51.0	10.6	20.0	176.7	8.0	15.4	19.2	6.5	6.6	9.8	7.0
Travel Time (hr)	2.3	5.4	0.5	2.2	11.4	0.3	2.7	3.3	0.4	2.8	4.2	0.4
Avg Speed (mph)	4	10	22	10	16	31	6	6	16	2	2	18
Fuel Used (gal)	0.7	2.3	0.2	0.9	6.2	0.2	0.9	1.2	0.2	0.8	1.2	0.2
Fuel Eff. (mpg)	15.8	22.5	44.9	22.2	28.4	41.0	16.6	16.5	28.7	8.4	8.3	46.3
HC Emissions (g)	2	17	2	5	52	2	5	8	2	3	6	2
CO Emissions (g)	100	488	93	197	1696	47	235	350	124	80	159	39
NOx Emissions (g)	7	55	7	16	172	6	15	22	5	7	16	5
Vehicles Entered	171	833	221	85	752	36	147	183	63	185	281	320
Vehicles Exited	172	837	222	86	763	36	145	179	62	182	278	320
Hourly Exit Rate	172	837	222	86	763	36	145	179	62	182	278	320
Input Volume	175	846	211	85	760	41	146	194	61	185	284	323
% of Volume	98	99	105	101	100	88	99	92	102	98	98	99
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)												
Occupancy (veh)	2	5	0	2	11	0	3	3	0	3	4	0

824: Lyndale Ave & 98th St Performance by movement

Movement	All
Denied Delay (hr)	0.1
Denied Del/Veh (s)	0.1
Total Delay (hr)	25.1
Total Del/Veh (s)	27.3
Stop Delay (hr)	21.8
Stop Del/Veh (s)	23.6
Total Stops	1729
Stop/Veh	0.52
Travel Dist (mi)	341.3
Travel Time (hr)	35.8
Avg Speed (mph)	10
Fuel Used (gal)	14.9
Fuel Eff. (mpg)	22.9
HC Emissions (g)	105
CO Emissions (g)	3606
NOx Emissions (g)	333
Vehicles Entered	3277
Vehicles Exited	3282
Hourly Exit Rate	3282
Input Volume	3312
% of Volume	99
Denied Entry Before	0
Denied Entry After	0
Density (ft/veh)	297
Occupancy (veh)	36

2823: 98th St & 35W West Ramps Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	SBL	SBT	SBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.4
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	0.2	0.2	3.4	0.9	3.6	0.4
Total Delay (hr)	10.0	0.5	2.0	0.5	1.1	0.9	1.5	0.9	0.1	17.6
Total Del/Veh (s)	23.6	10.0	53.0	1.8	52.9	18.2	50.2	44.4	1.7	18.4
Stop Delay (hr)	5.8	0.2	1.8	0.1	1.1	0.9	1.4	0.8	0.0	12.1
Stop Del/Veh (s)	13.6	3.8	49.9	0.5	49.5	16.7	47.1	40.4	0.0	12.7
Total Stops	793	92	134	59	70	150	95	55	0	1448
Stop/Veh	0.52	0.48	1.01	0.07	0.90	0.80	0.86	0.76	0.00	0.42
Travel Dist (mi)	355.1	44.7	8.9	61.2	8.2	19.8	21.3	14.0	46.6	579.7
Travel Time (hr)	20.3	2.0	2.3	2.2	1.5	1.7	2.4	1.4	2.0	35.7
Avg Speed (mph)	18	23	4	27	6	11	9	10	27	16
Fuel Used (gal)	15.0	1.7	0.7	2.1	0.5	0.8	1.0	0.6	1.3	23.7
Fuel Eff. (mpg)	23.6	26.7	13.2	29.6	14.9	24.2	22.1	23.6	35.3	24.5
HC Emissions (g)	168	20	2	25	4	9	5	4	15	252
CO Emissions (g)	6031	762	86	869	147	304	172	110	375	8854
NOx Emissions (g)	601	71	8	85	12	27	15	10	41	871
Vehicles Entered	1486	189	133	898	77	186	109	71	251	3400
Vehicles Exited	1504	187	128	898	74	184	107	70	251	3403
Hourly Exit Rate	1504	187	128	898	74	184	107	70	251	3403
Input Volume	1534	187	132	896	80	185	111	72	236	3433
% of Volume	98	100	97	100	92	99	96	97	106	99
Denied Entry Before	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0
Density (ft/veh)										295
Occupancy (veh)	20	2	2	2	1	2	2	1	2	35

4824: 35W East Ramps & 98th St Performance by movement

Movement	EBL	EBT	WBT	WBR	NBL	NBT	NBR	All
Denied Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.3
Denied Del/Veh (s)	0.0	0.0	0.0	0.0	1.1	3.6	3.5	0.3
Total Delay (hr)	2.5	0.8	4.8	0.7	3.5	0.3	0.6	13.3
Total Del/Veh (s)	31.2	2.5	15.4	15.6	54.3	59.5	11.6	15.0
Stop Delay (hr)	2.1	0.2	3.9	0.6	3.2	0.3	0.4	10.8
Stop Del/Veh (s)	26.3	0.6	12.5	13.2	50.4	54.2	8.4	12.2
Total Stops	232	61	375	61	207	18	56	1010
Stop/Veh	0.79	0.05	0.33	0.37	0.90	0.95	0.31	0.32
Travel Dist (mi)	22.3	84.6	55.9	8.2	40.5	3.4	29.5	244.3
Travel Time (hr)	3.3	3.3	6.5	1.1	5.0	0.4	1.8	21.4
Avg Speed (mph)	7	26	9	8	8	8	18	12
Fuel Used (gal)	1.1	3.1	3.3	0.4	2.0	0.2	1.0	11.0
Fuel Eff. (mpg)	21.1	27.1	17.1	19.2	20.4	20.1	29.8	22.2
HC Emissions (g)	4	37	28	2	13	1	6	92
CO Emissions (g)	140	1185	1073	80	395	30	249	3153
NOx Emissions (g)	14	136	100	10	37	3	20	319
Vehicles Entered	294	1155	1121	163	229	19	181	3162
Vehicles Exited	289	1154	1123	164	221	19	181	3151
Hourly Exit Rate	289	1154	1123	164	221	19	181	3151
Input Volume	320	1164	1130	158	219	20	184	3195
% of Volume	90	99	99	104	101	95	98	99
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0
Density (ft/veh)								187
Occupancy (veh)	3	3	7	1	5	0	2	21

