



TOWN BOARD SPECIAL AND JOINT PLANNING COMMISSION MEETING

April 3, 2023 - 5:30 PM

Town Board Chambers, 301 Walnut Street, Windsor, CO 80550

To view Town Board meeting broadcasts, visit

www.windsorgov.com/MeetingsOnDemand.

AGENDA

A. CALL TO ORDER

1. Roll Call
2. Review of Agenda by the Board and Addition of Items of New Business to the Agenda for Consideration

B. BOARD DISCUSSION

1. Comprehensive Plan Update - D. Eisenbraun, Senior Planner; Miriam McGilvray, Logan Simpson
2. Windsor Downtown Alternative Route Study - Final Report - E. Bracke, Transportation Planner
3. Future Meetings Agenda

C. EXECUTIVE SESSION

1. An Executive Session Pursuant to C.R.S. § 24-6-402 (e)(I) for the Purpose of Determining Positions Relative to Matters that may be Subject to Negotiations with Employees or Employee Organizations; Developing Strategy for and Receiving Reports on the Progress of Such Negotiations; and Instructing Negotiators - Selecting the New Town Attorney

D. ADJOURN

The Town of Windsor will make reasonable accommodations for access to Town services, programs, and activities and will make special communication arrangements for persons with disabilities. Please call (970) 674-2400 by noon on the Thursday prior to the meeting to make arrangements.



MEMORANDUM

Date: April 3, 2023
To: Mayor and Town Board
From: David Eisenbraun, Senior Planner
Re: Comprehensive Plan Update - D. Eisenbraun, Senior Planner; Miriam McGilvray, Logan Simpson

Item #: B.1.

Background / Discussion:

This presentation is to provide information on the current status of the Comprehensive Plan update. It will outline what has been accomplished to date, what to expect during the design week, happening April 4-7, and the next steps.

Financial Impact:

Relationship to Strategic Plan:

Recommendation:

CC:

Planning Commission

Attachments:

1. CompPlan_Project Update_April 2023

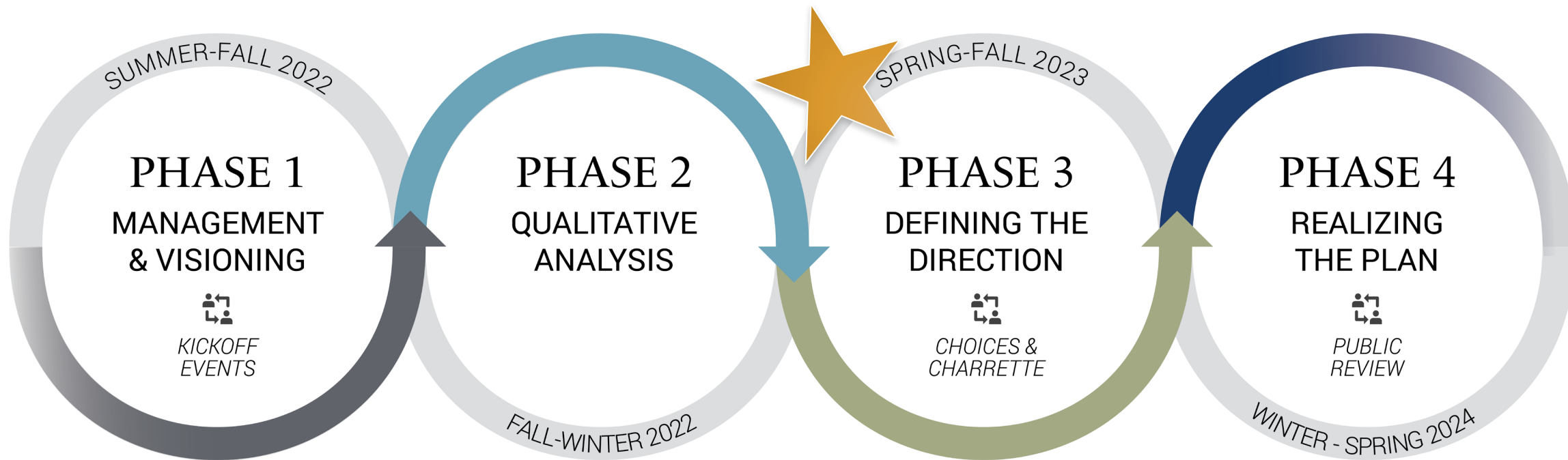


COMPREHENSIVE PLAN



PROJECT UPDATE

April 2023



Planning Process

TASKS:

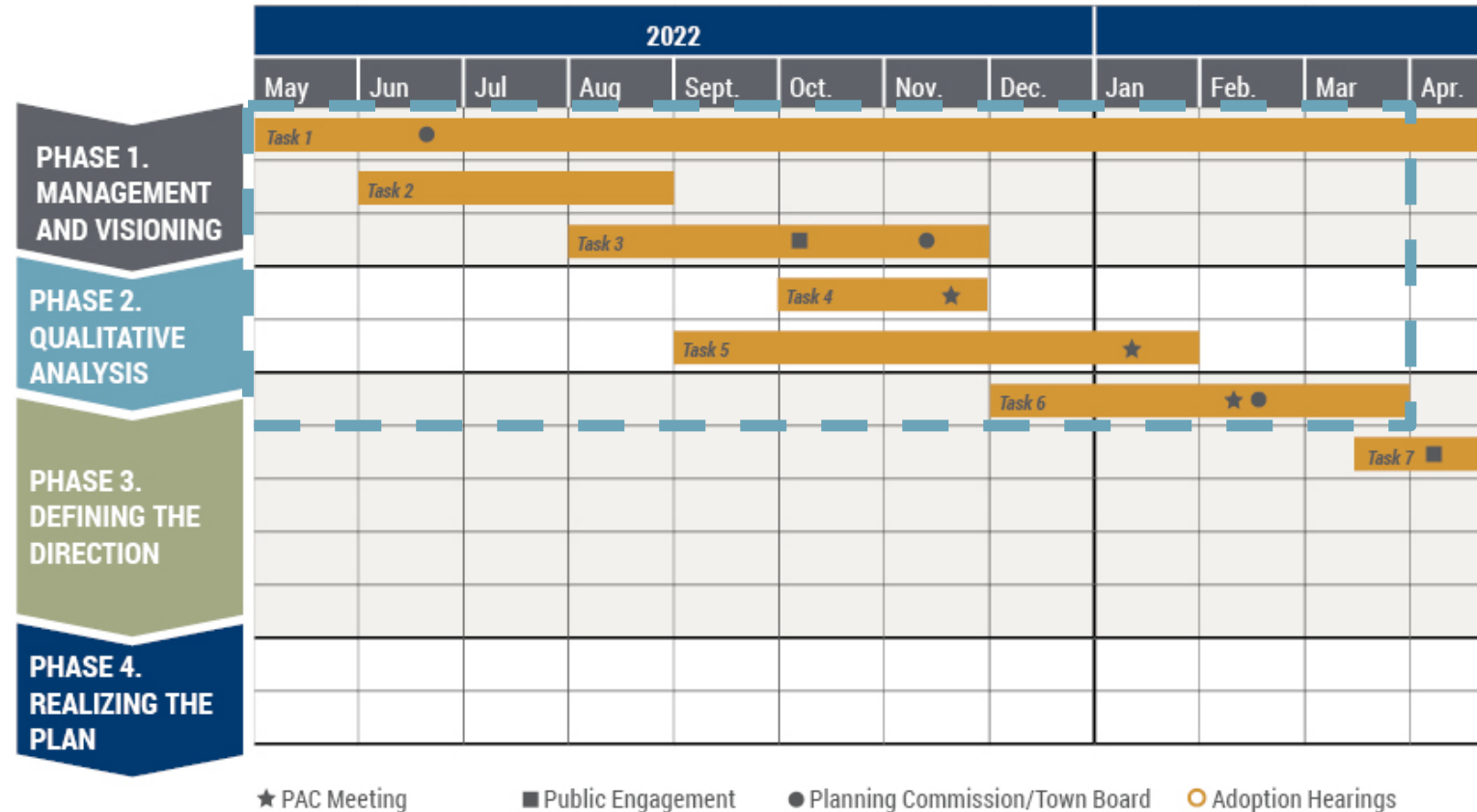
- OPPORTUNITIES & FISCAL IMPACT ANALYSIS
- POLICY FRAMEWORK DEVELOPMENT
- MANAGEMENT AND IMPLEMENTATION PLAN

PUBLIC ENGAGEMENT

- QUESTIONNAIRE #2
- CHOICES & PRIORITIES CHARRETTE

What We've Accomplished

- ✓ 1. Project Initiation
- ✓ 2. Public Engagement Plan
- ✓ 3. Project Kickoff
 - ✓ Stakeholder Interviews
 - ✓ Speaker Panel Event
 - ✓ Visioning Survey
 - ✓ Community Tour with Staff
- ✓ 4. Plan Audit
- ✓ 5. Existing Conditions
- ✓ 6. Opportunities Analysis



What We've Accomplished

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 - ✓ Stakeholder Interviews
 - ✓ **Speaker Panel Event**
 - ✓ Visioning Survey
 - ✓ Community Tour with Staff
- ✓ 4. Plan Audit
- ✓ 5. Existing Conditions
- ✓ 6. Opportunities Analysis



What We've Accomplished

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 - ✓ **Visioning Survey**
 - ✓ Community Tour with Staff
- ✓ 4. Plan Audit
- ✓ 5. Existing Conditions
- ✓ 6. Opportunities Analysis

What do you LOVE most about Windsor?

Note: Words appearing larger were found more frequently in responses.



What We've Accomplished

- ✓ 1. Project Initiation
- ✓ 2. Public Engagement Plan
- ✓ 3. Project Kickoff
 - ✓ Stakeholder Interviews
 - ✓ Speaker Panel Event
 - ✓ Visioning Survey
 - ✓ Community Tour with Staff
- ✓ **4. Plan Audit**
- ✓ 5. Existing Conditions
- ✓ 6. Opportunities Analysis

← → ↻ <https://survey.alchemer.com/s3/7064792/Town-of-Windsor-Comprehensive-Plan-Audit> A ☆ ☆



COMPREHENSIVE
PLAN 2022 WINDSOR
COLORADO

Town of Windsor Comprehensive Plan Audit

As users of the Windsor Comprehensive Plan and other Town/regional plans, your experience with them are invaluable to the Town's planning process. As you respond to this questionnaire, we ask you to consider how the statements may be strengthened, and if there is anything missing. Your input will be considered in other recent plan and studies.

Note: Starting on the second page, you may save your progress and come back to it at a later time. A "later" button located at the top of each page. For reference, [here is a link](#) to the full Comprehensive Plan.

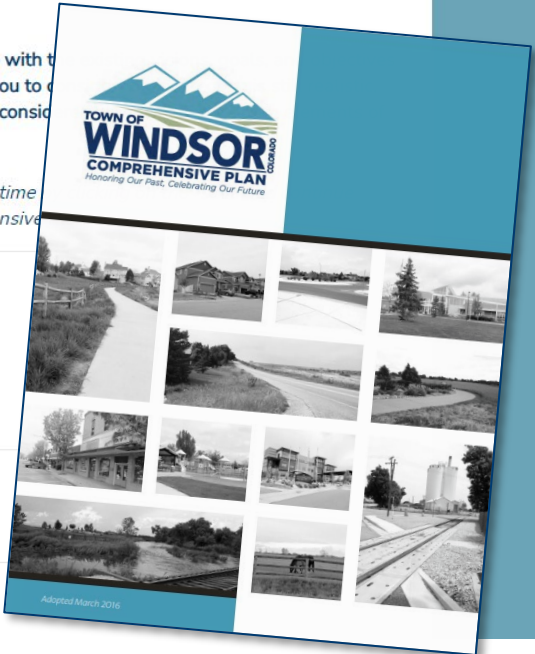
1. Before you begin, please provide your name. *

Name

2. What is your relationship with this planning effort?

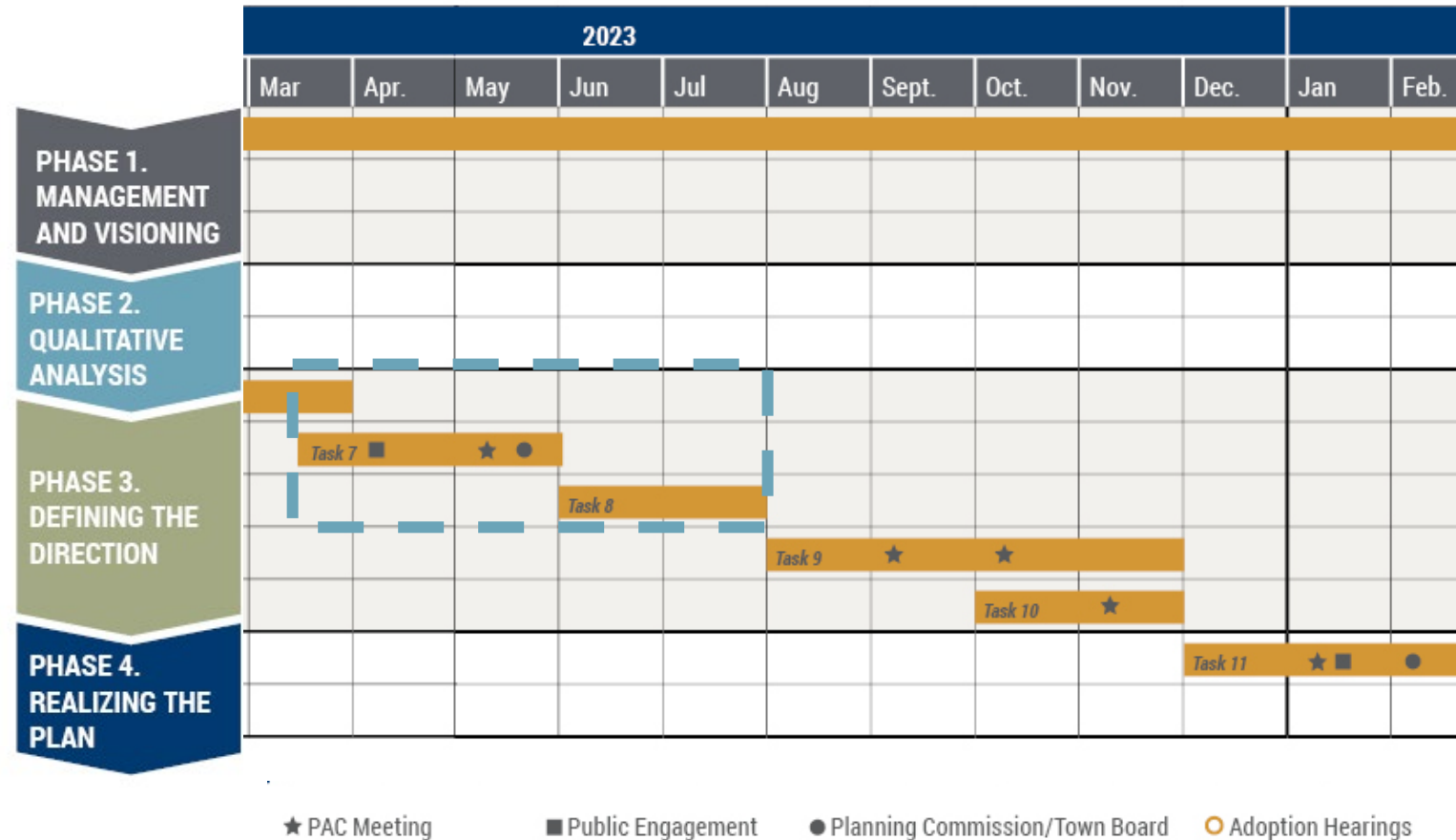
-- Please Select --

3. Which, if any, of the Plan's sections do you regularly refer to? Please select all that apply.



What's Coming Up Next

- 7. Community Choices and Priorities
- 8. Fiscal Impact Analysis

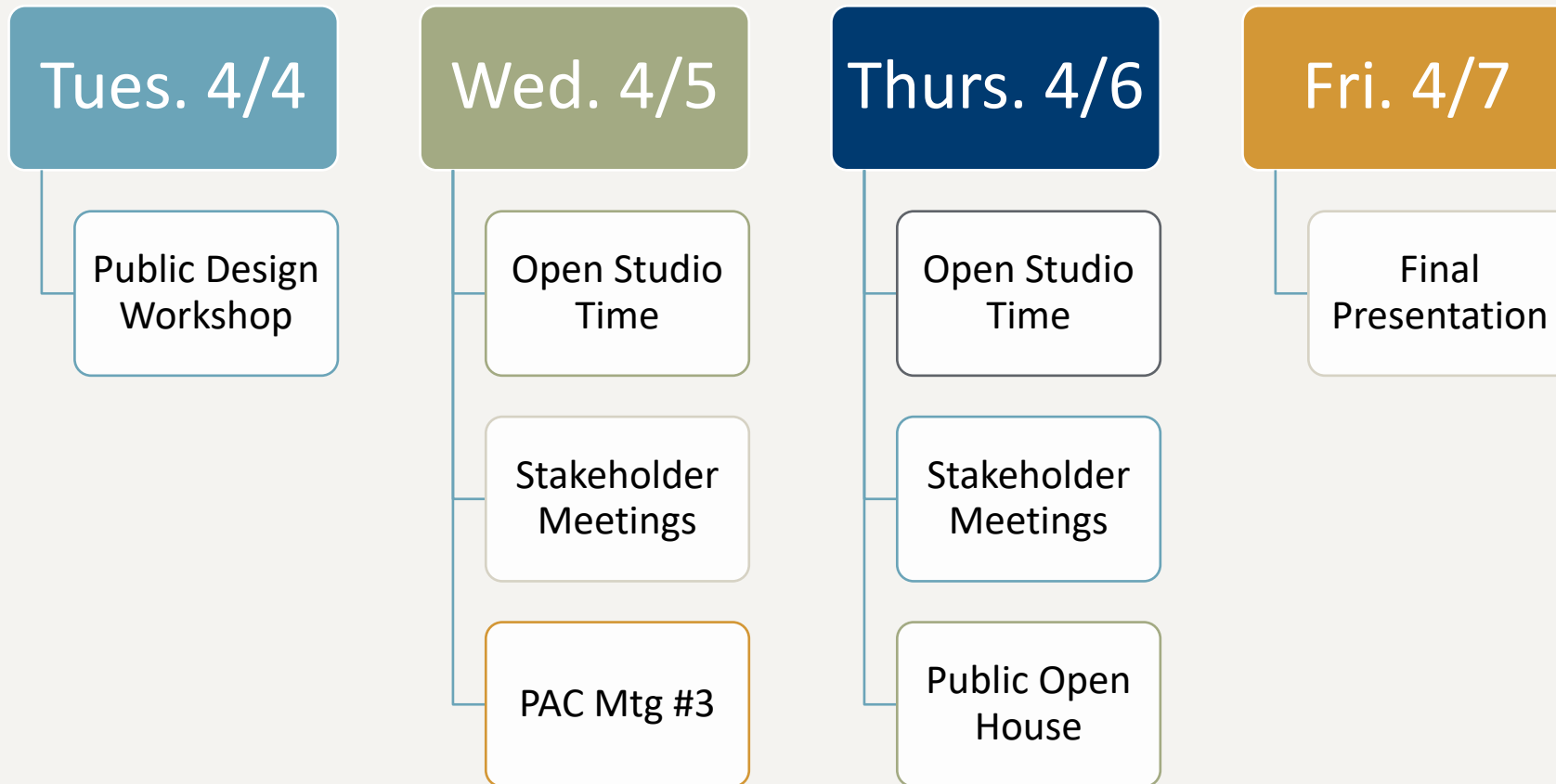


Comprehensive Plan Charrette

DESIRED OUTCOME OF ENGAGEMENT:

1. Guidance to develop Plan Goals and Objectives
(high-level plan direction)
2. Guidance on Land Use – type, mix, and location
3. Ideas for new implementation tools (programs,
regulation, studies etc.)

