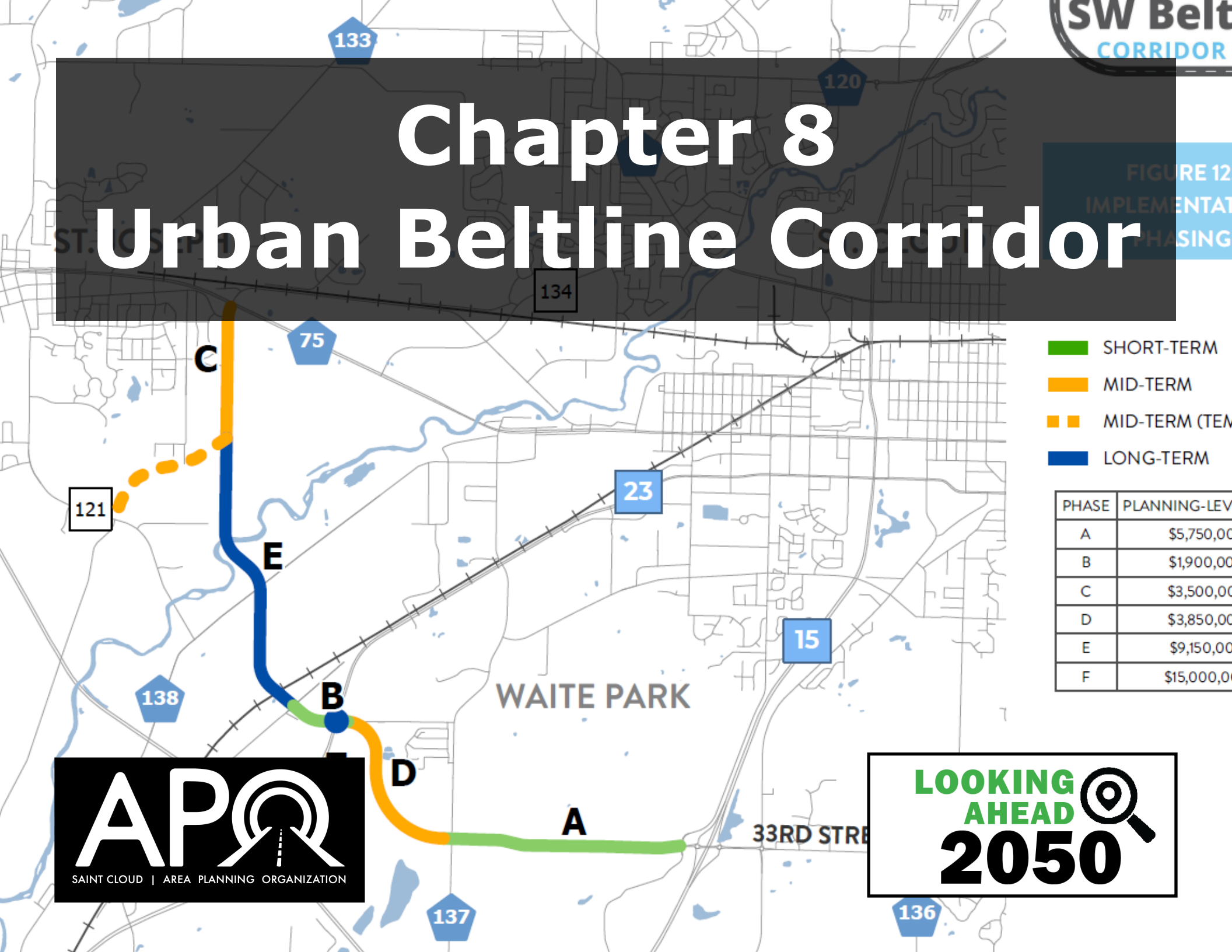
Chapter 8
Urban Beltline Corridor



Chapter 8: Urban Beltline Corridor Contents

The Saint Cloud Urban Beltline Corridor

Background

For the past several decades, Saint Cloud APO member jurisdictions have discussed the possibility of constructing an urban arterial beltline around the core metro. This proposed four-lane, at-grade, divided minor arterial roadway would be designed to divert through traffic off the principal arterial corridors (MN 15, MN 23, CSAH 75) as well as connect two vital freight corridors – I-94 and US 10 – which are currently separated by the Mississippi River.

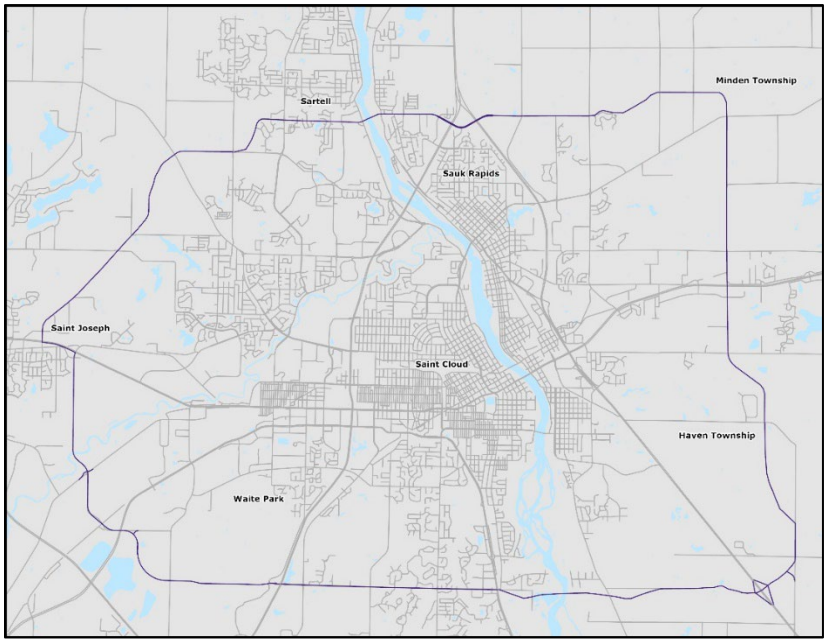


Figure 8.1: *Map of the proposed alignment of the urban minor arterial beltline.*
Map courtesy of Saint Cloud APO.

Figure 8.2: *A photo of University Drive in Saint Cloud. This roadway is an example of a four-lane, at-grade divided minor arterial.*
Photo courtesy of Saint Cloud APO.

Previous MTPs dating back to the APO's 2010 Transportation Plan (adopted in 1991) have identified the need to complete at least some portion of this concept as a means to address future transportation demands (i.e., congestion) on the existing roadway network.

During the early 2000s, the APO coordinated/participated in several studies related to the development of the corridor. Those studies included:

- A 2001 Southwest Arterial Alignment Study (https://tinyurl.com/yakc76kf) to connect 33rd Street S in Saint Cloud to CSAH 75 in Saint Joseph.

- A 2005 Environmental Impact Statement Scoping Decision (https://tinyurl.com/2etk5su5) regarding a bridge crossing the Mississippi River along the 33rd Street S corridor.
- A 2008 Scoping Document/Draft Scoping Decision Document (https://tinyurl.com/2aw8uws3) connecting CSAH 4/CSAH 133 to MN 15 – a continuation of the 2001 Southwest Arterial Alignment Study.