Total Zone Performance

Denied Delay (hr)	0.9
Denied Del/Veh (s)	1.0
Total Delay (hr)	61.6
Total Del/Veh (s)	1789.0
Stop Delay (hr)	47.7
Stop Del/Veh (s)	1385.6
Total Stops	4787
Stop/Veh	38.60
Travel Dist (mi)	1477.8
Travel Time (hr)	108.8
Avg Speed (mph)	14
Fuel Used (gal)	63.7
Fuel Eff. (mpg)	23.2
HC Emissions (g)	615
CO Emissions (g)	22388
NOx Emissions (g)	2124
Vehicles Entered	3057
Vehicles Exited	18
Hourly Exit Rate	18
Input Volume	15083
% of Volume	0
Denied Entry Before	0
Denied Entry After	0
Density (ft/veh)	291
Occupancy (veh)	108

Intersection: 100: 98th St & South Access

Movement	EB	EB	EB	EB	WB	WB	WB	SB
Directions Served	L	T	T	T	T	T	TR	R
Maximum Queue (ft)	128	136	6	24	4	72	82	135
Average Queue (ft)	58	16	0	1	0	6	5	56
95th Queue (ft)	110	82	4	18	3	57	36	113
Link Distance (ft)		202	202	202	266	266	266	212
Upstream Blk Time (%)		0				0		1
Queuing Penalty (veh)		0				0		0
Storage Bay Dist (ft)	100							
Storage Blk Time (%)	2	1						
Queuing Penalty (veh)	9	1						

Intersection: 105: Lyndale Ave & Southeast Access

Movement	EB	SB	SB
Directions Served	R	T	T
Maximum Queue (ft)	100	47	55
Average Queue (ft)	37	3	3
95th Queue (ft)	69	22	25
Link Distance (ft)	231		159
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		1	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Intersection: 110: Lyndale Ave & Northeast Access

Movement	EB	EB	NB	SB
Directions Served	L	R	L	TR
Maximum Queue (ft)	96	50	54	13
Average Queue (ft)	44	15	19	1
95th Queue (ft)	81	47	48	6
Link Distance (ft)	259			618
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		25	95	
Storage Blk Time (%)	26	2		
Queuing Penalty (veh)	4	1		

Intersection: 824: Lyndale Ave & 98th St

Movement	EB	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	L	T	T	R	L	L	T	T	L	T	T
Maximum Queue (ft)	153	120	248	266	160	107	215	341	362	159	233	194
Average Queue (ft)	70	60	124	136	13	16	62	164	207	106	115	77
95th Queue (ft)	122	108	222	238	109	61	137	277	328	166	196	157
Link Distance (ft)	266	266	266	266				1227	1227		499	499
Upstream Blk Time (%)			0	0	0							
Queuing Penalty (veh)			1	1	0							
Storage Bay Dist (ft)					230	150	150			100		
Storage Blk Time (%)				1			0	10		18	16	
Queuing Penalty (veh)				2			0	8		17	24	

Intersection: 824: Lyndale Ave & 98th St

Movement	NB	SB	SB	SB
Directions Served	R	L	T	T
Maximum Queue (ft)	74	202	193	152
Average Queue (ft)	30	133	130	109
95th Queue (ft)	59	204	191	161
Link Distance (ft)		142	142	142
Upstream Blk Time (%)		13	7	2
Queuing Penalty (veh)		26	14	4
Storage Bay Dist (ft)	550			
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2823: 98th St & 35W West Ramps

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	T	T	T	R	L	T	T	T	L	R	L	T
Maximum Queue (ft)	825	857	837	251	172	218	134	65	168	174	203	142
Average Queue (ft)	235	265	170	49	107	40	17	8	59	68	87	54
95th Queue (ft)	501	519	486	137	168	152	76	37	123	131	162	118
Link Distance (ft)	1113	1113	1113			222	222	222	552	552		1034
Upstream Blk Time (%)	0	0	0		0	0	0					
Queuing Penalty (veh)	0	0	0		0	1	0					
Storage Bay Dist (ft)				250	175						270	
Storage Blk Time (%)			1		2	1						
Queuing Penalty (veh)			3		5	1						

Intersection: 4824: 35W East Ramps & 98th St

Movement	EB	EB	EB	WB	WB	WB	NB	NB
Directions Served	L	T	T	T	T	TR	L	LTR
Maximum Queue (ft)	341	61	154	225	226	268	215	304
Average Queue (ft)	190	12	41	97	109	160	113	138
95th Queue (ft)	308	41	111	181	205	254	187	260
Link Distance (ft)	315	315	315	202	202	202	932	
Upstream Blk Time (%)	1			0	1	5		
Queuing Penalty (veh)	5			2	2	20		
Storage Bay Dist (ft)								400
Storage Blk Time (%)								
Queuing Penalty (veh)								

Zone Summary

Zone wide Queuing Penalty: 152