Comprehensive Plan Charrette





Tuesday 4/4 Public Design Workshop

Kickoff and Hands-on Design Charrette
intended to workshop ideas in small groups.
Each table will report back at the end.

5PM-7PM



Wednesday 4/5 Thursday 4/6 Open Studio Time

Consultants will use this time to visualize the ideas developed by the public at the Design Workshop. Open to the public.

10AM-5PM



Wednesday 4/5 Thursday 4/6 Stakeholder Meetings

Consultants and Town Staff invited stakeholders to join six topic-specific technical meetings, including transportation, water/utilities, schools/services, regional collaboration, business community, and housing/ development.

11AM, 2PM, and 4PM



Thursday 4/6 Open House

This is a public meeting, structured as an open house. Participants will be able to review the ideas and designs developed by the public, stakeholders, and consultants over the previous two days.

5PM-7PM



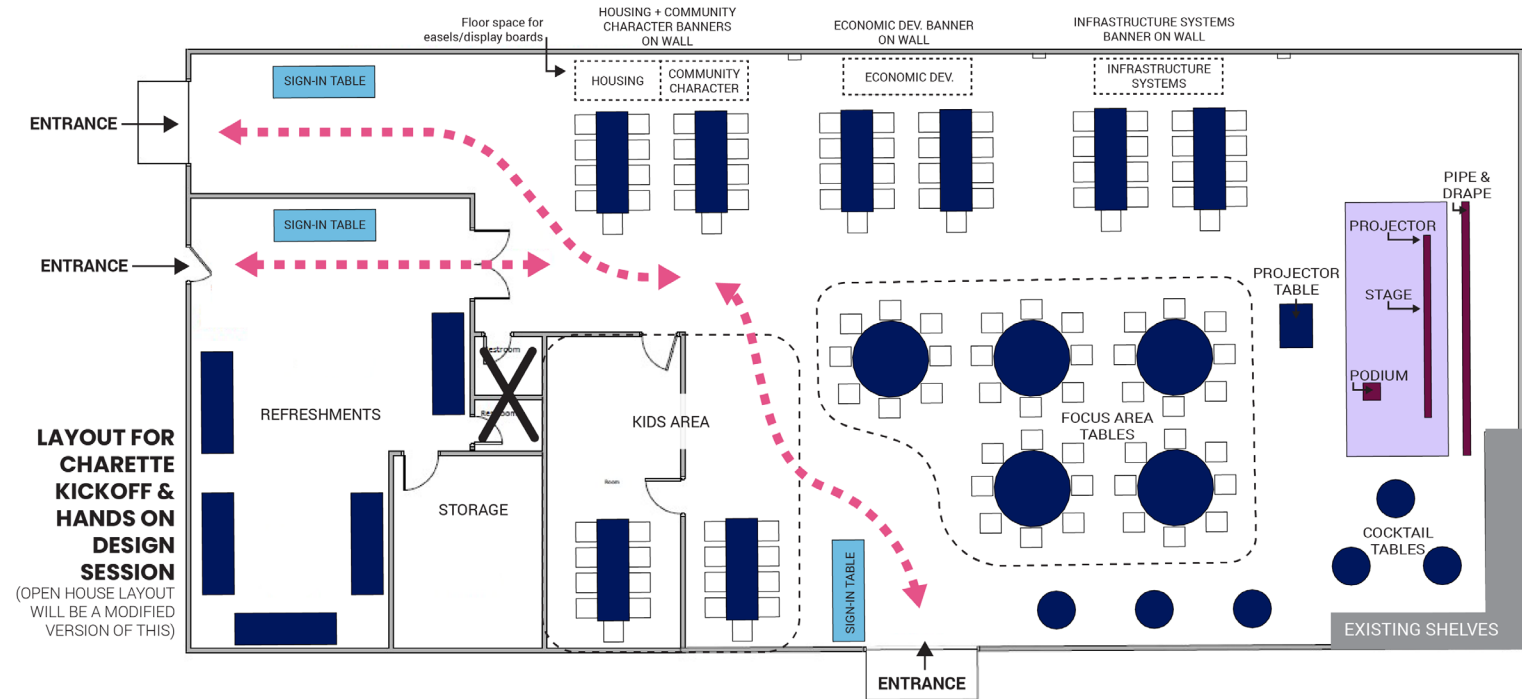
Friday 4/7 Final Presentation

Consultants will present the final designs and ideas developed over the week with the public and stakeholders.

5PM-6:30PM

Event Topics/ Stations

1. Welcome & Refreshments
2. Housing
3. Community Character
4. Economic Development
5. Infrastructure Systems
6. Land Use and Focus Areas
7. Kids Area



Areas of Discussion

Housing + Community Character

- What are the market trends or product type that we should prepare for?
- What are the biggest opportunities and issues for development in Windsor?
- What tools or code changes would encourage the development of different housing types in Windsor?

Economic Development

- What is the best way to support our local workforce and align job opportunities to our current residents' needs?
- How should the Town support existing businesses/local businesses/entrepreneurs?
- What are the challenges to continuing economic growth and vibrancy in Windsor?

Infrastructure Systems

- What are the water capacity or supply constraints?
- What are future expansion areas?
- What water efficiency tools or requirements should the Town consider?
- How can the Town support your operations in the future?



Continued Engagement Following Events

[Home](#) / [Comprehensive Plan Update](#)

Comprehensive Plan Update



The Town of Windsor is updating its 2016 Comprehensive Plan to guide the day-to-day decisions of the Town more accurately and holistically into the future. Since adoption of the 2016 Comprehensive Plan, Windsor has seen its population increase dramatically

Online Activities through Windsor Project Connect website:

- ☐ Idea Wall
- ☐ Visual Preference Survey
- ☐ Vision and Policy Direction Survey
- ☐ Interactive Draft Land Use Map

THANK YOU

Miriam McGilvray, AICP

Associate Planner

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Fort Collins, CO 80524

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MEMORANDUM

Date: April 3, 2023
To: Mayor and Town Board
From: Eric Bracke, Transportation Planner
Re: Windsor Downtown Alternative Route Study - Final Report - E. Bracke, Transportation Planner
Item #: B.2.

Background / Discussion:

The Windsor Downtown Alternative Route Study began in the summer of 2022 in an effort to look for bypass solutions for truck traffic on Main Street. The study went through a major effort to understand traffic and travel patterns by gathering peak hour counts, daily traffic counts, as well as Bluetooth data throughout the community. The study analyzed the data with the intent of finding affinity to divert trips off of Main Street onto other routes. There is some possibility of diverting trips from the northwest to the southeast and the southwest to northeast, with very little potential of diverting the east-west thru trips.

Some Key Observations:

Key Observations & Conclusions

Traffic data was collected in the fall of 2022, including intersection turning counts, daily traffic counts, and travel patterns. Key observations included:

- Main Street is the busiest east-west street with over 16,000 vehicles per day
- The busiest travel pattern is along Main Street between 11th Street and 4th Street
- Most signalized intersections operate at acceptable levels of service

The observed traffic volumes were also used to estimate future traffic volumes. Analysis of this data, as well as a review of current conditions for all users of Main Street, resulted in the following key conclusions:

- Main Street congestion will increase in the future as vehicle volumes grow
- Pedestrian and bicycle connectivity to and through downtown is limited
- Trucks cannot be entirely eliminated from downtown due to state law and access needs for local businesses

Community outreach was conducted to understand how people use Main Street and what issues or opportunities they see related to downtown mobility. In August 2022, project team members gathered input at the Windsor Farmer's Market. A survey taken by 245 people resulted in the following findings:

- Driving through downtown is the primary way that survey participants use Main Street
- Downtown congestion and pedestrian safety are major concerns
- Survey participants favor restricted truck access and intersection improvements

Across all the paths, the total estimated potential for rerouting trips from Main Street is up to 725 vehicles per day – less than 5% of Main Street's average daily total of 16,000 vehicles per day. This amount of diversion will not substantially improve downtown traffic operations, so a designated alternate route may not be warranted. There are still steps Windsor can take to strengthen the overall roadway network, provide and enhance alternate routes, and improve safety in downtown, including:

- Construct Weld County Road 70 between Highway 257 and Clydesdale Lane
- Construct the extension of Crossroads Boulevard east of Highway 257
- Implement recommendations from Windsor's transportation plan to improve downtown walkability
- Work with CDOT and surrounding communities to improve operations on alternate routes
- Work at creating additional friction in the downtown so through trips may be voluntarily diverted

A copy of the report is attached to this Agenda Summary

Financial Impact:

none at this time

Relationship to Strategic Plan:

Vital Infrastructure

Recommendation:

Accept the report

CC:

Attachments:

1. Downtown Alts Rts Study Report_final

Windsor Downtown Alternate Route Study

Prepared for

Town of Windsor
301 Walnut Street
Windsor, CO 80550

Prepared by

Felsburg Holt & Ullevig
6400 S Fiddlers Green Circle, Suite 1500
Greenwood Village, CO 80111



Principal in Charge: Michelle Stevens, PE, MBA
Project Manager: Paul Brown, PE, PTOE

FHU Project Number 121464-04

March 2023

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Appendix B. Project Data Collection Technical Memorandum
Appendix C. Traffic Operations Technical Memorandum
Appendix D. Diversion Potential Summary Technical Memorandum
Appendix E. Public Involvement

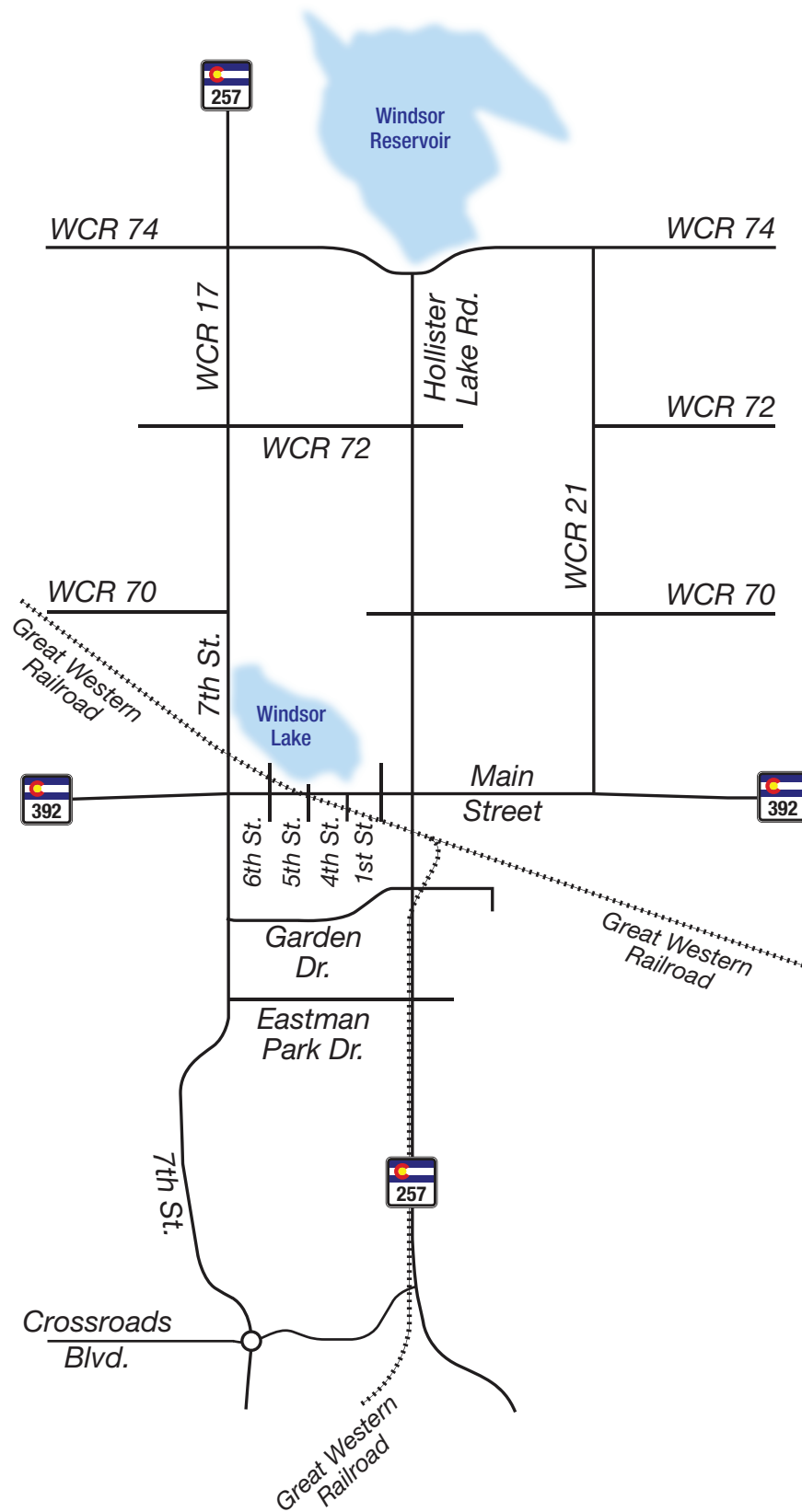
I. Introduction

The Town of Windsor is a growing community along the north Front Range corridor of Colorado. Like many smaller towns, Windsor's Main Street is a state highway that connects Windsor to interstates and other US highways. Main Street is a designated Colorado Department of Transportation (CDOT) State Highway (SH), providing east-west connectivity along SH 392 from US 287 and Interstate 25 (I-25) east to US 85 and SH 14. The segment between Hollister Lake Road and Weld County Road (WCR) 17 is also designated as an overlap for SH 257, which provides north-south connectivity from SH 60 and US 34 north to SH 14. **Figure I** provides a map of the study area. This regional connectivity results in a mix of local and regional traffic in downtown, which affects the quality of life for local residents and businesses.

The Windsor Downtown Alternate Route Study has evaluated current traffic flows through downtown Windsor, with an emphasis on truck traffic. Evaluations include:

- Peak hour traffic operations
- Daily link operations
- Motorist travel patterns
- Planned roadway improvements

The project team has also gathered public input to both identify issues and obtain input on possible solutions. Based on these efforts, the study has recommended improvements and tools to reduce the impacts of regional traffic in the downtown area while providing additional capacity for diverted trips.



2. Data Collection

The data collection effort for the Windsor Downtown Alternate Route Study consisted of compiling available data from other sources and collecting project-specific data. This Chapter documents the results that serve as the basis for subsequent analyses in the Downtown Alternate Route Study.

2.1 Available Data Collection

Main Street through downtown Windsor is part of two CDOT state highways: SH 257 and SH 392, as shown on **Figure 1**. The project team collected volume data for these highways from CDOT's Online Transportation Information System (OTIS) for the four-year period between 2018 and 2022. OTIS provides downloadable statistics for state highways across CDOT's network, including historic daily traffic count data, truck percentages, and anticipated future growth based on past trends. These data are also presented in **Appendix A, Available Traffic Count Technical Memorandum**.