Due to the economic recession in the mid-2000s, thoughts of constructing this corridor were put on hold.

However, since the completion of the APO's 2045 MTP in 2019, there has been a renewed interest in completing the beltline corridor. As part of the 2045 MTP Travel Demand Model (TDM) effort, APO staffers instructed the modeling consultants to run a scenario (based upon a conceptual alignment from previous studies) of the beltline alongside the completion of capacity expansion projects identified to understand the impacts a completed beltline would have on the roadway operations.

Within recent years the APO has coordinated/participated in the completion of several studies related to this effort. Those studies include:

- A 2021 Southwest Beltline Corridor Study (https://tinyurl.com/437247s3) to identify a preferred alignment of the beltline corridor between the interchange of MN 15 and 33rd Street S in Waite Park to CSAH 75 in Saint Joseph.
- A 2022 Alignment Study of CSAH 133 (https://tinyurl.com/yu66msf5) to identify a preferred alignment of CSAH 133 between Pinecone Road and 19th Avenue in LeSauk Township/Sartell.
- A 2023 Mississippi River Bridge Planning Study (https://tinyurl.com/bdcfnm58) to determine a preferred alignment of a roadway corridor (including the construction of a new bridge) to connect 33rd Street S/CSAH 75 in Saint Cloud to US 10 in Haven Township.

In addition, the Saint Cloud APO has also received Congressionally Directed Spending funds to complete an environmental review document regarding the proposed Mississippi River Bridge. This effort will begin shortly after the adoption of this MTP.

Looking Ahead 2050 Beltline Model Scenario

As part of the 2050 MTP, APO staffers once again instructed modeling consultants to develop a scenario to include the full beltline corridor (including portions that have not been completed/fiscally constrained in this plan) in addition to the fiscally constrained capacity expansion projects identified in the APO's 2050 Build model. The current alignment of the beltline scenario modeled in the 2050 MTP incorporates the new proposed alignments for several corridors including the Southwest connection and the 33rd Street S Mississippi River Bridge.

Anticipated Cost of Construction

While several existing corridors within the APO have already been identified as "part of the beltline," a substantial portion of this minor arterial corridor remains unbuilt. Using the preferred corridor cross-section for this roadway, consulting firm KLJ was able to develop cost estimates (in 2023 dollars) for the unbuilt sections of the beltline. Note that these estimates are only for construction and do not factor in crucial components such as right-of-way and environmental documentation.

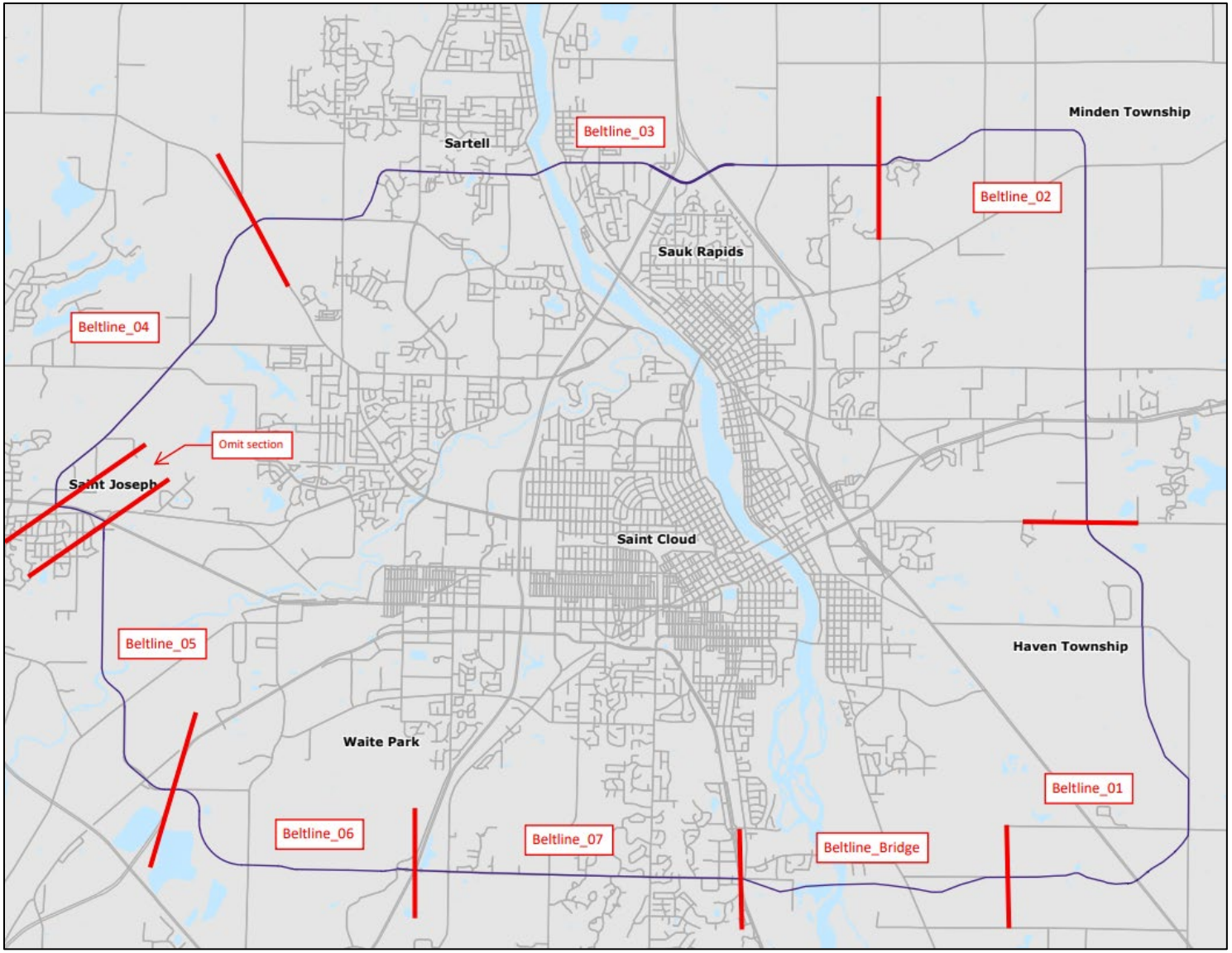


Figure 8.3: *A map sectioning out various components of the urban arterial beltline to do construction cost estimates. Data courtesy of Saint Cloud APO and KLJ.*

Beltline Project Section	Termini	Length (in miles)	Construction Cost Estimate (in 2023 dollars)
Beltline_Bridge	Roosevelt Road/Stearns CSAH 75 to 37th Street SE	2.57	$42,650,000
Beltline_01	37th Street SE to Second Street SE	5.84	$42,310,000
Beltline_02	Second Street SE to Mayhew Lake Road	5.88	$42,140,000
Beltline_03	Stearns CSAH 4 to Mayhew Lake Road	5.43	$49,890,000
Beltline_04	Stearns CSAH 75 to Stearns CSAH 4	3.54	$23,180,000
Beltline_05	Stearns CSAH 75 to MN 23	3.01	$21,700,000
Beltline_06	MN 23 to MN 15	2.81	$19,970,000
Beltline_07	MN 15 to Roosevelt Road/Stearns CSAH 75	2.56	$18,090,000
Total		**31.62**	**$259,920,000**

Figure 8.4: *Anticipated costs (in 2023 dollars) for uncompleted sections of the APO's proposed urban arterial beltline. Data courtesy of KLJ.*

In total, the estimated construction cost to build out the beltline corridor (in 2023 dollars) will require an investment of $259,920,000. As the years progress, the construction cost is expected to increase due to inflation.

Anticipated Impacts of the Beltline

If APO jurisdictions were to complete all components of the beltline ***IN ADDITION TO*** the proposed capacity expansion projects identified in the 2050 Build model scenario, the region would experience varying levels of improvement in system operation.

Despite the substantial investment needed to complete the 2050 Build + Beltline scenario, the percentage of lane miles under (LOS A-C) or approaching (LOS D-E) capacity remains relatively similar in comparison to the 2050 Build model results. That said, the number of lane miles over capacity within the MPA would be considerably reduced with a fully constructed beltline in place. As illustrated in Figure 8.5, the 2050 Build + Beltline scenario is forecasted to have approximately 11 lane miles with a LOS F as compared to 44.4 lane miles with a LOS F rating with just the 2050 Build Model forecast.

Like the 2050 Build Model, the 2050 Build + Beltline model is also a slight improvement over the 2050 No-Build Model results. As reflected in Figure 8.5, the addition of the 142.3 lane miles will result in a 3.2 percentage point increase in LOS A-C lane miles compared to the No-Build alternative, as well as fewer lane miles approaching capacity (a decrease of 1.4 percentage points) or over capacity (1.8 percentage points).

However, even with the improvements the 2050 Build + Beltline scenario will make to the network, the forecasted population and development growth anticipated by 2050 will result in this scenario operating at a lesser efficiency than the current 2020 base year model.

Network	Lane Miles Under Capacity (LOS A-C)	% Under-Capacity Lane Miles	Lane Miles Approaching Capacity (LOS D & E)	% Approaching Capacity Lane Miles	Lane Miles Over Capacity (LOS F)	% Over Capacity Lane Miles	Total Lane Miles	Lane Miles Added from Base Year
Base Year (2020)	1,518.5	96.1%	59.3%	3.8%	3.1	0.2%	1,581.0	0
2050 No-Build Model	1,372.0	86.6%	174.2%	11.0%	38.7	2.4%	1,584.9	+3.9
2050 Build Model	1,442.4	88.0%	152.5	9.3%	44.4	2.7%	1,639.2	+58.2
2050 Build + Beltline Model	1,551.2	89.8%	165.1	9.6%	11.0	0.6%	1,727.2	+146.2

Figure 8.5: *Lane mile capacity comparison between the base year (2020) model, the 2050 No-Build model, the 2050 Build model, and the 2050 Build + Beltline model.*
Data courtesy of KLJ.

LOS Ranking	2050 Build + Beltline Model Lane Miles	Percent of Lane Miles by LOS Ranking*
A	983.3	56.9%
B	308.6	17.9%
C	259.3	15.0%
D	154.3	8.9%
E	10.8	0.6%
F	11.0	0.6%
Total	1,727.2	100%

**Due to rounding, the percentage totals do not add up to 100%.*
Figure 8.6: *The number and percentage of lane miles by LOS ranking.*
Data courtesy of KLJ.

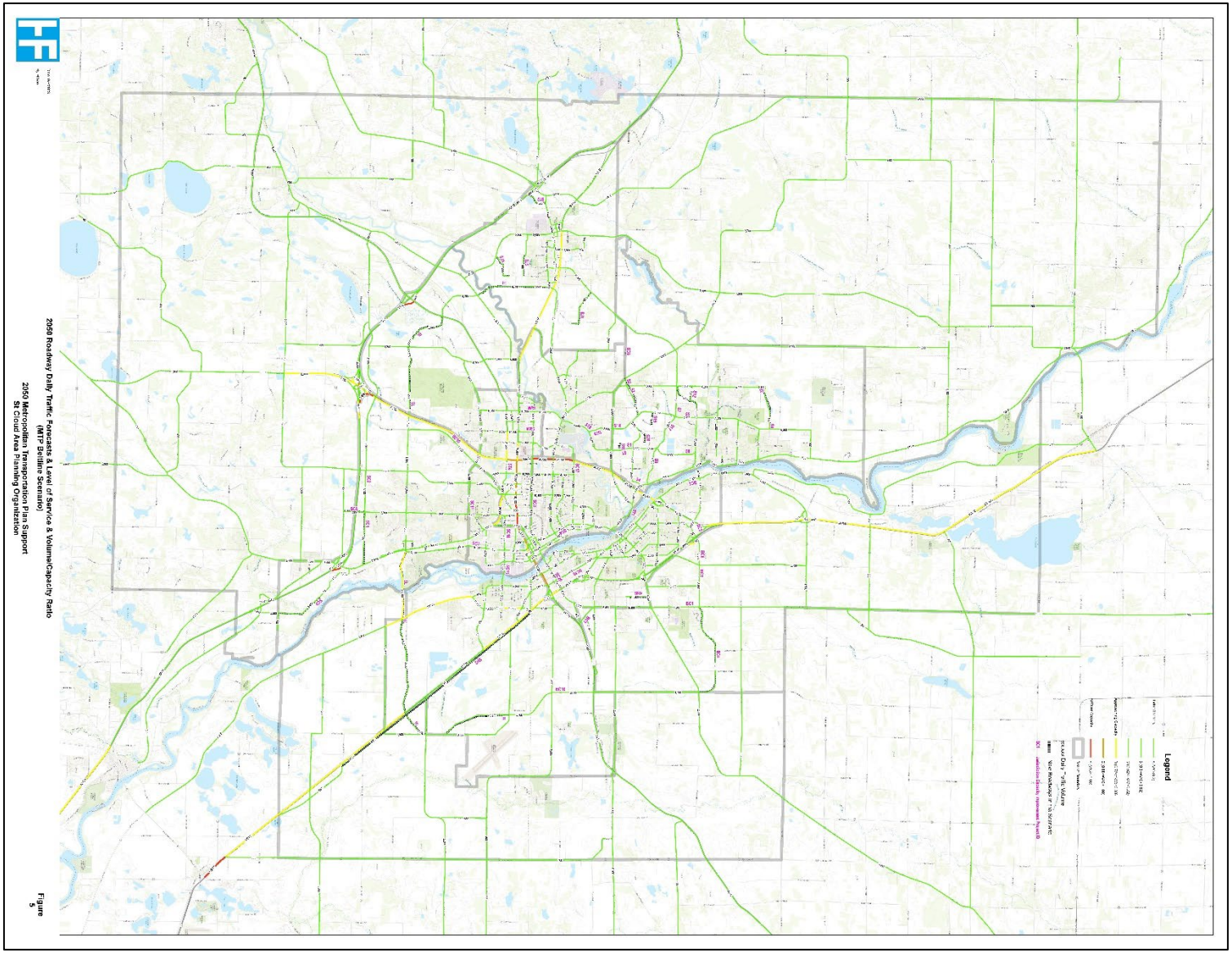


Figure 8.7: *2050 Build + Beltline Model results LOS map of the MPA.*
Data courtesy of KLJ.