2.2 SH 257 – Mileage Reference Marker (MRM) 8 to MRM 15

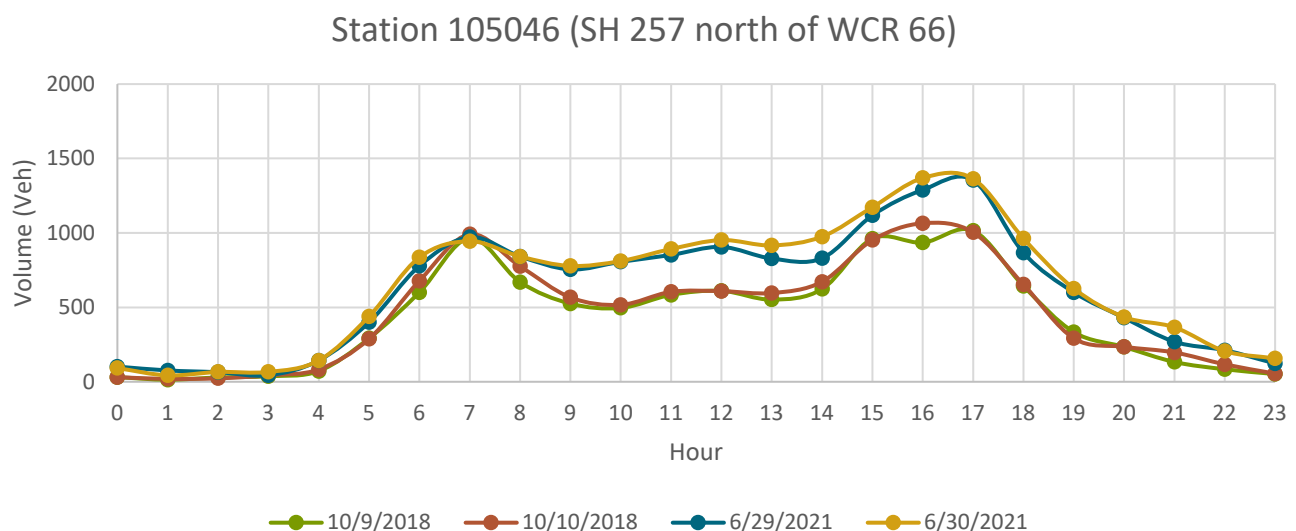
The Windsor study area along SH 257 extends from south of Crossroads Boulevard (approximately MRM 7.9) to Weld County Road (WCR) 74 (approximately MRM 14.5), about 7 miles. To provide a more complete picture of travel along SH 257, the project team collected OTIS data from SH 34 (Greeley) to SH 14 (Fort Collins) as summarized below.

2.2.1 Short-Duration Count Stations

There are six short-duration count stations along SH 257 from which data were collected.

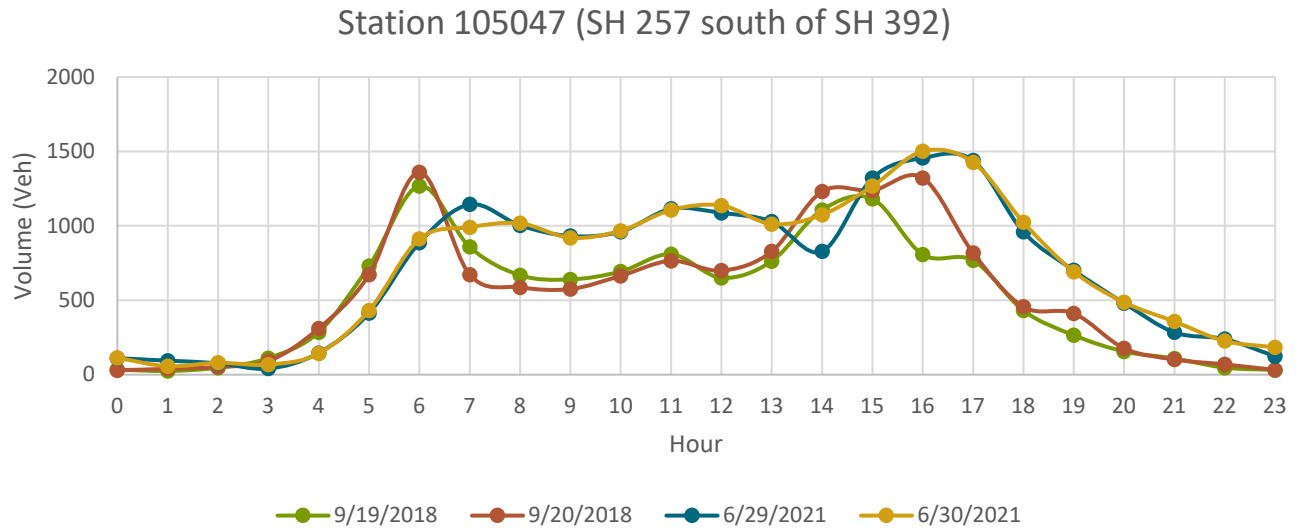
- Station 105046 is north of WCR 66 / Eastman Park Road. Short-duration count data are available for 2-day periods in 2018 and 2021, as shown on **Figure 2**.

Figure 2. Station 105046 Count Comparison



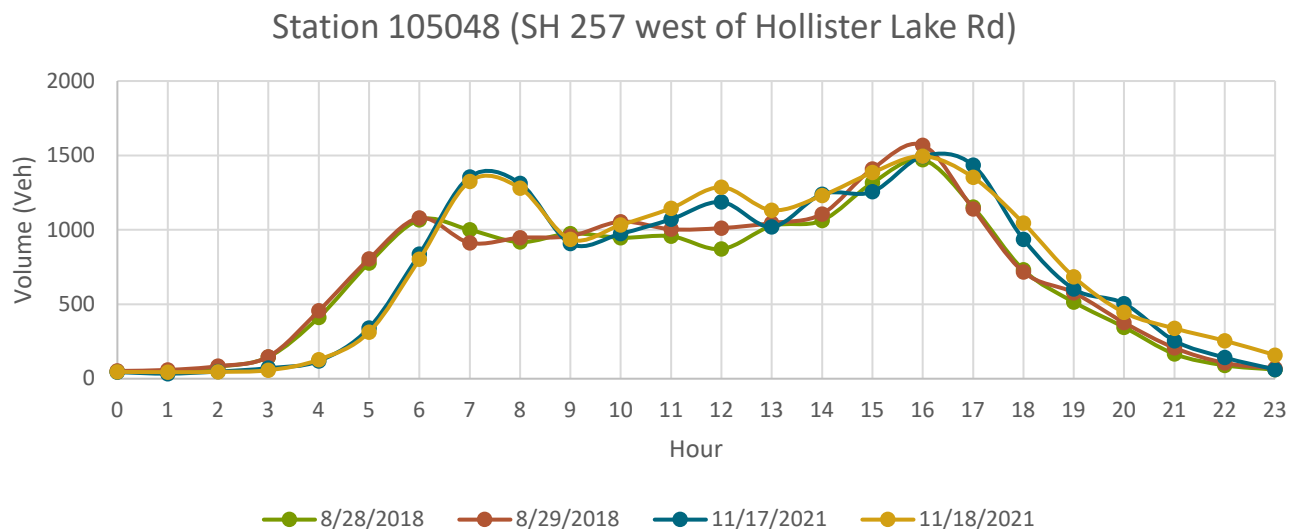
- Station 105047 is south of SH 392 / Main Street. Short-duration count data are available for 2-day periods in 2018 and 2021, as shown on **Figure 3**.

Figure 3. Station 105047 Count Comparison



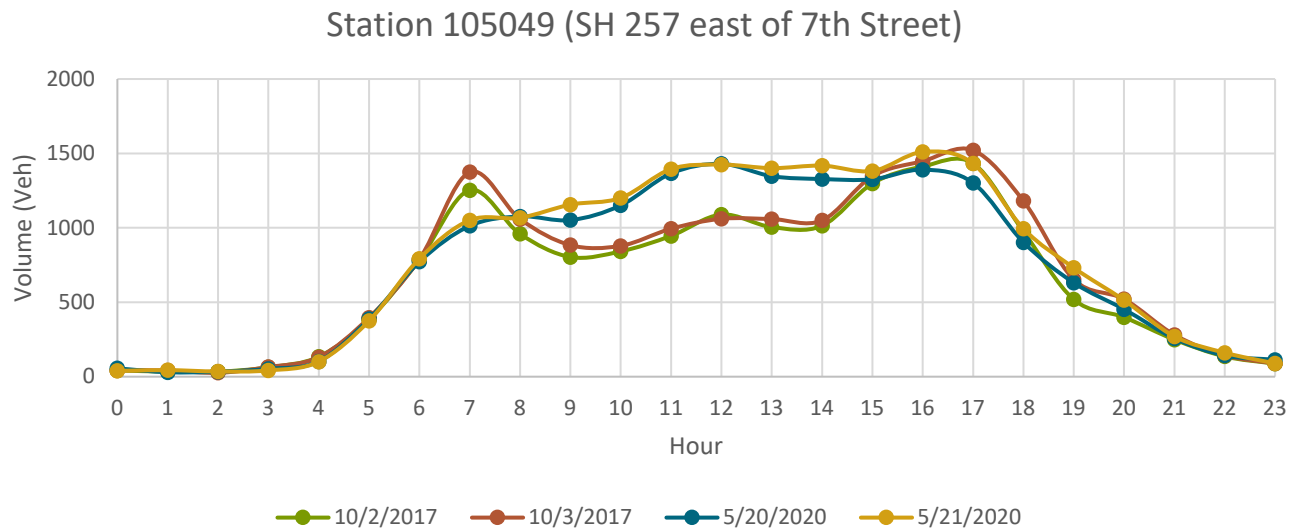
- Station 105048 is on Main Street west of Hollister Lake Road. Short-duration count data are available for 2-day periods in 2018 and 2021, as shown on **Figure 4**.

Figure 4. Station 105048 Count Comparison



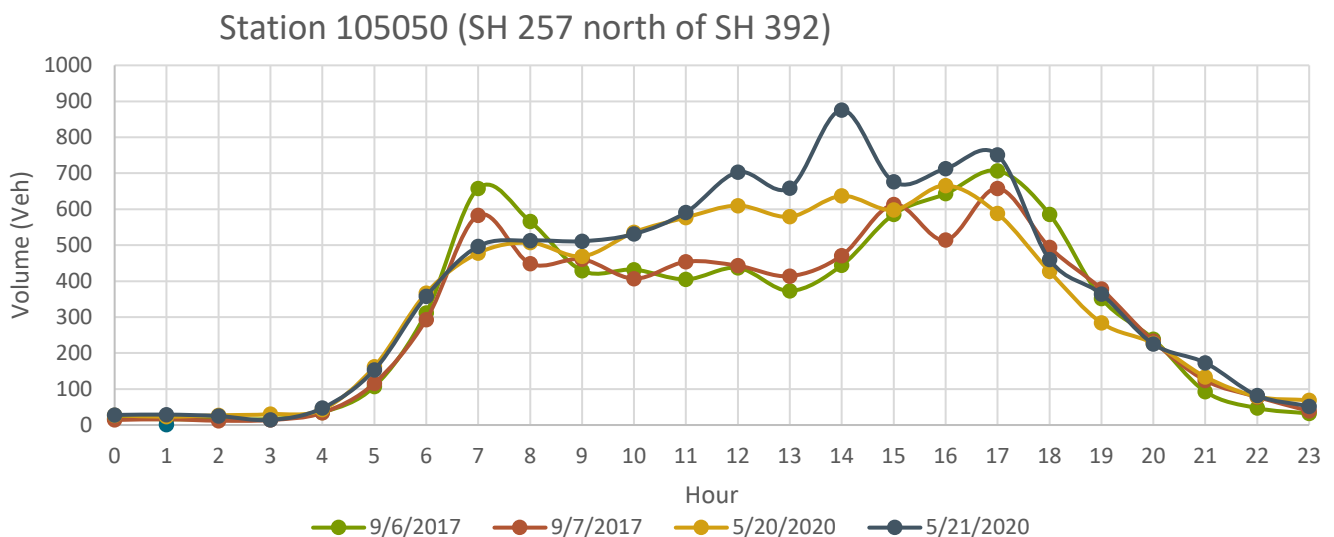
- Station I05049 is on Main Street east of 7th Street. Short-duration count data are available for 2-day periods in 2017 and 2020, as shown on **Figure 5**.

Figure 5. Station I05049 Count Comparison



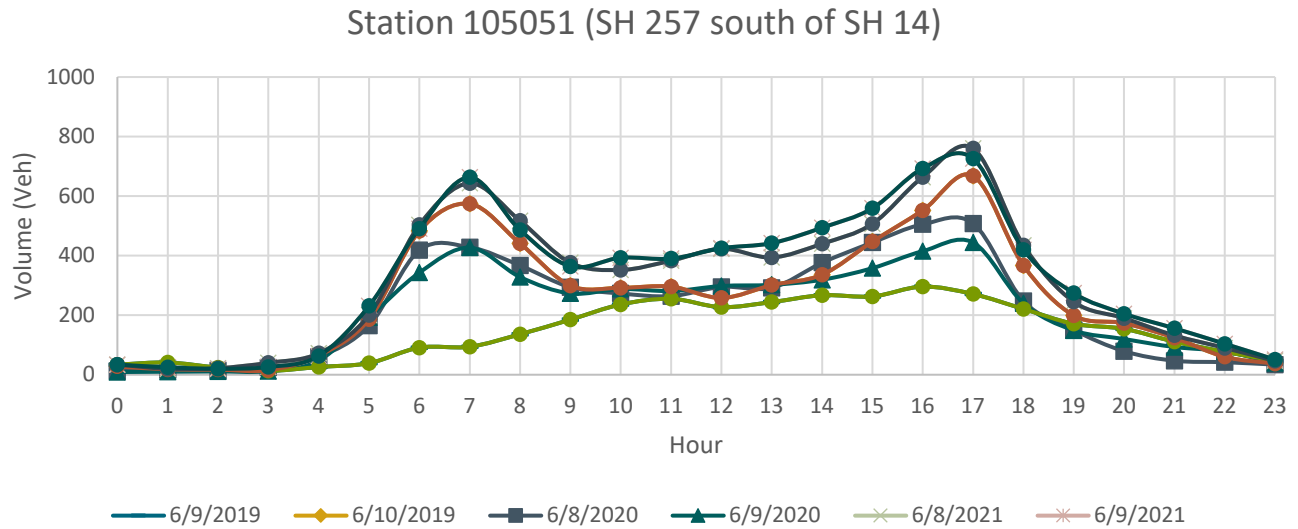
- Station I05050 is north of Main Street on SH 257. Short-duration count data are available for 2-day periods in 2017 and 2020, as shown on **Figure 6**.

Figure 6. Station I05050 Count Comparison



- Station 105051 is south of SH 14. Short-duration count data are available for multiple 2-day periods in various years. For consistency with other stations, **Figure 7** shows count data for two days in 2019, 2020, and 2021.

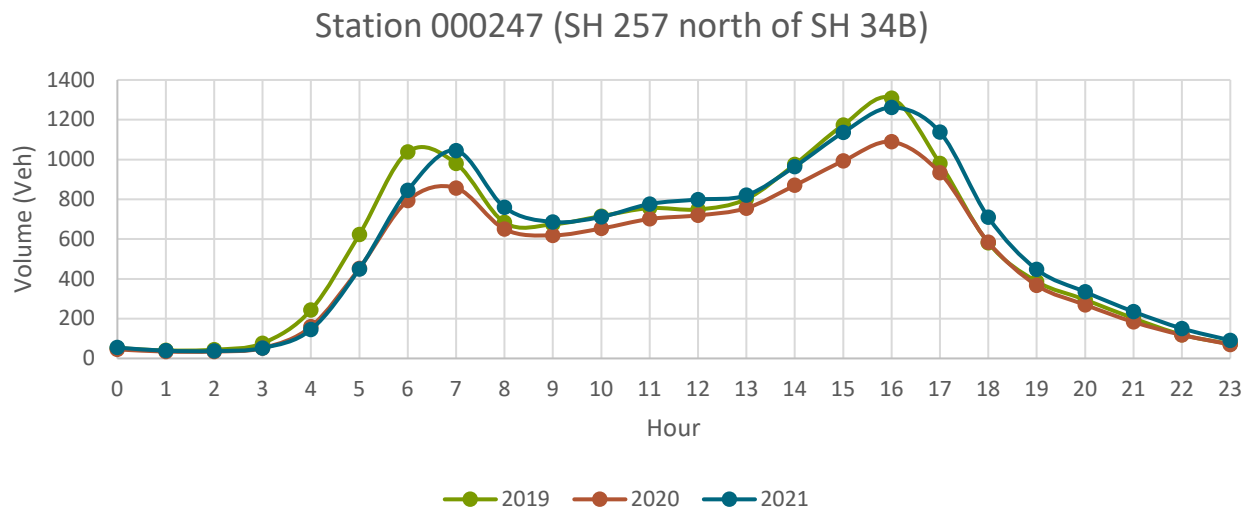
Figure 7. Station 105051 Count Comparison



2.2.2 Continuous Count Stations

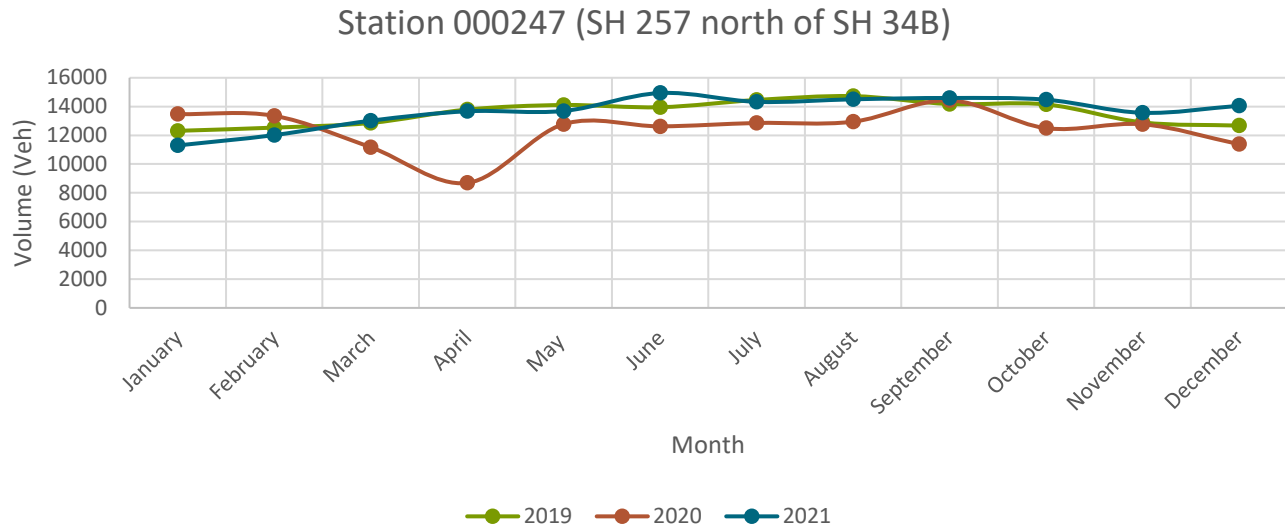
Since there are no continuous count stations in the study area, the project team reviewed the CDOT OTIS dataset for nearby continuous stations. The nearest continuous count station is Station 000247, located on SH 257 just north of US 34 (Business) on the western fringe of Greeley (about 2.5 miles south of Crossroads Boulevard along SH 257). Yearly data were downloaded for 2019, 2020, and 2021, the most recent three years in which data were available, as shown on **Figure 8**.