Like the previous iterations of the model, the lane miles that have the lower LOS ranking are primarily concentrated on MN 15 and MN 23 throughout the core of the urban area. However, unlike the 2050 No-Build and 2050 Build model runs, the 2050 Build + Beltline scenario does not have additional roadway corridors with a LOS E or LOS F ranking. The only other model scenario that has accomplished this is the 2020 base year model run.

Roadway	Termini	LOS	Agency/Jurisdiction
MN 15	Third Street N to 12th Street N	F	MnDOT
MN 23	25th Avenue to Washington Memorial Drive	F	MnDOT
MN 15	Third Street N to MN 23 (Second Street S)	E	MnDOT
MN 23	MN 15 to 25th Avenue	E	MnDOT
MN 23	Washington Memorial Drive to 12th Avenue S	E	MnDOT
MN 23	Fifth Avenue S to Lincoln Avenue SE	E	MnDOT

Figure 8.8: *Roadway segments within the MPA with a LOS F or LOS E based on the 2050 Build + Beltline model results. Data courtesy of KLJ.*

Another Bridge Crossing the Mississippi?

While the completion of the entire urban beltline (in addition to the 2050 MTP projects) will be able to improve traffic flow across the metro, not all components of the beltline are created equal.

Case in point, the proposed bridge and subsequent roadway connecting Roosevelt Road/CSAH 75 at 33rd Street S in Saint Cloud to US 10 in Haven Township crossing the Mississippi River.

As stated earlier, this particular portion of the beltline has been extensively studied both in the early 2000s as well as within the years between the completion of the 2045 MTP and the 2050 MTP.

But would another bridge across the Mississippi River make that much of an impact on through traffic in the core metro area?

The model results indicate a strong likelihood that this would be the case.

While it is true the Level of Service (LOS) along portions of MN 23 would still be approaching or over capacity regardless of whether this portion of the beltline was constructed, rerouting of vehicles from MN 23 to the proposed bridge crossing would reduce the number of vehicles using MN 23 between US 10 and MN 15 by roughly 10,000 vehicles per day.

However, traffic no longer using the MN 23 corridor through the metro will ultimately be using other corridors to access the additional east/west connection proposed by constructing the bridge. This includes Sherburne County's CSAH 8, which if the

bridge is constructed, will experience a 153.8% increase in average annual daily traffic (AADT), resulting in a LOS change from an under-capacity rating to approaching capacity (LOS D).

Roadway	Termini	2050 Build AADT	2050 Build LOS	2050 Build + Beltline AADT	2050 Build + Beltline LOS	AADT Difference
MN 23	MN 15 to 25th Avenue	35,900	F	35,300	E	**-600**
MN 23	25th Avenue to Washington Memorial Drive	45,400	F	40,700	F	**-300**
MN 23	Washington Memorial Drive to 12th Avenue S	37,000	F	34,100	E	**-2,900**
MN 23	Fifth Avenue S to Lincoln Avenue SE	37,800	F	31,800	E	**-6,000**
University Drive	Bridge 73540 (University Bridge)	16,600	E	5,900	LOS A-C (Under capacity)	**-10,700**
CSAH 8 SE	15th Avenue SE junction to proposed bridge crossing	5,200	LOS A-C (Under capacity)	13,200	D	+8,000
Beltline Bridge	CSAH 8 SE junction to Roosevelt Road/CSAH 75	N/A	N/A	31,100	D	+31,100

Figure 8.9: *Comparison of Average Annual Daily Traffic (AADT) and LOS for specific roadway corridors between the 2050 Build and 2050 Build + Beltline model scenarios.*
Data courtesy of KLJ.

Additional travel pattern changes due to the proposed bridge connection include an improvement in LOS along US 10 north and south of the alignment. This LOS improvement indicates motorists traveling on US 10 will also see the need to use the new crossing to access destinations to the west of the Mississippi River, including I-94, thereby bypassing the core metro.