**Figure 8. Continuous Count Station 000247
24-Hour ADT Profile**



The project team prepared a second graph showing seasonal variations at this station (**Figure 9**). The 2019 data show little seasonal variation at this count station, except for minor decreases in winter volumes when compared to the remaining seasons. The 2020 data show a dip related to the pandemic in March and April. The 2021 data generally mirror the 2019 data.

**Figure 9. Continuous Count Station 000247
Seasonal AADT Monthly Profile**



2.2.3 Supplemental Data

The project team collected data regarding average annual daily traffic (AADT), truck percentages, and traffic growth at each count station identified previously, as shown in **Table I**. The AADT ranges from 5,900 to 18,000 vehicles per day (vpd), the truck percentage ranges from 3.3 to 13.8, and the annual growth rate ranges from 2.08 percent to 2.60 percent per year.

Table I. SH 257 Supplemental OTIS Data

Station	2020 AADT	Percent Trucks	20-Year Factor (Annual Growth Rate)
I05046	10,000	6.4	1.51 (2.08% per year)
I05047	12,000	7.5	1.51 (2.08% per year)
I05048	16,000	4.4	1.53 (2.15% per year)
I05049	18,000	3.3	1.52 (2.12% per year)
I05050	8,300	7.1	1.54 (2.18% per year)
I05051	5,900	13.8	1.60 (2.38% per year)
000247*	14,000	5.9	1.67 (2.60% per year)

* Continuous count station outside the project study area

AADT = average annual daily traffic

2.2.4 SH 257 Data Summary

Based on the SH 257 data, the project team has drawn the following conclusions.

Volume Peaking

The peaking characteristics at the identified count stations show distinct AM and PM peak hours. The morning peak hour is typically 7:00 AM to 8:00 AM, except on SH 257 south of SH 392, where it is 6:00 AM to 7:00 AM. The evening peak hour varies across count stations, with 4:00 PM to 5:00 PM and 5:00 PM to 6:00 PM being the most common. The morning peak hour volumes are typically lower than the evening peak hour volumes.

Pandemic Impacts

The continuous count station on SH 257 near Greeley west of Airpark Road shows that 2021 volumes are similar to 2019 volumes. The short-duration count stations had available data collected in 2020, after the pandemic began. These volumes are typically lower than those in the data collected before the pandemic, which is consistent with 2020 data shown at the continuous count station. Based on these data, it is assumed that no pandemic adjustments are needed.

Seasonal Peaking

The continuous count station data show that summer months (July, August, and September) are the highest volume months in the Windsor area. The winter months (December, January, and February) are the lowest volume months. **Table 2** presents seasonal factors based on 2019 data.

Table 2. Seasonal Adjustment Factors

Month	Adjustment Factor
January	1.101
February	1.081
March	1.054
April	0.983
May	0.961
June	0.971
July	0.937
August	0.920
September	0.956
October	0.958
November	1.051
December	1.069

2.3 SH 392 from MRM 79 to MRM 84

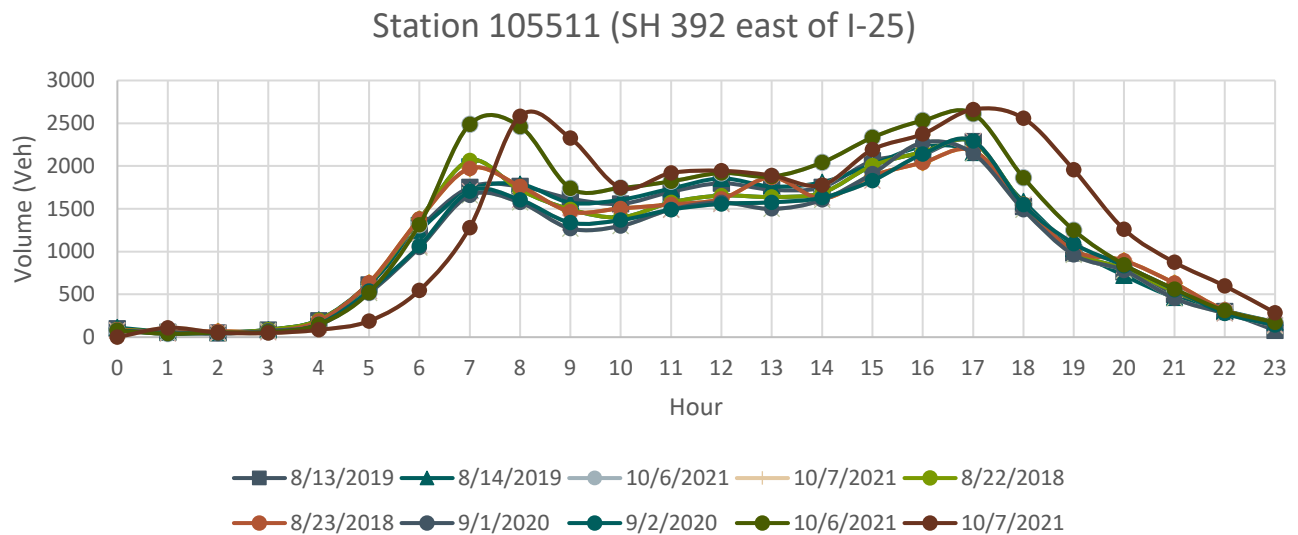
The Windsor study area along SH 392 extends from west of 15th Street (WCR 15) (approximately MRM 103.3) to WCR 23 (approximately MRM 107.2), about 4 miles. To provide a more complete picture of travel along SH 392, the project team collected OTIS data from I-25 to WCR 27 (east of Severance) as summarized in the following subsections.

2.3.1 Short Duration Count Stations

There are four short-duration count stations in the study area.

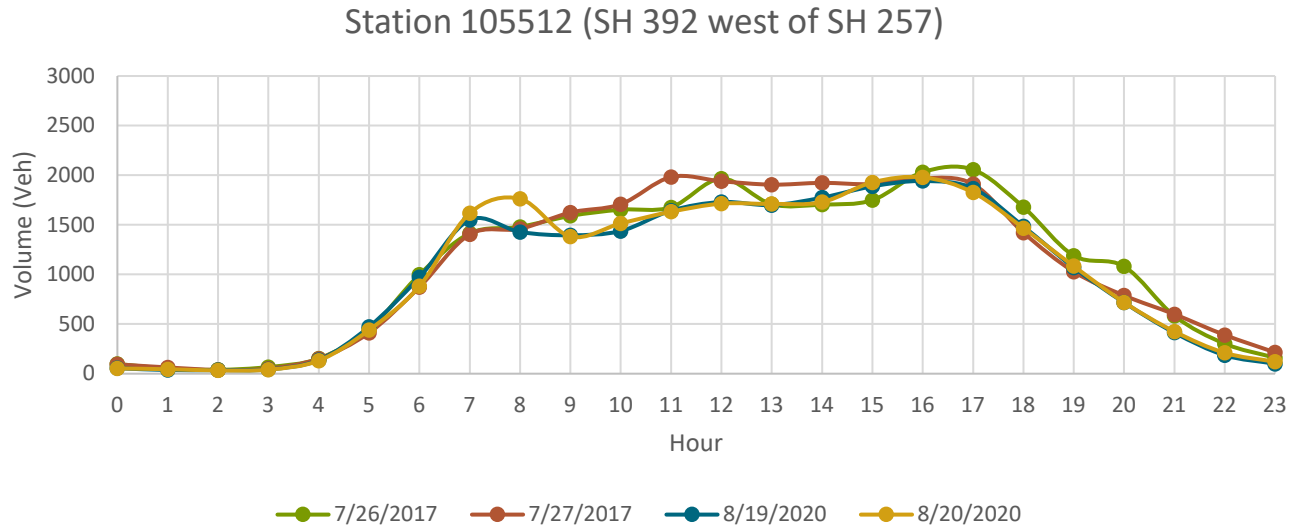
- Station 105511 is east of the I-25 interchange. Short-duration count data are available for four 2-day periods in 2018, 2019, 2020, and 2021, as shown on **Figure 10**. The 2021 data are notably higher than those of previous years, which may be related to construction along I-25 near this count station.

Figure 10. Station 105511 Count Comparison



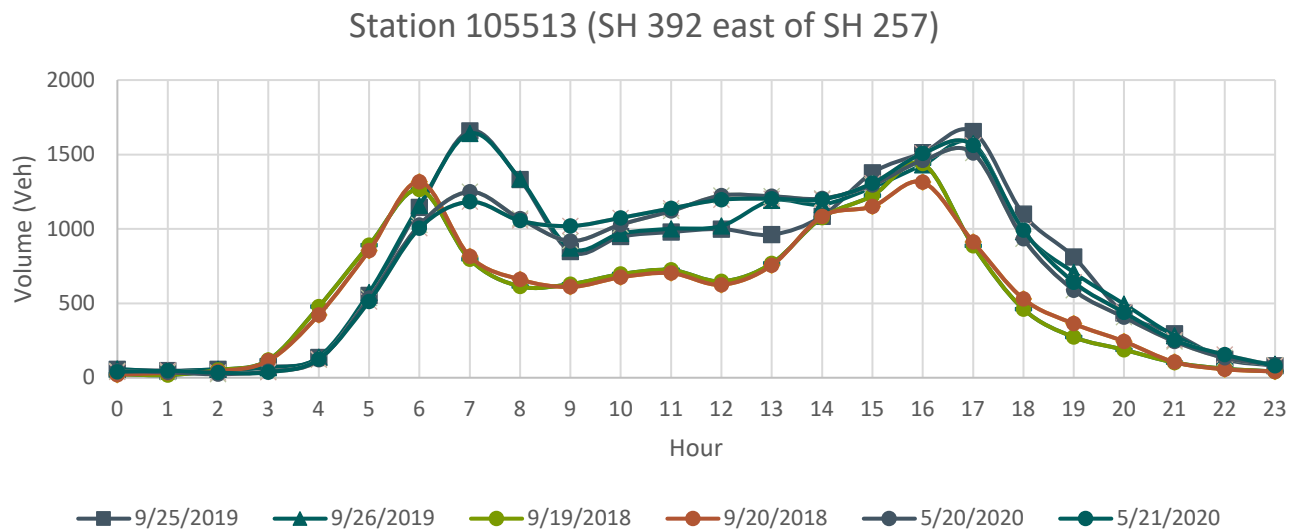
- Station 105512 is west of WCR 17 / SH 257. Short-duration count data are available for two 2-day periods in 2017 and 2020, as shown on **Figure 11**. No anomalies were noted.

Figure 11. Station 105512 Count Comparison



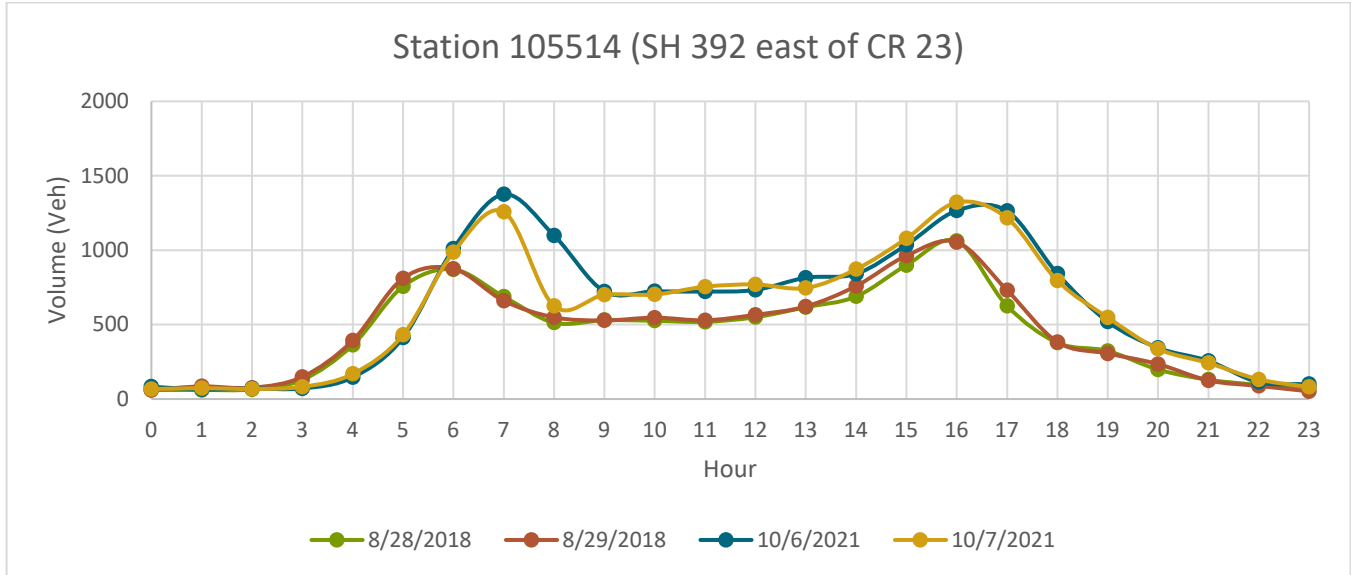
- Station 105513 is east of Hollister Lake Road / SH 257. Short-duration count data are available for three 2-day periods in 2018, 2019, and 2020, as shown on **Figure 12**. The 2018 data appear shifted earlier than the 2019 and 2020 data, but no reason could be found.

Figure 12. Station 105513 Count Comparison



- Station 105514 is east of WCR 23. Short-duration count data are available for two 2-day periods in 2018 and 2021, as shown on **Figure 13**. The 2021 data are significantly higher than the 2018 data.

Figure 13. Station 105514 Count Comparison



2.3.2 Continuous Count Stations

CDOT does not have any continuous count stations on SH 392. The nearest continuous count stations are on SH 257 north of US 34 and on US 34 near WCR 15. Since there are no continuous count stations on SH 392, the SH 257 continuous count station north of US 34 was assumed to be representative of seasonal trends on SH 392. See **Section 2.2.2** for details.

2.3.3 Supplemental Data

The project team also collected data regarding AADT, truck percentages, and traffic growth at each identified count station. These data are shown in **Table 3**. The AADT ranges from 10,000 to 23,000 vpd, the truck percentage ranges from 4.3 to 8.9, and the annual growth rate ranges from 1.44 percent to 2.05 percent per year.

Table 3. SH 392 Supplemental OTIS Data

Station	2020 AADT	Percent Trucks	20-Year Factor (Annual Growth Rate)
105511	23,000	4.4	1.33 (1.44% per year)
105512	20,000	4.3	1.50 (2.05% per year)
105513	15,000	5.6	1.49 (2.01% per year)
105514	10,000	8.9	1.46 (1.91% per year)

AADT = average annual daily traffic

2.3.4 SH 392 Data Summary

Based on the SH 392 data, the project team has drawn the following conclusions.

Volume Peaking

Peaking characteristics at the identified count stations show general AM and PM peak hours. The morning peak hour varies across the count stations, with some counts showing morning peaks as early as 6:00 AM to 7:00 AM and other counts not showing a true AM peak hour. The evening peak hour also varies across the count stations but is typically either 4:00 PM to 5:00 PM or 5:00 PM to 6:00 PM. The morning peak hour volumes are typically lower than the evening peak hour volumes.

Pandemic Impacts

As noted in **Section 2.2.2**, there is no continuous count station available along SH 392 to evaluate pandemic impacts. Two of the short-duration count stations had 2021 data available, and these counts are typically higher than 2018 or 2019 data.

Seasonal Peaking

As noted in **Section 2.3.2**, there is no continuous count station available along SH 392 to evaluate seasonal peaking.

2.4 Available Data Collection Conclusions

The project team collected historic traffic count data at 11 locations in or near the Windsor Downtown Alternate Route study area, including one continuous count station. Based on these data, the project team has drawn the following conclusions.

2.4.1 Volume Peaking

A review of traffic peaks revealed the following information:

- The morning peak hour volumes are typically lower than the evening peak hour volumes.
- Most short duration count sites had at least one day with a distinct morning peak hour between 6:00 AM and 7:00 AM or 7:00 AM and 8:00 AM.
- Most short duration count sites had at least one day with a distinct evening peak hour between 4:00 PM and 5:00 PM or 5:00 PM and 6:00 PM.

It should be noted that most of the historic count data are presented in hourly format. Due to this, some resolution in the count data is lost. For example, a 7:45 AM to 8:45 AM peak may show up in hourly data as 8:00 AM to 9:00 AM, while a 7:30 AM to 8:30 AM peak may show up as a 7:00 AM to 8:00 AM peak depending on data just outside the peak. Further, peak hours can shift over time, with differing peaks in summer and winter months.

2.4.2 Pandemic Impacts

A review of pandemic-related volume data revealed the following information:

- The continuous count station northwest of Greeley shows that 2021 volumes are similar to or greater than 2019 volumes, and consistently greater than 2020 volumes.
- Data from short-duration count stations show constant or increasing volumes in 2021 when compared to pre-pandemic data.

Based on these data, no pandemic adjustments are anticipated for project-specific count data collected in 2022.

2.4.3 Seasonal Peaking

One continuous count station was available to provide seasonal adjustment factors. Based on this count station, **Table 2** provides seasonal adjustment factors for use in the Downtown Alternate Route Study. As described previously, these data indicate that volumes are highest in the summer months and lowest in the winter months.

2.4.4 Supplemental Data

A review of the truck percentages across the various count stations reveals that they range from approximately 3 percent to 14 percent, with higher percentages at the more rural count stations. The truck percentages in the downtown Windsor area vary between 3.3 percent and 7.1 percent.

The growth rates typically range between 1.4 percent per year and 2.6 percent per year. The growth rates are more consistent along SH 257. The growth rate in the downtown Windsor area varies between 2.0 percent per year and 2.4 percent per year.

2.5 Project Data Collection

The project team worked with the Town of Windsor to define traffic data collection locations throughout the study area based on the available data and industry practice. The project team collected the following project-specific data:

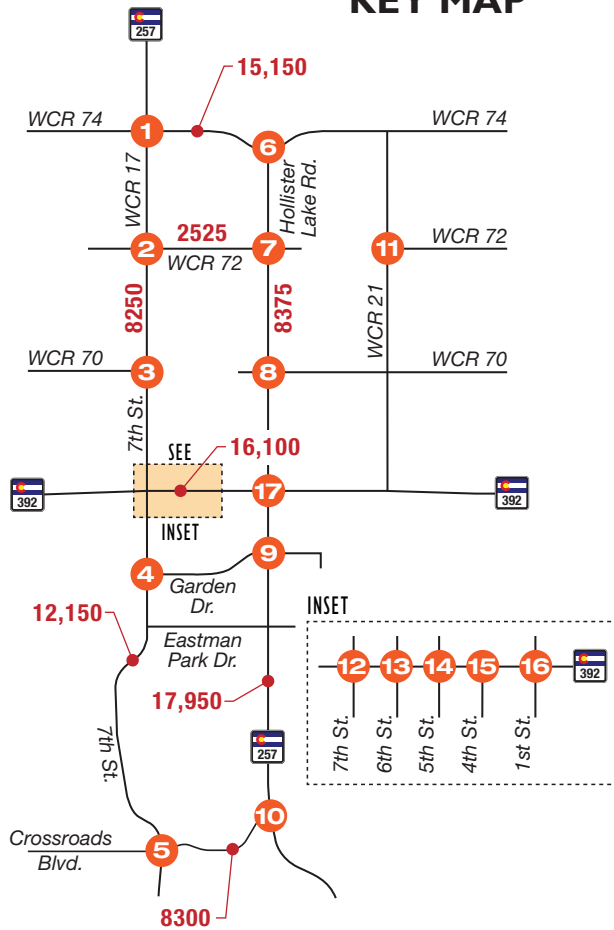
- Daily traffic volume levels at 8 locations,
- Vehicle classification and speed information at the same 8 locations,
- Vehicle turning movements at 17 intersections, and
- Travel pattern information using Bluetooth™ recording methods.

Refer to **Appendix B, Project Data Collection Technical Memorandum**.

2.5.1 Daily Traffic Volumes

Twenty-four-hour vehicle volumes in vpd were recorded at the locations shown on **Figure 14**. These volumes are also shown in **Table 4**, which summarizes the volumes by direction.

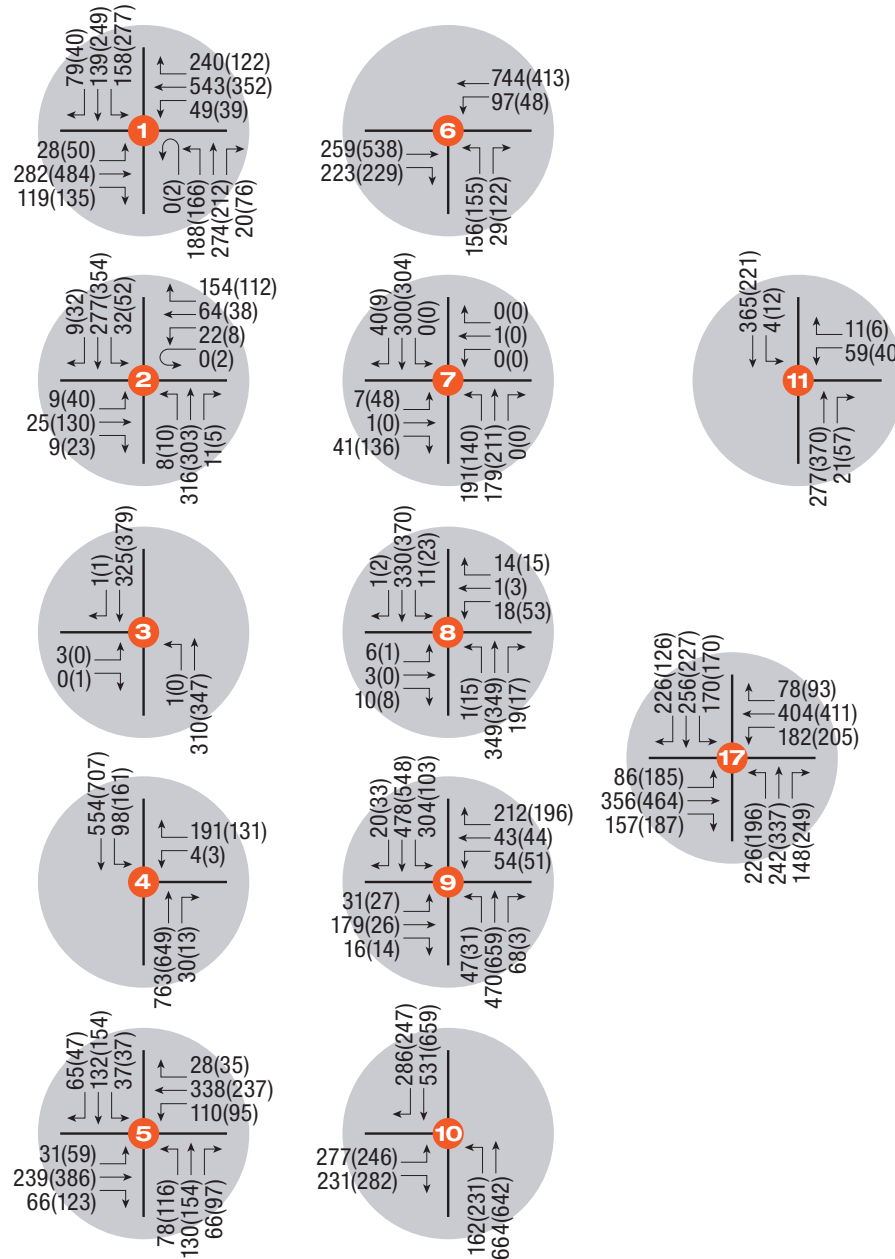
KEY MAP



LEGEND

xxx(xxx) = AM(PM) Peak Hour Traffic Volumes

XXXX = Daily Traffic Volumes



INSET INTERSECTIONS

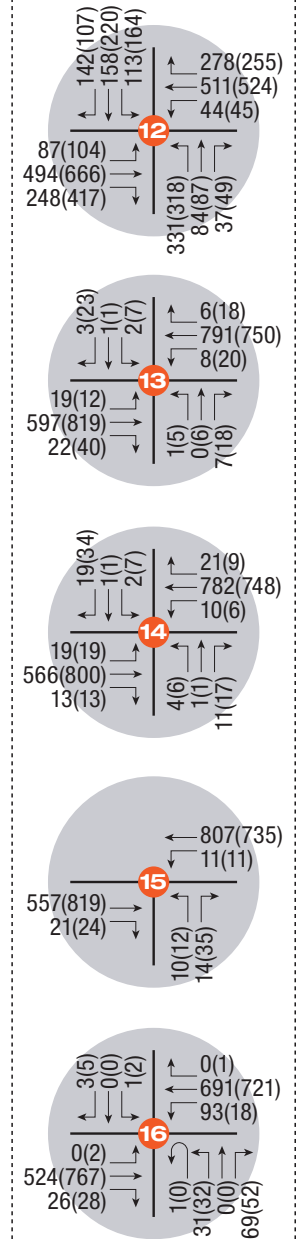


Table 4. Daily Traffic Volumes

Location	Direction		TOTAL
	Northbound	Southbound	
7 th Street – South of Eastman Park Drive	6,100	6,050	12,150
SH 257 – Between WCR 70 & WCR 72	3,925	4,325	8,250
SH 257 – South of Eastman Park Drive	9,050	8,900	17,950
Hollister Lake Road – Between WCR 70 & WCR 72	3,950	4,425	8,375
	Eastbound	Westbound	
Crossroads Boulevard – East of 7 th Street	4,300	4,000	8,300
Main Street (SH 257 / SH 392) – East of 5 th Street	7,850	8,250	16,100
WCR 72 – East of SH 257	1,150	1,375	2,525
WCR 74 – East of SH 257	7,775	7,375	15,150

SH = State Highway

WCR = Weld County Road

As shown in **Table 4**, daily traffic volumes vary from about 2,500 vpd to almost 18,000 vpd depending on the street segment. The lowest daily volume is along WCR 72 to the east of SH 257, which does not have significant east/west continuity. The highest levels are along the state highway segments on Main Street in downtown Windsor and south of Eastman Park Drive on SH 257 and on WCR 74 to the east of SH 257.

2.5.2 Intersection Turning Movements

Vehicle movements were recorded at 17 intersections along several main travel routes during the AM and PM peak hours of vehicle activity on a typical weekday. The project team collected data from 6:30 AM to 8:30 AM (AM peak) and from 4:00 PM to 6:00 PM (PM peak). These time periods were chosen based on the CDOT OTIS data presented earlier in this chapter. The peak one-hour of activity within the recorded hours can vary from intersection to intersection due to the intersection's location in relationship to the downtown core of Windsor and on intersection travel patterns. The AM peak hour is typically between 7:00 AM and 8:30 AM, while the PM peak hour varies within the two-hour recording window.

Figure 14 also shows the AM and PM peak hour traffic volumes. The level of vehicle movements can differ considerably with some movements being almost zero (e.g., turning movements at the 7th Street/WCR 70 intersection), while the main through movements range from less than 50 vehicles per hour (vph) (eastbound/westbound on SH 257 at Garden Drive) to over 800 vph (westbound during the AM peak hour at the SH 392/4th Street intersection). The highest levels of through movements are typically along Main Street between 1st and 6th Streets.

Some left turn or right turn movements are somewhat significant (greater than 200 vph):

- Westbound right turn from WCR 74 onto SH 257 (AM peak hour)
- Eastbound right turn from WCR 74 onto Hollister Lake Road (AM & PM peak hours)
- Westbound right turn from Garden Drive onto SH 257 (AM peak hour)
- Eastbound left turn (AM & PM peak hours) and northbound left turn (AM peak hour) at the Crossroads Boulevard/SH 257 intersection
- Eastbound and westbound right turns and northbound left turn at the SH 392/7th Street intersection (AM & PM peak hours)
- Southbound right turn, northbound left turn (AM peak hour), and westbound left turn (PM peak hour) at the SH 392/SH 257/Hollister Lake Road intersection

Of note, a few left turn movements exceed 300 vph (northbound 7th Street onto SH 392 – both peak periods) and southbound left turn on SH 257 at Garden Drive. The eastbound right turn from SH 392 onto 7th Street exceeds 400 vph during the PM peak hour.

2.5.3 Vehicle Classifications and Speeds

As part of the daily traffic volume data collection, vehicle classification and speed data were recorded (refer to **Table 5**). The recorded data allow the summation of the typical types of vehicles using the local and state highway network. The vehicle classifications can be divided into three main categories:

1. Articulated vehicles (tractor-trailer type)
2. Single Unit vehicles (3 or 4 axle trucks)
3. Passenger vehicles (motorcycles, passenger cars, pick-up trucks, vans, school buses)

Not surprisingly, most vehicle movements in the study area roadway network are passenger vehicles (about 95 percent to 99 percent) reflecting the residential nature of the towns of Windsor and Severance and the surrounding neighborhoods. Very few Single Unit vehicle types are found, with the majority likely being smaller delivery type vehicles. They make up 2.2 percent or less of the total number of vehicles. The highest value is 3.3 percent southbound on Hollister Lake Road south of WCR 72. The percentage of tractor-trailer type vehicles is relatively small also. The highest percentage of Articulated trucks (2.9 percent) is found along SH 257 south of Eastman Park Drive, near the commercial areas associated with the Great Western Industrial Park.

Table 5. Vehicle Classification Summary

Location/Vehicle Type	Direction		Average Percentage
	Northbound	Southbound	
7 th Street – South of Eastman Park Drive			
Passenger Vehicles	99.1%	99.4%	99.2%
Single Unit Trucks	0.5%	0.4%	0.5%
Articulated Trucks	0.4%	0.2%	0.3%
SH 257 – Between WCR 70 & WCR 72			
Passenger Vehicles	97.3%	97.5%	97.4%
Single Unit Trucks	1.1%	2.0%	1.6%
Articulated Trucks	1.6%	0.5%	1.0%
SH 257 – South of Eastman Park Drive			
Passenger Vehicles	95.2%	95.6%	95.4%
Single Unit Trucks	1.7%	1.7%	1.7%
Articulated Trucks	3.1%	2.7%	2.9%
Hollister Lake Rd. – Between WCR 70 & WCR 72			
Passenger Vehicles	95.8%	95.3%	95.5%
Single Unit Trucks	1.0%	3.3%	2.2%
Articulated Trucks	3.2%	1.4%	2.3%
Location/Vehicle Type	Eastbound	Westbound	Average Percentage
Crossroads Boulevard – East of 7 th Street			
Passenger Vehicles	96.8%	96.8%	96.8%
Single Unit Trucks	1.1%	0.9%	1.0%
Articulated Trucks	2.1%	2.3%	2.2%
Main Street (SH 257 / SH 392) – East of 5 th Street			
Passenger Vehicles	95.6%	97.2%	96.4%
Single Unit Trucks	1.7%	1.3%	1.5%
Articulated Trucks	2.7%	1.5%	2.1%
WCR 72 – East of SH 257			
Passenger Vehicles	98.8%	99.1%	98.9%
Single Unit Trucks	0.6%	0.6%	0.6%
Articulated Trucks	0.6%	0.3%	0.5%
WCR 74 – East of SH 257			
Passenger Vehicles	96.8%	97.7%	97.2%
Single Unit Trucks	0.9%	0.7%	0.8%
Articulated Trucks	2.3%	1.6%	2.0%

SH = State Highway

WCR = Weld County Road

Vehicle speeds were recorded on the same days as the traffic volume and vehicle classification data and represent all vehicle types. Speed data are presented in three categories:

- Average Speed (the average speed of all vehicles)
- 85th Percentile Speed (the speed at which 85 percent of all vehicles are traveling at or below)
- Highest Speed (the recorded highest speed in either direction)

Table 6 summarizes the collected speed data. Key points from the collected data include:

- Average speeds were always lower than the posted speed, likely related to varying congestion issues.
- The 85th percentile speeds, which are often used to set the posted speed, were at or below the posted speed. Only 7th Street south of Eastman Park Drive had 85th percentile speeds essentially the same as the posted speed. Other 85th percentile speeds were 2 to 11 miles per hour (mph) below the posted speed limit.
- A few motorists were greatly exceeding the posted speed limit; in some cases, more than 25 mph above the posted speed.
- The average and 85th percentile speeds along SH 392 (Main Street) to the east of 5th Street were below the posted speed limit by 8 to 16 mph, possibly related to congestion levels in the downtown area. This congestion could be related to interaction with diagonal parking maneuvers and pedestrian activity.

Table 6. Summary of Vehicle Travel Speeds (24-Hour Period)

Location	Posted Speed	Recorded Speeds (mph)					
		Average		85 th Percentile		Highest	
		NB	SB	NB	SB	NB	SB
7 th Street south of Eastman Park Drive	45 mph	41	40	45	44	71–75	61–65
SH 257 between WCR 70 & WCR 72	55 mph	34	35	44	48	>76	51–55
SH 257 south of Eastman Park Drive	55 mph	41	40	45	44	71–75	61–65
Hollister Lake Road between WCR 70 & WCR 72	45 mph	32	34	43	38	>76	51–55
Location		EB	WB	EB	WB	EB	WB
Crossroads Boulevard east of 7 th Street	45 mph	34	34	38	38	51–55	51–55
Main Street (SH 257 / SH 392) east of 5 th Street	30 mph	16	14	22	19	51–55	31–35
WCR 72 east of SH 257	55 mph	37	37	44	43	61–65	61–65
WCR 74 east of SH 257	55 mph	41	37	44	47	>76	66–70

EB = eastbound mph = miles per hour NB = northbound SB = southbound
SH = State Highway WB = westbound WCR = Weld County Road

2.5.4 Vehicle Origin/Destination Data

For this study, one of the key issues is the routes that motorists use to travel through the Town of Windsor, particularly along the one-mile segment of Main Street where the state highway designation is shared with both SH 257 and SH 392. To evaluate this information, the project team collected data via Bluetooth™ wireless technology, which uses short-range radio communications to record the locations of cell phones as motorists pass by Bluetooth™ data collection devices.

Bluetooth™ technology allows the number of vehicles passing a specific location to be matched to another specific location to understand how many vehicles traveled through these two data collection sites. Numerous data collection points can be used to understand specific travel patterns; however, the number of data collection points can become excessive to understand all possible patterns. For this project, data collection devices were placed at the following eight locations, shown on

Figure 15. Bluetooth™ data were collected for the same 24-hour period at each location.