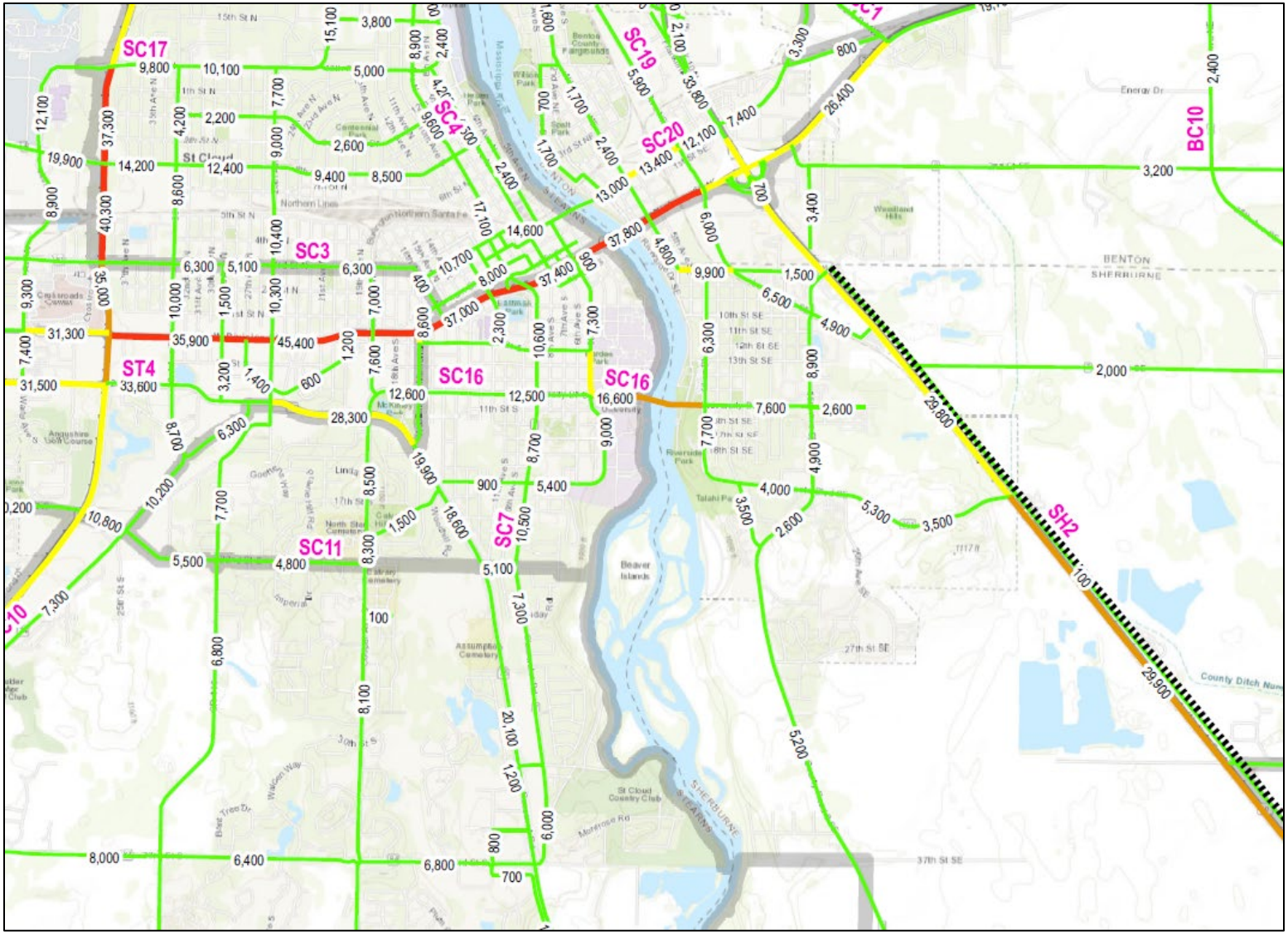


Figure 8.10: *A close-up LOS map from the 2050 Build model scenario.*
Data courtesy of KLJ.

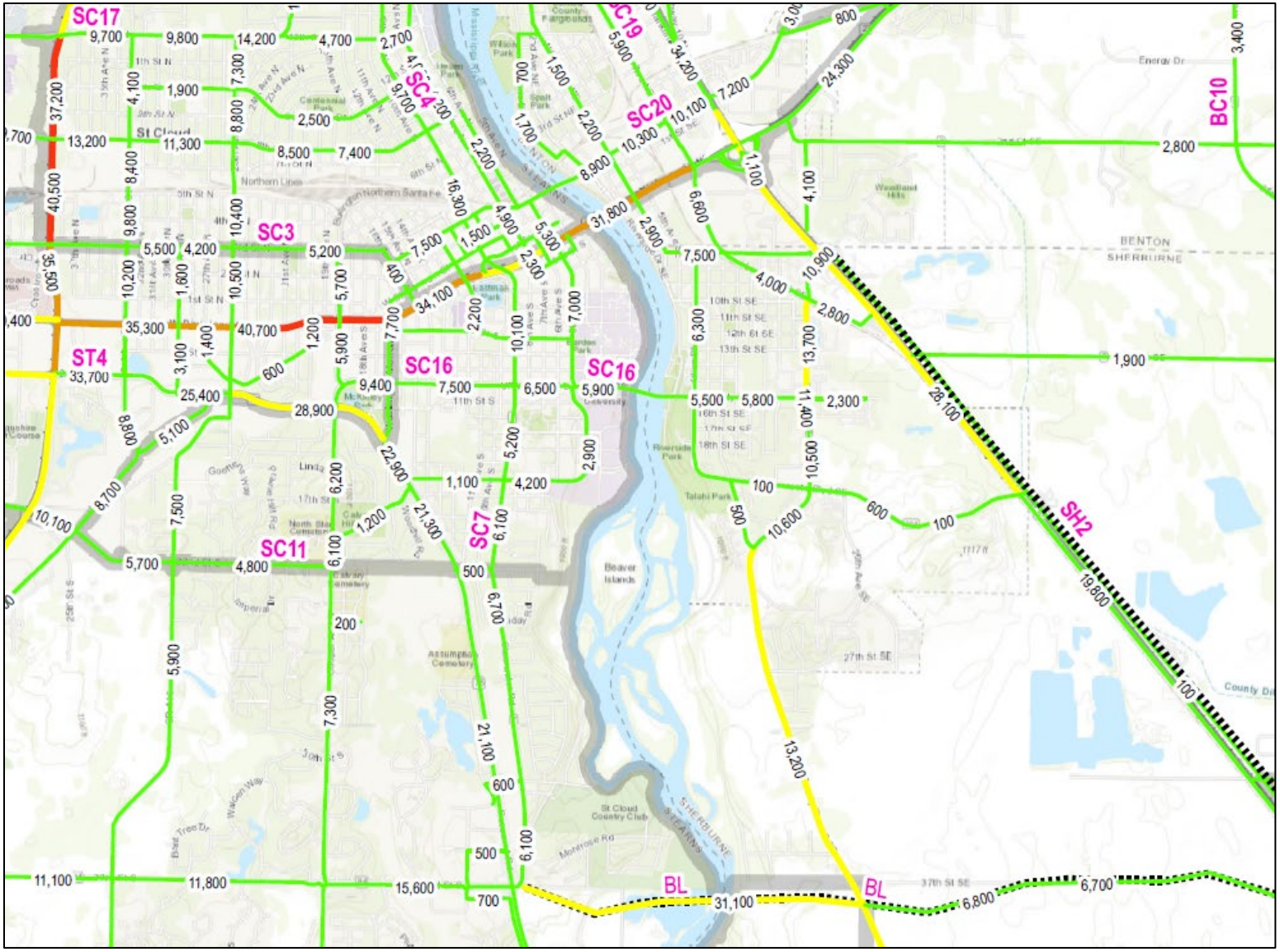


Figure 8.11: *A close-up LOS map from the 2050 Build + Beltline model scenario.*
Data courtesy of KLJ.

In-Depth Model Comparisons

As in previous model comparisons, consulting firm KLJ was able to further analyze the 2050 Build + Beltline model scenario using Vehicle Miles Traveled (VMT), Vehicle Hours Traveled (VHT), and Travel Delay.

In addition to reviewing these metrics, KLJ also calculated anticipated Greenhouse Gas (GHG) emission savings for the 2050 Build + Beltline Model. Like the 2050 Build model, this comparison was made against the 2020 base-year model.

Vehicle Miles Traveled

Despite the additional 88 lane miles added to the network with the completion of the beltline, overall VMT between the 2050 Build and 2050 Build + Beltline scenario experienced a minimal increase (0.8%). Like previous model scenarios, the other principal arterial network (MN 15, MN 23, and CSAH 75) continues to carry the majority of traffic within the APO's planning area (43.7%). This is a 14.4% increase in VMT on the other principal arterial network with the beltline completed as compared to the 2050 Build scenario.

As stated earlier, the completed beltline corridor will function as a minor arterial roadway. However, in comparing the 2050 Build and 2050 Build + Beltline scenarios, VMT on the minor arterial roadways will see a reduction of 17.4% if the beltline is completed.

Figure 8.12: *A photo of MN 15 in Saint Cloud near the intersection with Veterans Drive/Eighth Street N/CSAH 4. Even with the beltline in place, principal arterials like MN 15 will still carry most of the traffic within the APO's planning area.*
Photo courtesy of Saint Cloud APO.