- | | |
|---|---|
| 1. WCR 74 west of SH 257 | 5. Main Street (SH 257 / SH 392) west of 4 th Street |
| 2. SH 257 north of WCR 74 | 6. SH 392 east of Hollister Lake Road |
| 3. WCR 74 east of Hollister Lake Road | 7. Crossroads Boulevard west of Pelican Farms Road |
| 4. SH 392 (Main Street) west of 11 th Street | 8. SH 257 south of Crossroads Boulevard |

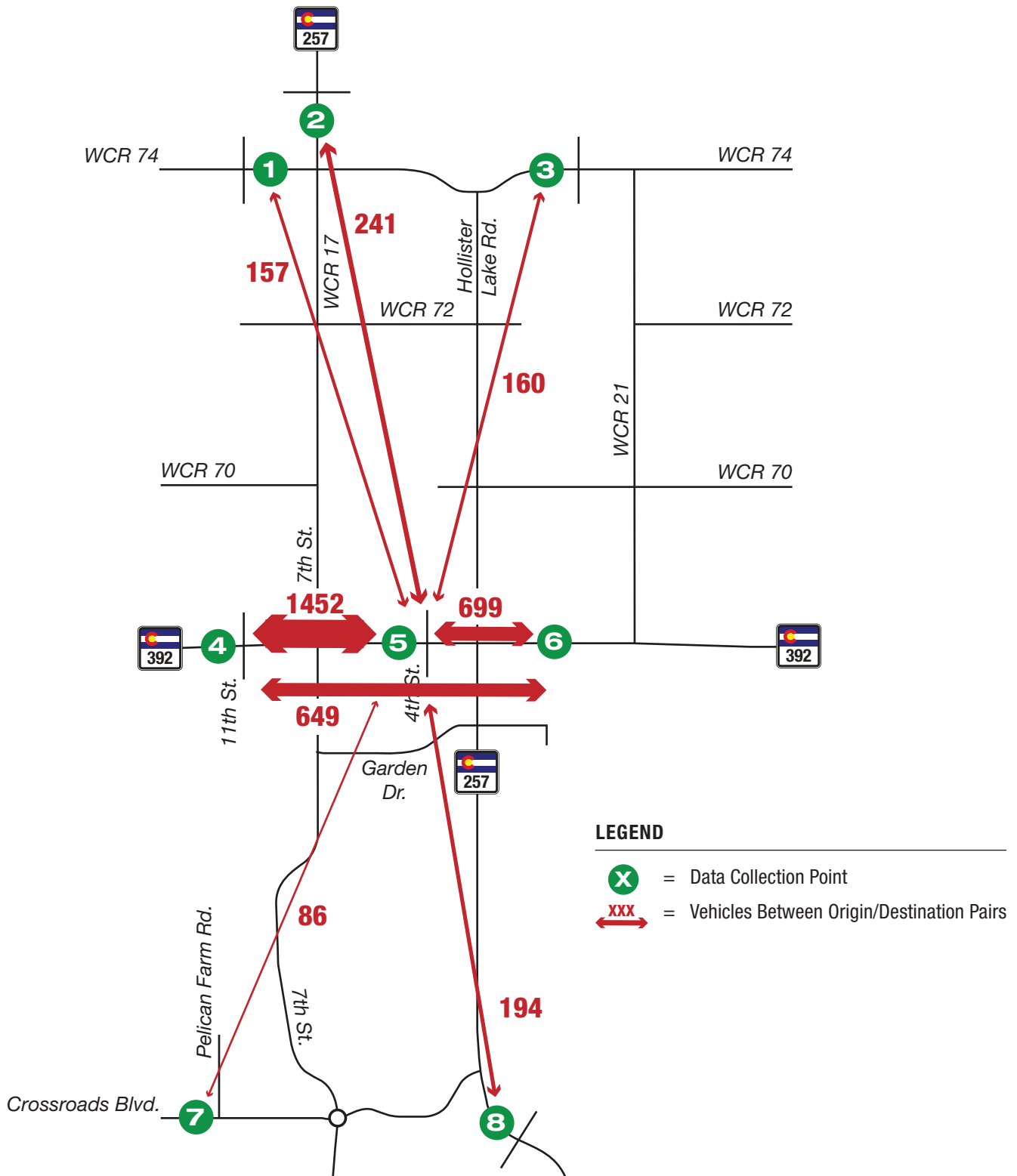
It is important to note that Bluetooth™ data collection has various limitations. To be recorded, a vehicle must have a cell phone in it, the phone must be turned on, and the phone must be actively searching for a Wi-Fi connection. Hence, the Bluetooth™ data collection does not capture every vehicle. Even with these limitations, a total of approximately 472,500 data points were recorded.

These 472,500 data points also have limitations. When more than one person carrying an active cell phone is in a vehicle, more than one data point can be recorded for that vehicle at that location. During congested conditions, a slow-moving vehicle may be recorded numerous times at a given station while the cell phone is within range of that Bluetooth™ data collection device. Motorists can pass through a data collection station, stop at a destination, and return past the same data collection station, showing up as a duplicate record at a later time. The Bluetooth™ dataset was filtered to remove these duplicate records, resulting in unique records for each vehicle at each data collection point.

The next step in the analysis was to determine how many of the unique records appeared at more than one data collection point. Vehicles that showed up at several data collection stations give a snapshot of travel patterns, as they can be shown to go from one station to another. A total of about 3,600 individual data points were found to appear at multiple Bluetooth™ data collection points. These data are summarized on **Figure 15** and in the following bullets:

- Most vehicles that travel through the downtown Windsor data collection location (Main Street west of 4th Street) have origins and/or destinations along SH 392 (Main Street). Almost 1,500 vehicles traveled between 11th and 4th Streets, while another 700 traveled between 4th Street and Hollister Lake Road. An additional 650 vehicles traveled through downtown between 11th Street and Hollister Lake Road. This is intuitive since SH 392 is an important east/west route in northern Colorado.
- Travel between other data collection locations and the downtown Windsor data collection location represents only a fraction of the east/west movements along Main Street. About 200 vehicles traveled between SH 257 at Crossroads Boulevard and the downtown Windsor data collection location, while another 250 traveled between the downtown Windsor data collection location and SH 257 north of WCR 74. These data suggest that not many motorists follow SH 257 through downtown to travel between the Crossroads area and the WCR 74 area. Given the number of alternative routes (including 7th Street and Hollister Lake Road), it is not surprising that motorists familiar with Windsor avoid Main Street during times of anticipated congestion.

Regardless of potential limitations, the Bluetooth™ data are a valuable resource to provide origin and destination information for the project.



3. Main Street Evaluation

Chapter 3 summarizes the traffic operations analyses prepared for the Windsor Downtown Alternate Route Study. Traffic analyses are based on project traffic data summarized in **Chapter 2**. They also use traffic signal timing data and geometric conditions information gathered in support of the traffic operational analysis process. The results are summarized in **Section 3.4** and **Appendix C, Traffic Operations Technical Memorandum**. Pedestrian and bicycle connectivity evaluations were also performed and are presented in **Section 3.5** and **Section 3.6**, respectively. A truck access evaluation was also conducted, which is presented in **Section 3.7**.

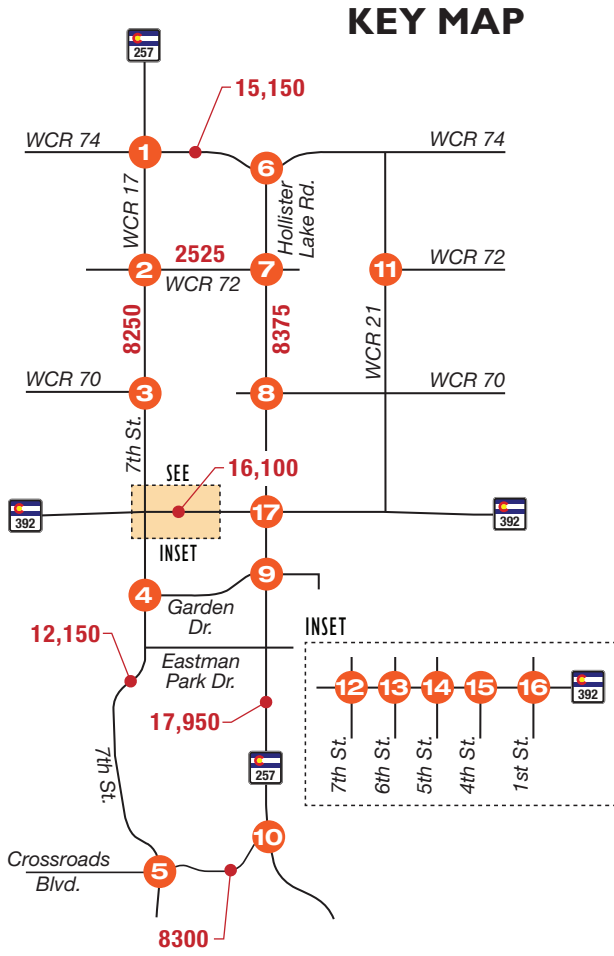
3.1 Existing Conditions Data

The traffic operational analyses for the Windsor Downtown Alternate Route Study began with the existing counts presented in **Chapter 2**. The project team reviewed these counts to determine the morning and afternoon peak hours to be evaluated. Peak hours were found to be:

- AM peak hour: 7:30 AM to 8:30 AM
- PM peak hour: 4:45 PM to 5:45 PM

Figure 16 shows the resulting existing condition volumes, which are adjusted to reflect a consistent peak hour across the network.

Using these peak hour data, the project team calculated peak hour factors, percent heavy vehicles, and other operational inputs. The project team obtained existing traffic signal timings from CDOT for signalized intersections in the study area, while they obtained geometric data such as number of lanes, turn pocket lengths, and lane assignments from aerial photography and field visits.



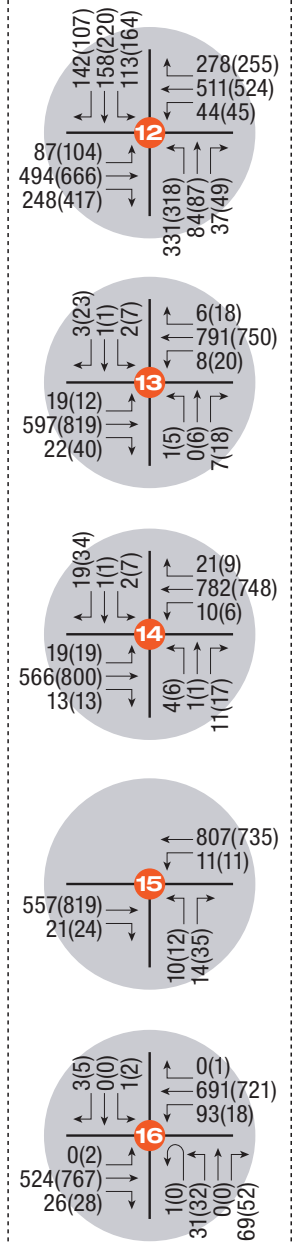
LEGEND

xxx(xxx) = AM(PM) Peak Hour Traffic Volumes

XXXX = Daily Traffic Volumes



INSET INTERSECTIONS



3.2 Future Year Forecasts

The Windsor Downtown Alternate Route Study is evaluating two future years: short-term (2027) and long-term (2042). Volume forecasts were developed for each future year. The project team evaluated two sources to determine an appropriate growth rate.

3.2.1 CDOT Growth Rates

Data from **Chapter 2** indicate an annual growth rate between 2.08 percent per year and 2.38 percent per year on SH 257 and between 1.44 percent per year and 2.05 percent per year on SH 392 in the Windsor area, as shown in **Table 7**. These data point to an overall annual growth rate of approximately 2 percent per year in the study area.

Table 7. State Highway Growth Rates

Route	Between		Annual Growth Rate
SH 257	Eastman Park Drive	E Garden Drive	2.08%
SH 257	E Chestnut Street	E Main Street / SH 392	2.08%
Main Street (SH 257)	Hollister Lake Road	1 st Street	2.15%
Main Street (SH 257)	6 th Street	7 th Street	2.12%
SH 257	7 th Street	Birch Street	2.18%
SH 257	WCR 80	SH 14	2.38%
SH 392	Westgate Drive	LCR 5	1.44%
Main Street (SH 392)	10 th Street	7 th Street	2.05%
Main Street (SH 392)	Hollister Lake Road	WCR 21	2.01%
SH 392	WCR 23	WCR 25	1.91%

LCR = Larimer County Road

SH = State Highway

WCR = Weld County Road

3.2.2 Travel Demand Model Growth Rates

The project team compiled data from the North Front Range Metropolitan Planning Organization (NFRMPO) travel demand model for 29 links in the study area, including state highways, county roads, and local streets. The goal of this effort was to expand the dataset used to determine the growth rate beyond the state highway data described in **Chapter 2**. As shown in **Table 8**, the growth rates range from 2.36 percent per year to 9.94 percent per year, with an average of 4.76 percent per year. These data point to a forecasted annual growth rate of between 4 percent and 5 percent per year across the study area.

Table 8. NFRMPO Growth Rates

Route	Between		Annual Growth Rate
SH 257	WCR 74	WCR 76	6.33%
WCR 74	Valleyview Circle	SH 257	4.13%
WCR 74	SH 257	Hollister Lake Road	5.32%
WCR 74	Hollister Lake Road	WCR 21	5.44%
SH 257	WCR 72	WCR 74	4.26%
Hollister Lake Road	WCR 72	WCR 74	9.94%
WCR 72	SH 257	Hollister Lake Road	2.36%
SH 257	WCR 70	WCR 72	6.06%
Hollister Lake Road	WCR 70	WCR 72	5.21%
SH 257	SH 392	WCR 70	6.08%
Hollister Lake Road	SH 392	WCR 70	4.67%
Main Street	10 th Street	7 th Street	3.74%
Main Street	7 th Street	3 rd Street	4.32%
Main Street	3 rd Street	1 st Street	4.56%
Main Street	1 st Street	Hollister Lake Road	5.19%
Main Street	Hollister Lake Road	Consolidated Law Ditch	5.03%
7 th Street	Walnut Street	Main Street	3.09%
SH 257	Walnut Street	Main Street	4.68%
7 th Street	Garden Drive	Stone Mountain Road	2.93%
SH 257	Garden Drive	Walnut Street	5.30%
7 th Street	Eastman Park Drive	Hemlock Drive	2.85%
SH 257	Eastman Park Drive	GWRR	5.22%
7 th Street	Crossroads Boulevard	Hilltop Drive	2.80%
SH 257	Crossroads Boulevard	Cache La Poudre River	4.29%
Crossroads Boulevard	WCR 15.75	7 th Street	4.46%
Crossroads Boulevard	7 th Street	New Liberty Road	4.88%
Crossroads Boulevard	New Liberty Road	SH 257	5.39%
7 th Street	WCR 60.5	Crossroads Boulevard	6.32%
SH 257	Rancho Drive	Crossroads Boulevard	3.07%

GWRR = Great Western Railroad

SH = State Highway

WCR = Weld County Road

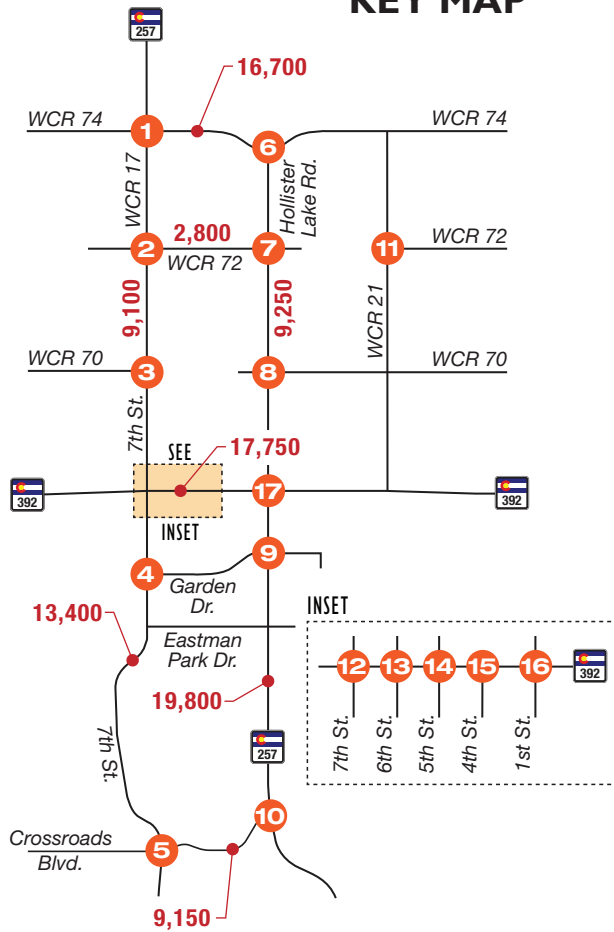
3.2.3 Final Future Year Forecasts

The project team reviewed the CDOT growth rates and the NFRMPO travel demand model growth rates with Windsor staff. Based on this review, the project team developed the following approach to future year forecasts for the Windsor Downtown Alternate Route Study:

- Apply a 2 percent annual growth rate to existing counts for both forecast years.
- Add supplemental traffic from the connection of WCR 72 to Hollister Lake Road from the east (Town of Severance) to the network. This connection does not currently exist but is planned as development along this corridor occurs. It will bring traffic to the Windsor study area when it is completed.

With this process, the CDOT 2 percent per year annual growth is increased somewhat by the addition of WCR 72 traffic, bringing overall growth closer to the forecasts from the NFRMPO travel demand model. The resulting annual growth is reasonable when compared to common traffic engineering practice. The forecasted volumes for 2027 and 2045 are presented on **Figure 17** and **Figure 18**, respectively.