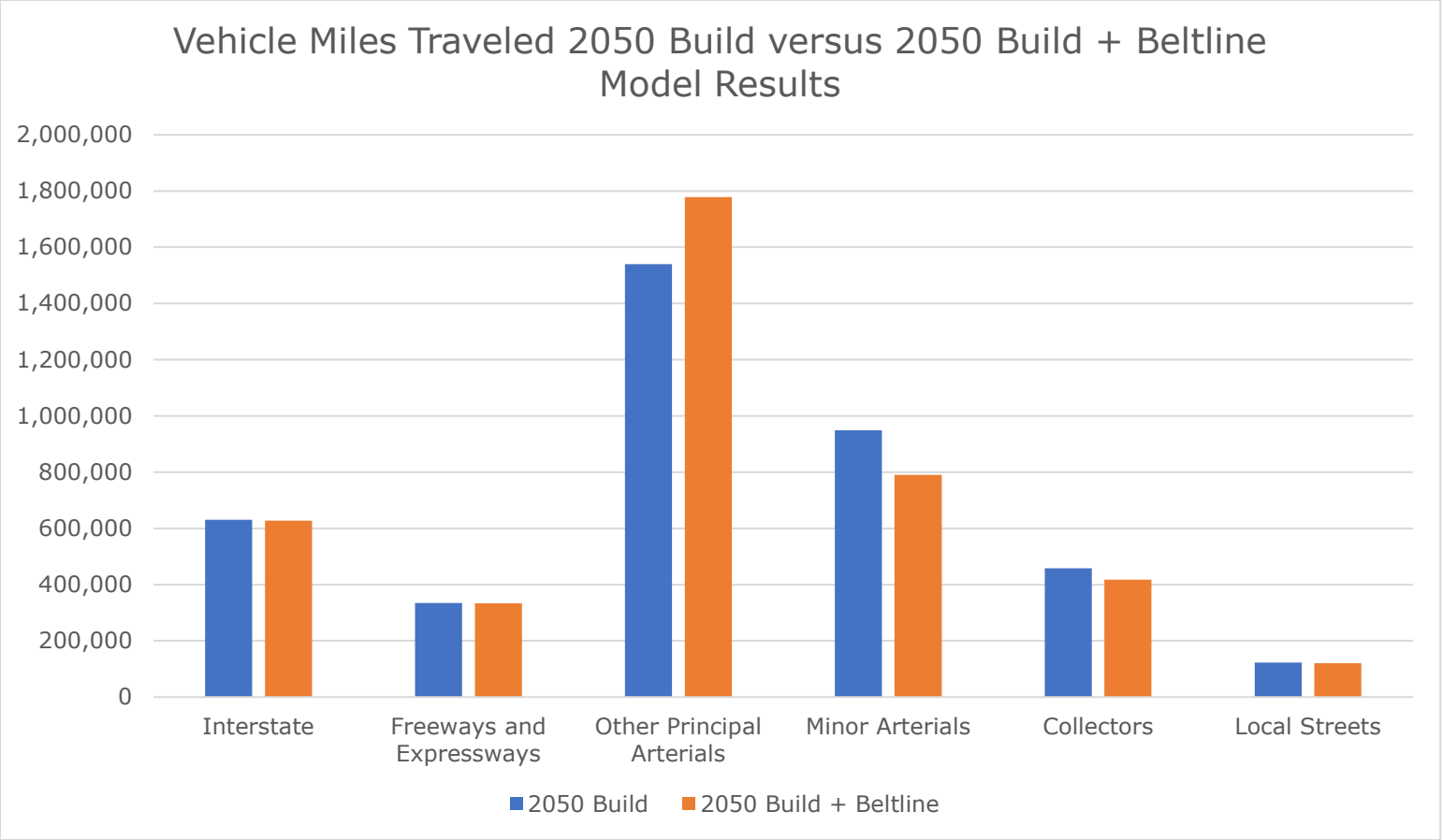


Figure 8.13: *Vehicle miles traveled comparisons between the 2050 Build and 2050 Build + Beltline model. Data courtesy of KLJ.*

Vehicle Hours Traveled

With the completion of both the 2050 MTP projects and the build-out of the beltline corridor, overall VHT within the Saint Cloud MPA will minimally decrease (0.2%) as compared to only constructing the 2050 MTP capacity expansion projects.

Similarly, much of the vehicle hours traveled with the 2050 Build + Beltline scenario will be done primarily on the other principal arterial network (44.7%) with minor arterials carrying the next highest percentage of VHT at 23.6%.

Just like VMT, the VHT on the minor arterial network will experience a decline under the 2050 Build + Beltline scenario compared to the 2050 Build scenario – a drop of 16.3%.

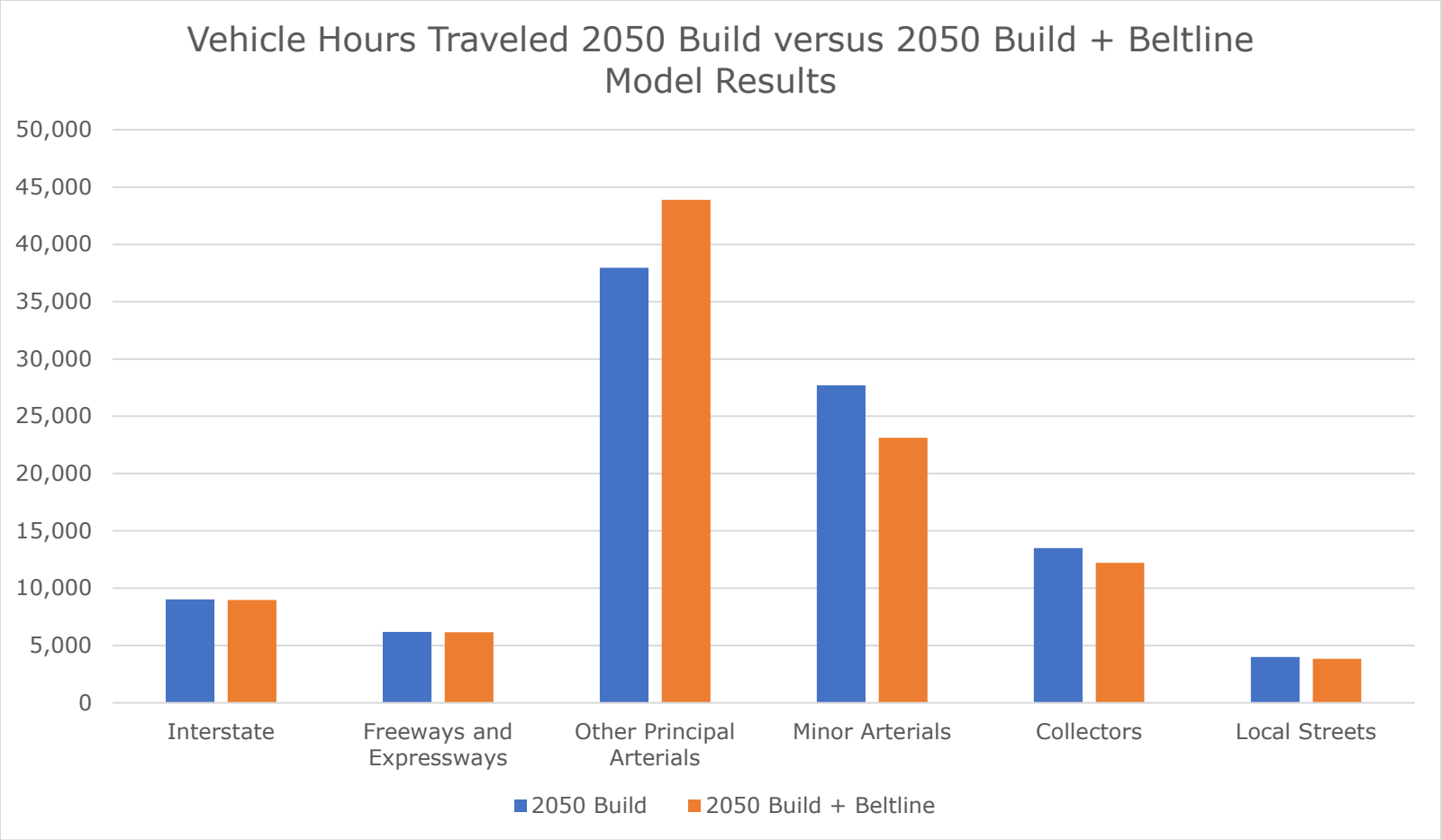


Figure 8.14: *Vehicle hours traveled comparisons between 2050 Build and 2050 Build + Beltline model. Data courtesy of KLJ.*

Travel Delay

While VMT and VHT comparisons between the 2050 Build and 2050 Build + Beltline models resulted in minimal change overall, travel delay, however, has proven to show the most significant difference.

In terms of the regional transportation network, completion of both the 2050 MTP capacity expansion projects and the urban beltline will improve overall travel delay by 13% as opposed to just completing the 2050 capacity expansion projects. Despite the additional VMT and VHT anticipated to occur on both the principal and minor arterial network, the beltline will improve the

overall time motorists will be sitting in traffic on those roadways by 9.1% and 29.3% respectively. In short, while motorists will be using these two types of roadways most often, traffic congestion on these corridors will see a sizeable improvement due to the 88 additional lane miles built because of the beltline.

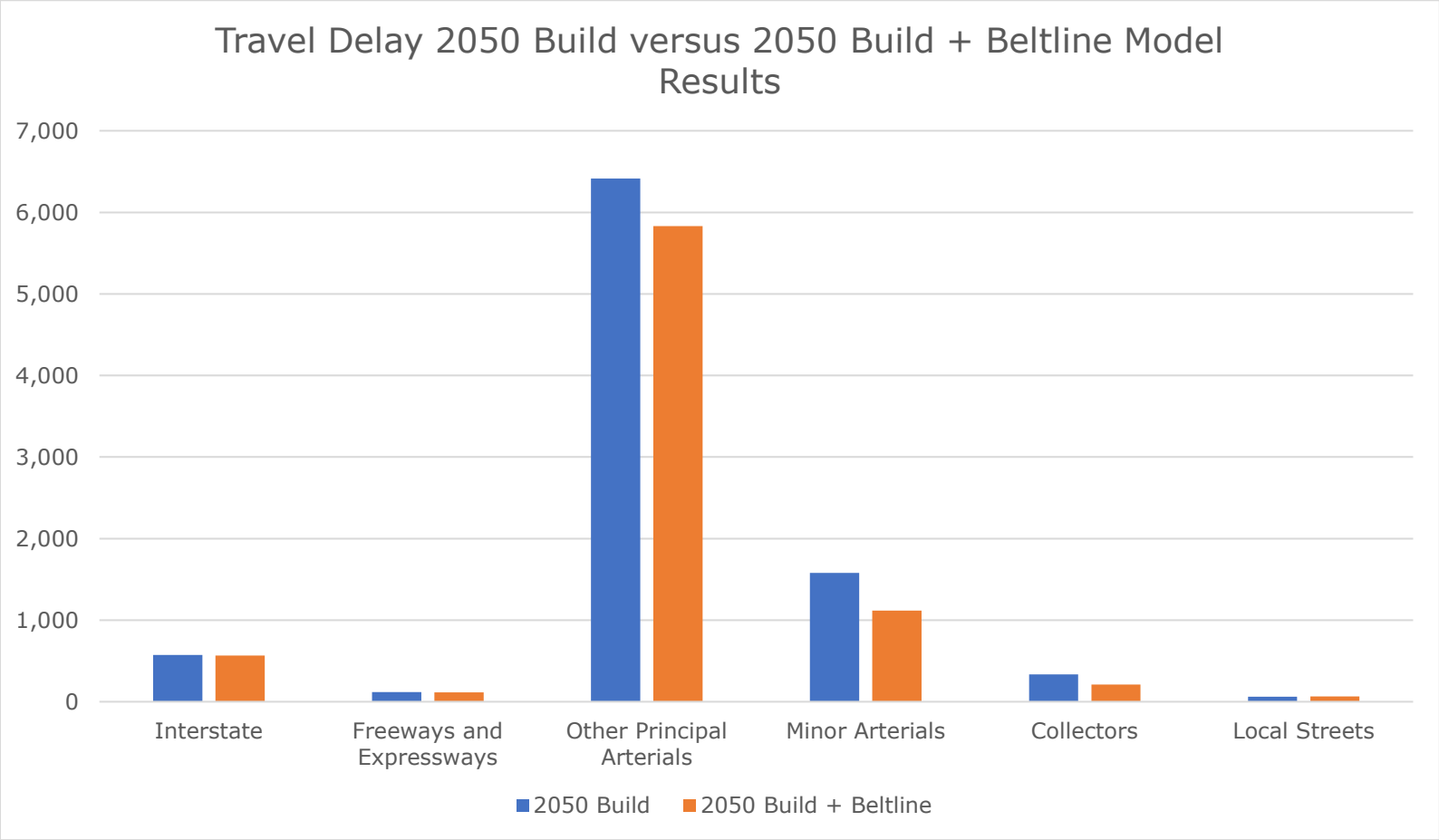


Figure 8.15: *Travel delay comparisons between the 2050 Build and 2050 Build + Beltline models. Data courtesy of KLJ.*

Greenhouse Gas Emissions

Like the 2050 Build model, KLJ also provided a comparison of GHG emissions savings for the 2050 Build + Beltline scenario. Once again, these comparisons strictly look at the year 2020 (our base year) and the year 2050 (the final year of our planning horizon).