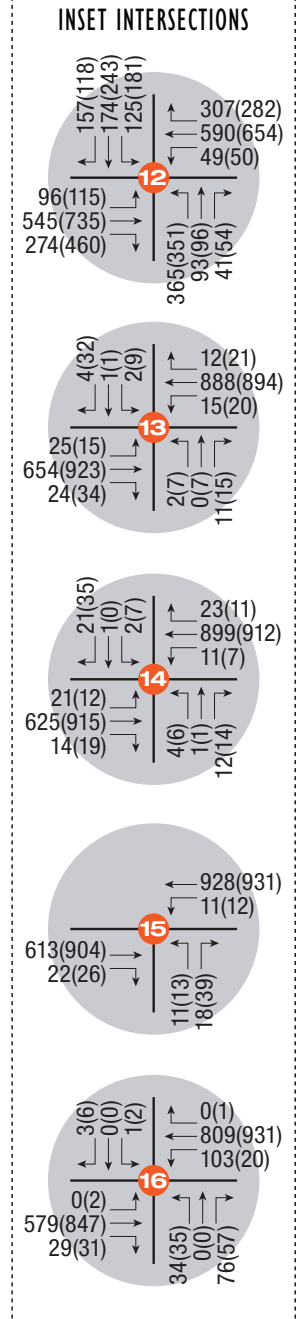
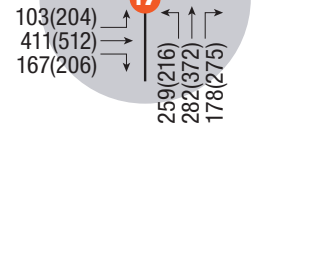
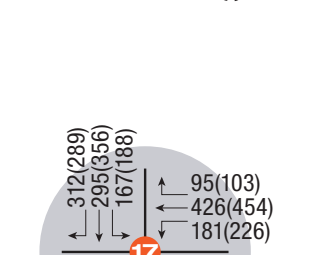
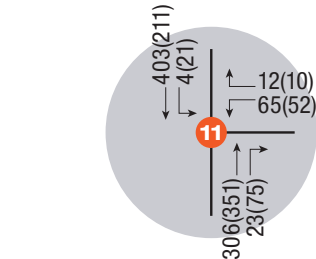
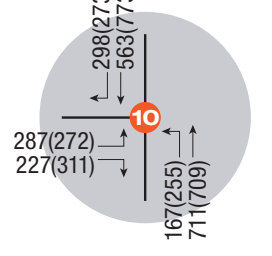
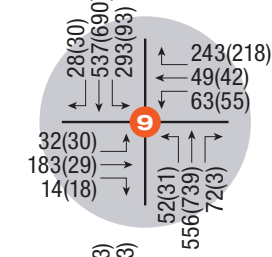
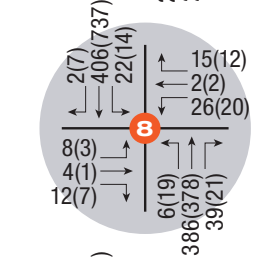
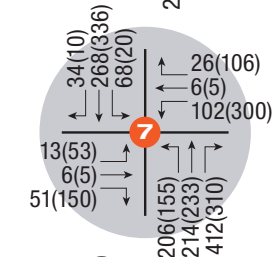
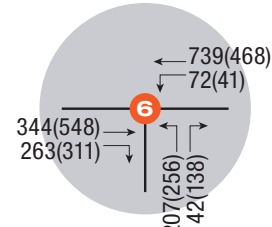
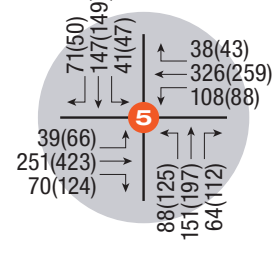
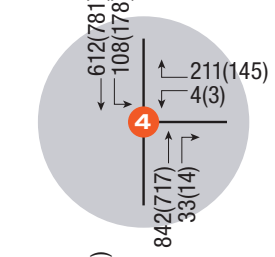
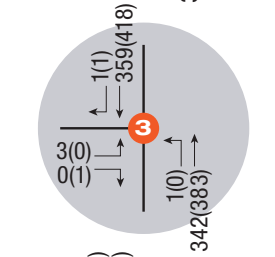
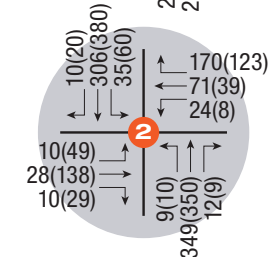
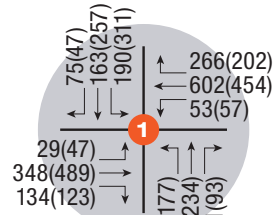
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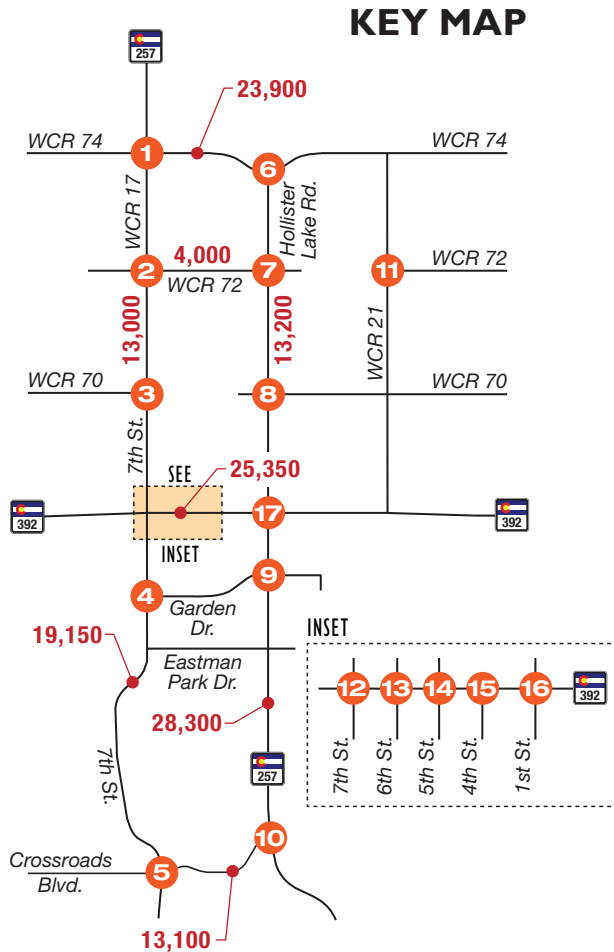


LEGEND

xxx(xxx) = AM(PM) Peak Hour Traffic Volumes

XXXX = Daily Traffic Volumes

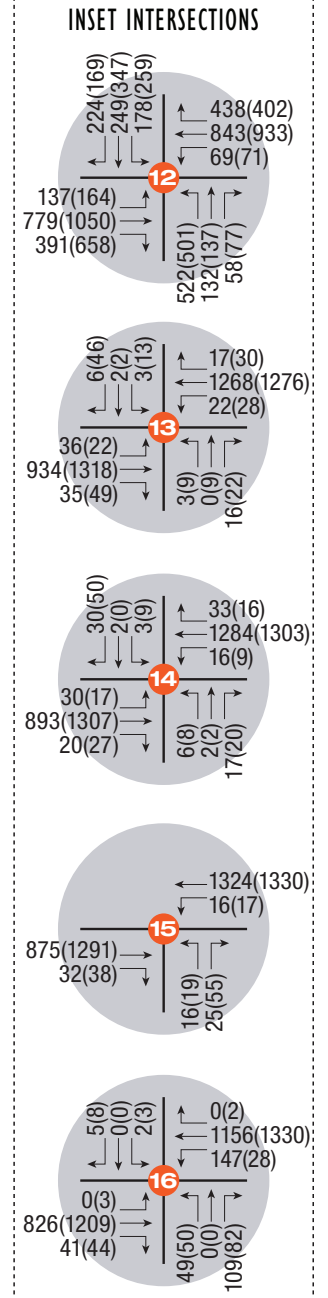
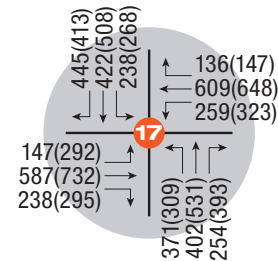
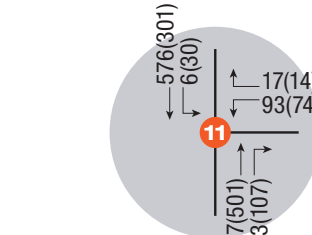
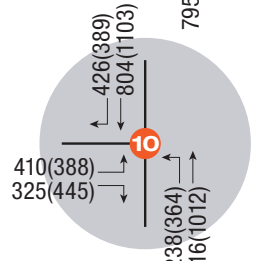
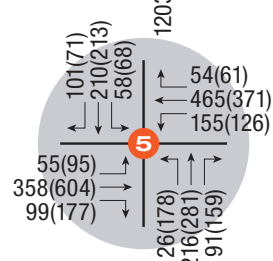
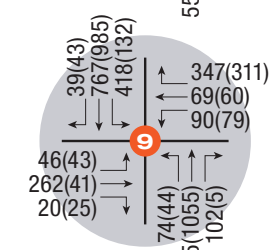
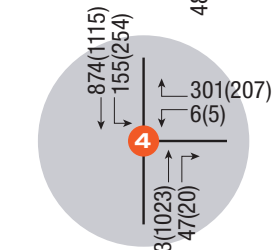
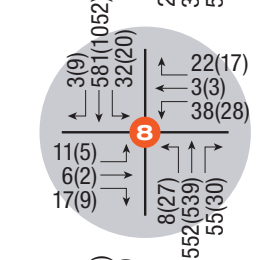
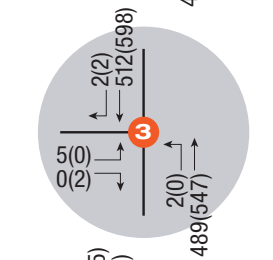
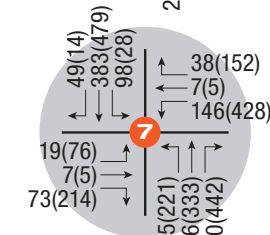
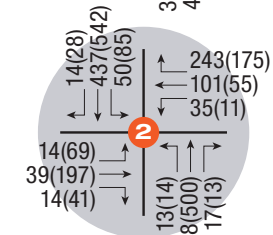
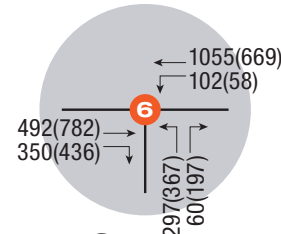
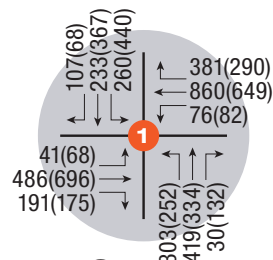




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xxx(xxx) = AM(PM) Peak Hour Traffic Volumes

XXXX = Daily Traffic Volumes



3.3 Traffic Operations

The project team used the volumes and supporting data described previously to evaluate traffic operations under existing (2022) and future (short-term and long-term) scenarios.

3.3.1 Analysis Methodology

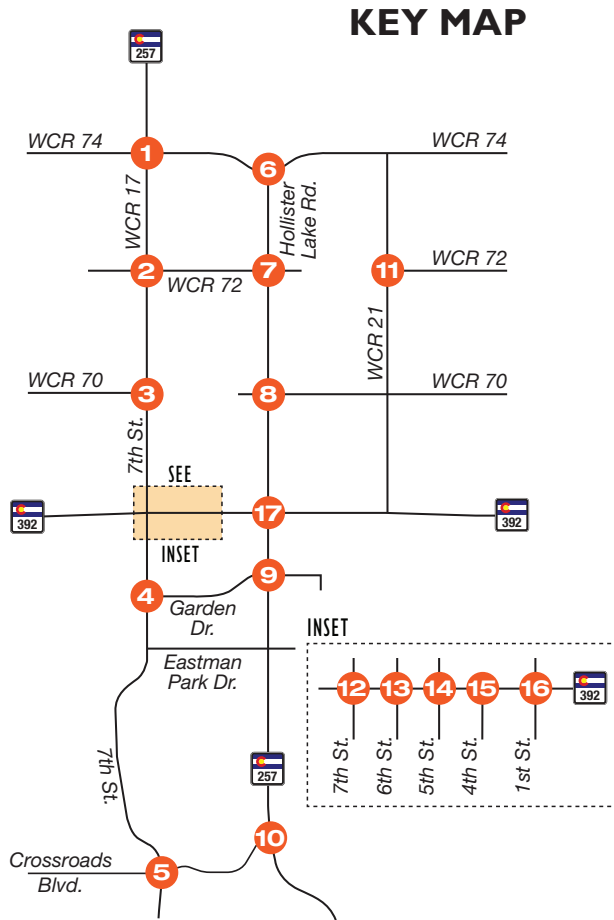
Traffic operations within the study area were evaluated according to techniques documented in the Highway Capacity Manual, Sixth Edition (HCM)¹. Synchro (version 11) and SIDRA Intersection (version 8) were used for the HCM evaluations. Level of Service (LOS), a qualitative measure of traffic operational conditions based on roadway capacity and vehicle delay, was determined for all movements that must yield right-of-way to other traffic movements. LOS is described by a letter designation ranging from LOS A to LOS F, with LOS A representing nearly free-flow travel and LOS F representing congested conditions. LOS D (or better) is considered adequate in most jurisdictions and was used to define acceptable operations in this study.

3.3.2 Existing Conditions

The existing conditions analysis used the year 2022 AM and PM peak hour volumes with existing geometry, signal timings, and other inputs to evaluate current traffic operations. The results of this process are shown on **Figure 19**. The signalized intersections operate at LOS D or better in both peak periods. The Crossroads Boulevard / 7th Street roundabout also operates acceptably. However, several stop-controlled intersections exhibit poor operations (LOS E or LOS F) on the side street approaches:

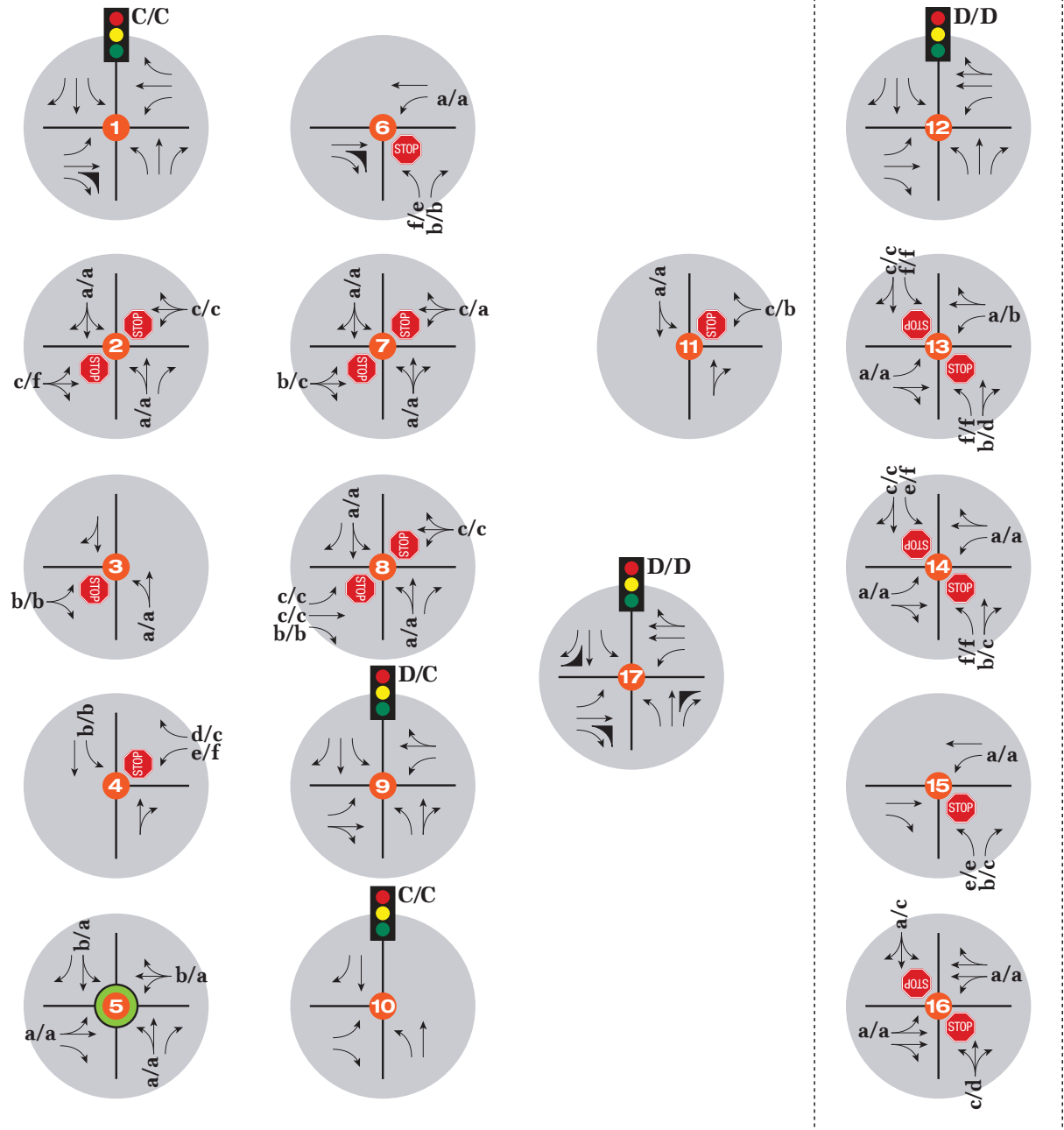
- The eastbound approach to the WCR 72 intersection with SH 257 (#2) operates at LOS F in the PM peak hour. Due to the flared nature of both the eastbound and westbound approaches to this intersection, actual operations may be better than indicated by the operational analysis.
- The westbound left turn lane at the Garden Drive intersection with 7th Street (#4) operates at LOS E in the AM peak hour and at LOS F in the PM peak hour. Although the left turn movement operates poorly, the left turning volume is low and the overall westbound approach operates acceptably.
- The northbound approach to the Hollister Lake Road intersection with WCR 74 (#6) operates at LOS F in the AM peak hour and at LOS E in the PM peak hour. This intersection is within the Town of Severance's Growth Boundary. Their Transportation Master Plan (TMP) identifies WCR 74 improvements through this intersection by year 2040.
- Various side street approaches from 4th Street, 5th Street, and 6th Street onto Main Street in downtown Windsor operate at LOS E or LOS F in the AM and PM peak hours. This is consistent with the urban nature of Windsor's central business district.