The GHG emissions evaluation comparison of the 2020 base year model to the 2050 Build + Beltline model includes the following assumptions:

1. GHG emissions were calculated ***solely*** based on travel delays to understand the impacts the capacity expansion projects had in addressing vehicle idling. These calculations do not account for increases in VMT and VHT because of the 2050 Build scenario.
2. The vehicle fleet does not change between 2020 and 2050. The GHG emissions calculations for both base year 2020 and the 2050 Build + Beltline scenario assume 94% of vehicles traveling on roadways within the planning area are all purpose vehicles (i.e., large sedans, pickups, SUVs, and commercial vehicles) that require gasoline. The remaining 6% of vehicles would be considered tractor-trailers/semi-trucks that use diesel fuel. The GHG emissions calculations ***do not*** account for the likelihood of continued electric vehicle (EV) adoption among consumers within the APO's planning area.
3. The amount of gasoline consumed per hour of idling for all purpose vehicles (large sedans) is 0.39 gallons per hour. The amount of diesel fuel consumed per hour of idling for tractor-trailers/semi-trucks is 0.64 gallons per hour. This is based on data pulled from the Argonne National Laboratory, Idling Reduction Savings Calculator (2014) (https://tinyurl.com/4m48svf6).
4. The amount of nitrogen oxides (NO_x), particulate matter ($PM_{2.5}$), and carbon dioxide (CO_2) emitted from idling vehicles is broken down as follows:

Fuel Type	NO_x (in grams/hour)	$PM_{2.5}$ (in grams/hour)	CO_2 (in metric tons/gallon)
Gasoline	3.515	0	8.887E-03
Diesel	33.763	1.1	1.0180E-02

Figure 8.16: *The amount of nitrogen oxides (NO_x) – in grams/hour – particulate matter ($PM_{2.5}$) – in grams/hour – and carbon dioxide (CO_2) – in metric tons/gallon – emitted by idling vehicles by fuel type.*
Data courtesy of the U.S. Environmental Protection Agency (EPA).

This comparison also assumes all fiscally constrained capacity expansion projects as well as all portions of the beltline are completed.

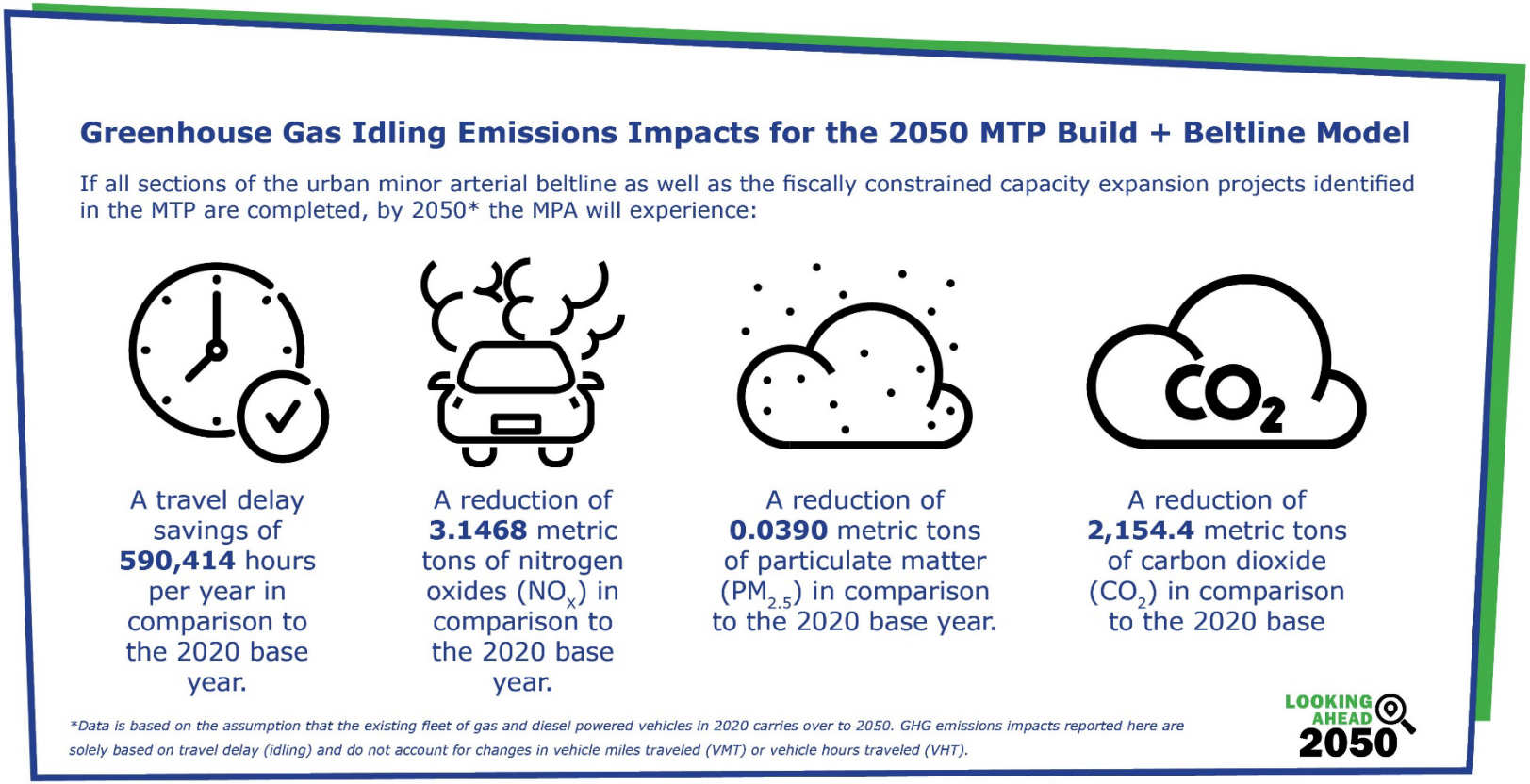


Figure 8.17: *An infographic of the greenhouse gas emission savings if all sections of the urban minor arterial beltline and all capacity expansion projects in the MTP are implemented by 2050.*
Data courtesy of KLJ.

Even though the 2050 Build + Beltline model adds 88 lane miles to the system, based upon the GHG emissions savings through the reduction of vehicle idling, the region could likely see a drop GHG in idling-related emissions from the build-out of the beltline.

Similar to the comparisons between the 2050 No-Build and the 2050 Build model results in Chapter 7, the largest contributing factor for the anticipated savings on GHG emissions can be directly correlated to the significant improvement in travel delay. As the in-depth model comparisons between the 2050 Build and 2050 Build + Beltline indicate, the motoring public stands to save 13% more hours per year regionwide by completing the beltline in addition to the capacity expansion projects identified in the

previous chapter. With traffic flow improvement – especially on heavily traveled corridors such as the metro area's principal arterial network which is currently (2024) at the lower end of the LOS scale – less time will be spent "stuck in traffic."

Network	Delay Savings (Hours/Year)	NO_x Savings (Metric Tons)	$PM_{2.5}$ Savings (Metric Tons)	CO_2 Savings (Metric Tons)
2050 Build Model	172,489	0.9193	0.0114	629.4
2050 Build + Beltline Model	590,414	3.1468	0.0390	2,154.4
Difference	**+417,925**	**+2.2275**	**+0.0276**	**+1,525**

Figure 8.18: *Comparison of GHG emission savings between the 2050 Build and 2050 Build + Beltline model. Data courtesy of KLJ.*

Figure 8.19: *The recommended alignment corridor for the proposed Mississippi River bridge crossing as determined by the efforts of the Mississippi River Bridge Planning Study conducted by Stantec Consulting Services, Inc.*