¹ *Highway Capacity Manual, 6th Edition – A Guide for Multimodal Analysis*, Transportation Research Board, Washington DC, 2016.



LEGEND

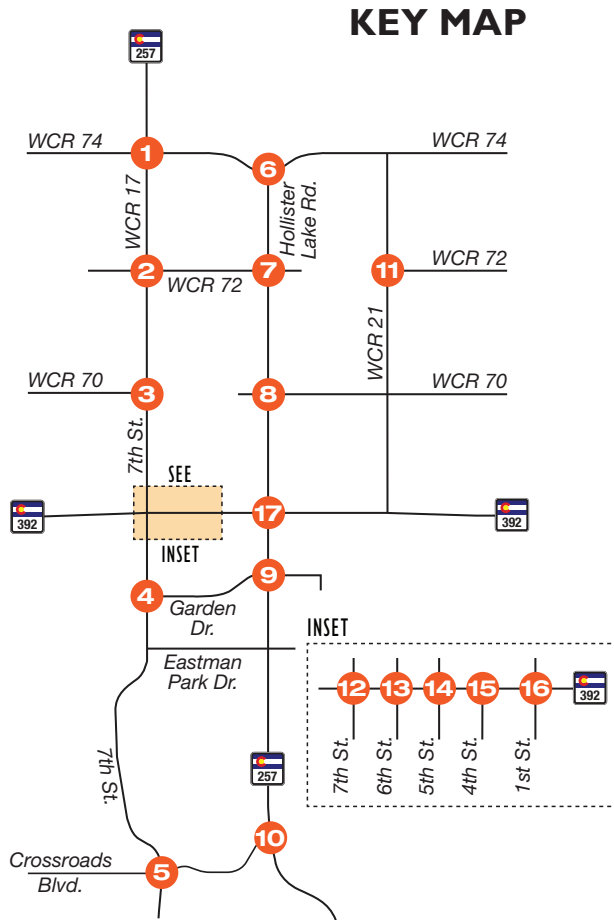
- X/X = AM/PM Peak Hour Signalized Intersection Level of Service
- x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service
- = Stop Sign
- = Traffic Signal
- = Roundabout



3.3.3 Short-Term (2027) Conditions

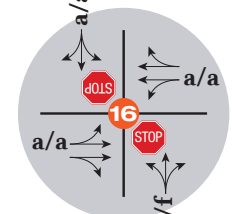
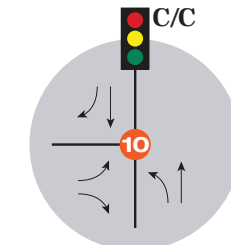
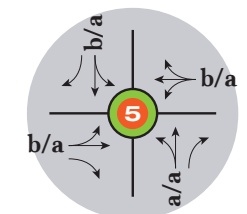
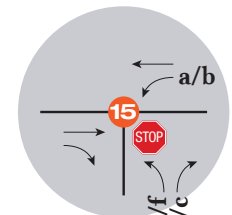
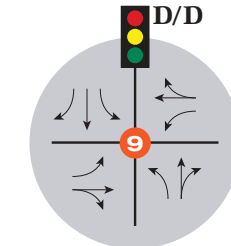
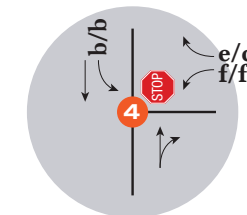
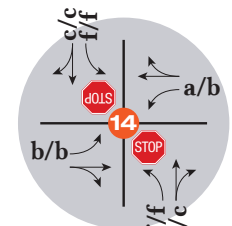
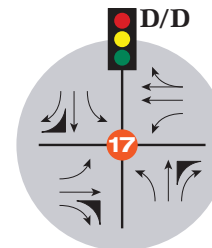
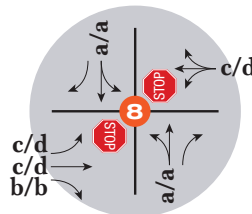
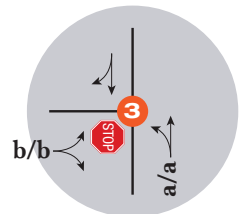
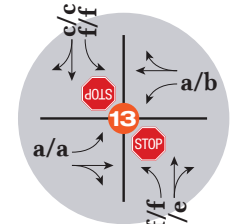
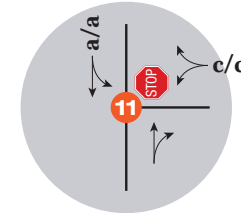
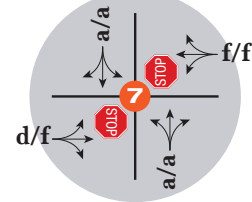
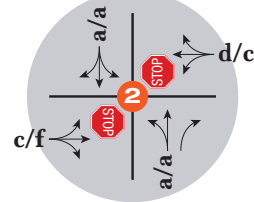
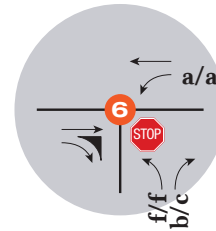
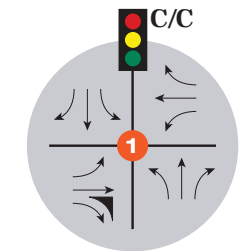
The short-term conditions analysis used the forecasted 2027 AM and PM peak hour volumes with existing geometry, signal timings, and other inputs to evaluate short-term traffic operations. The results of this process are shown on **Figure 20**. Several signalized intersections continue to operate at LOS D or better in both peak periods, but two signalized intersections drop to LOS E in at least one peak period. The Crossroads Boulevard / 7th Street roundabout continues to operate acceptably. Again, several stop-controlled intersections exhibit poor operations on the side street approaches:

- The eastbound approach to the WCR 72 intersection with SH 257 (#2) continues to operate at LOS F in the PM peak hour. Due to the flared nature of both the eastbound and westbound intersection approaches, actual operations may be better than indicated by the analysis.
- The westbound left turn lane at the Garden Drive intersection with 7th Street (#4) operates at LOS F in the AM and PM peak hours, and the westbound right turn lane operates at LOS E in the AM peak hour. Given existing constraints at the intersection, potential mitigations are limited. Since the neighborhood to the east along Garden Drive is essentially built out limiting future traffic growth along Garden Drive, no mitigations are recommended.
- The northbound approach to the Hollister Lake Road intersection with WCR 74 (#6) operates at LOS F in the AM and PM peak hours. As noted under existing conditions, Severance's TMP identifies future WCR 74 improvements in this area.
- The westbound approach to the Hollister Lake Road intersection with WCR 72 (#7) operates at LOS F in both the AM and PM peak hours, while the eastbound approach operates at LOS F in the PM peak hour. This intersection is also within the Town of Severance's Growth Boundary. Appropriate improvements should be considered when the westbound approach to this intersection is built.
- One approach of the signalized intersection of Main Street and 7th Street (#12) drops to LOS E in the PM peak hour with existing timings. Optimized signal timings can restore LOS D or better operations, but the intersection should be monitored for potential geometric improvements.
- Various side street approaches from 4th Street, 5th Street, and 6th Street onto Main Street in downtown Windsor operate at LOS E or LOS F in the AM and PM peak hours, similar to existing conditions and consistent with the urban nature of Windsor's central business district.
- The northbound approach to the 1st Street intersection with Main Street (#16) operates at LOS F in the AM and PM peak hours. Windsor recently resurfaced 1st Street between Main Street and Walnut Street. The project included striped bike lanes and parking on both sides of the street in accordance with Windsor's TMP. Although the restriping does not improve vehicular operations, it provides enhanced bicycle and pedestrian access. The bike lanes and parking should be retained in lieu of modifications that could improve traffic operations.
- The signalized intersection of Main Street and Hollister Lake Road (#17) drops to LOS E in the AM and PM peak hours with existing timings and geometry. Windsor is currently designing improvements at this location, which are anticipated to result in acceptable future year operations in the short-term horizon.

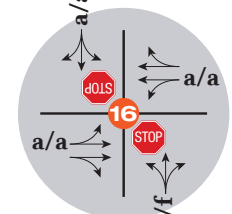
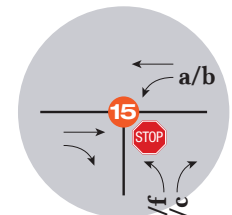
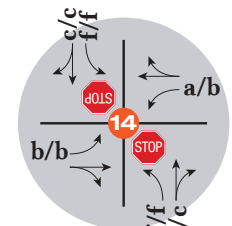
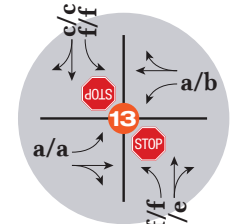
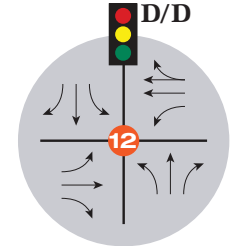


LEGEND

- X/X = AM/PM Peak Hour Signalized Intersection Level of Service
- x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service
- = Stop Sign
- = Traffic Signal
- = Roundabout



INSET INTERSECTIONS



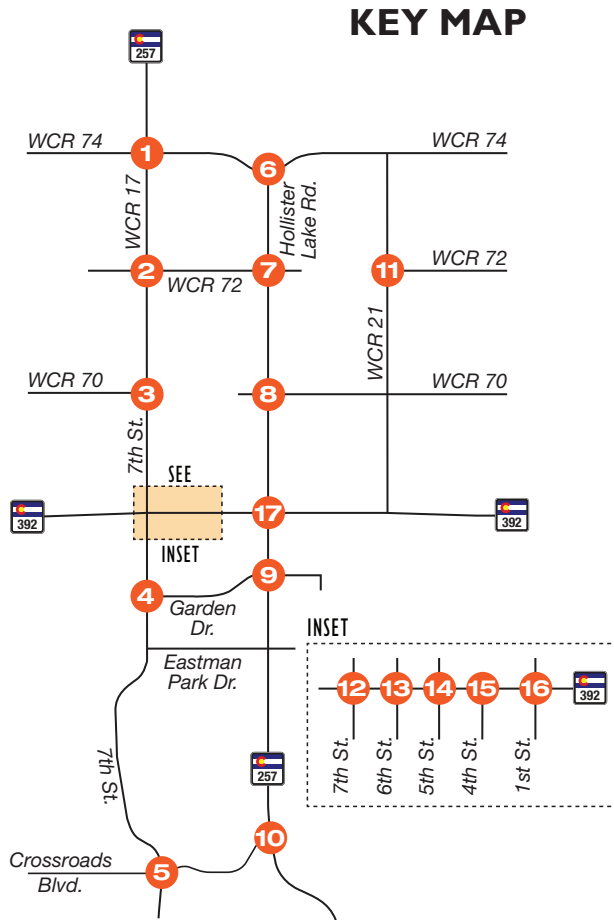
3.3.4 Long-Term (2045) Conditions

The long-term conditions analysis used the forecasted 2045 AM and PM peak hour volumes with existing geometry, signal timings, and other inputs to evaluate long-term traffic operations. The results of this process are shown on **Figure 21**. Most signalized intersections drop to LOS E or F in at least one peak period. The Crossroads Boulevard / 7th Street roundabout continues to operate acceptably overall, but one approach drops to LOS F. By 2045, most stop-controlled intersections exhibit poor operations on the side street approaches:

- The signalized intersection of WCR 74 and 7th Street (#1) drops to LOS F in the AM peak hour and LOS E in the PM peak hour, assuming traffic signal retiming but no changes to intersection geometry. As noted under existing conditions, Severance's TMP identifies future WCR 74 improvements in this area.
- The eastbound approach to the WCR 72 intersection with SH 257 (#2) operates at LOS F in the AM and PM peak hours, while the westbound approach operates at LOS F in the AM peak hour. Although the flared nature of both the eastbound and westbound approaches to this intersection will help, operations by 2045 deteriorate to the point where more substantial improvements may be necessary. These improvements may be coupled with development as it occurs along the WCR 72 corridor.
- Both the westbound left turn lane and the westbound right turn lane at the Garden Drive intersection with 7th Street (#4) operate at LOS F in the AM and PM peak hours. Given existing constraints at the intersection, potential mitigations are limited. Since the neighborhood to the east along Garden Drive is essentially built out limiting future traffic growth along Garden Drive, no mitigations are recommended.
- The westbound approach to the Crossroads Boulevard roundabout at 7th Street (#5) operates at LOS F in the AM peak hour. Because this roundabout has been constructed with additional pavement on the westbound approach, it can be restriped as a 2-lane approach to address the anticipated operational shortfall when needed.
- The northbound approach to the Hollister Lake Road intersection with WCR 74 (#6) operates at LOS F in the AM and PM peak hours. As noted under existing conditions, Severance's TMP identifies future WCR 74 improvements in this area.
- The eastbound and westbound approaches to the Hollister Lake Road intersection with WCR 72 (#7) operate at LOS F in the AM and PM peak hours. This intersection is also within the Town of Severance's Growth Boundary. Appropriate improvements should be considered when the westbound approach to this intersection is built.
- The signalized intersection of Garden Drive and SH 257 (#9) drops to LOS F in the AM and PM peak hours with existing timings and geometry. Retiming results in operational improvements, but LOS F remains in both peak hours. The intersection should be monitored for potential geometric improvements.
- The signalized intersection of Crossroads Boulevard and SH 257 (#10) drops to LOS F in the PM peak hour with existing timings and geometry, and retiming does not restore acceptable operations. The eastbound approach provides additional width that is currently striped out.

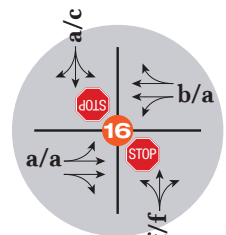
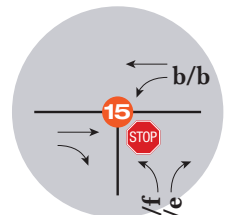
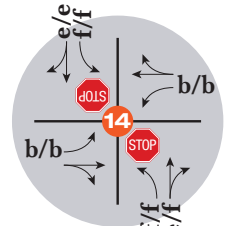
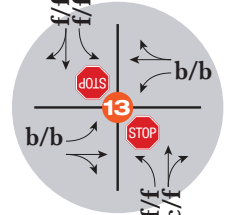
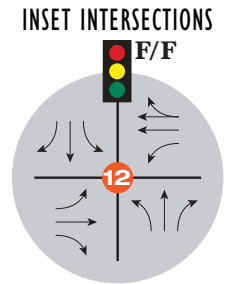
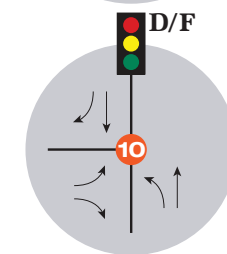
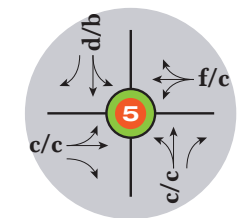
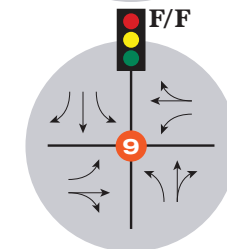
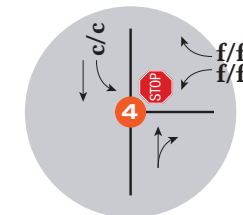
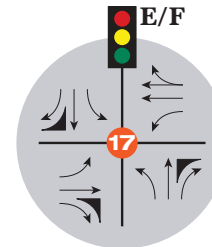
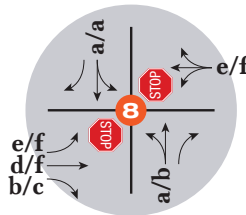
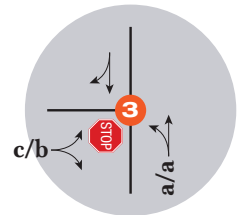
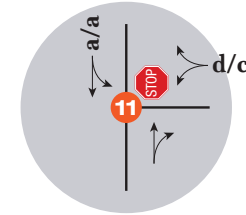
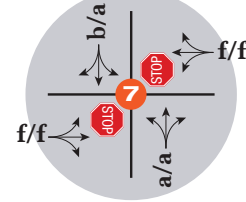
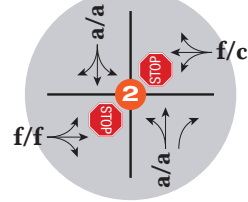
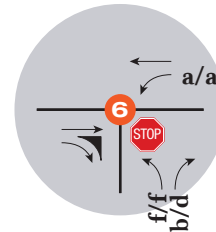
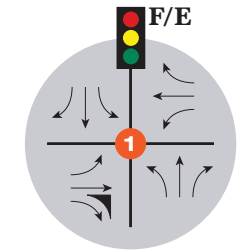
This width, coupled with either widening along Hollister Lake Road or extension of Crossroads Boulevard to the east, could improve operations.

- The signalized intersection of Main Street and 7th Street (#12) drops to LOS F in the AM and PM peak hours with existing timings. Optimized signal timings can improve operations for some movements, but deficiencies will remain. The intersection should be monitored for potential geometric improvements.
- Various side street approaches from 4th Street, 5th Street, and 6th Street onto Main Street in downtown Windsor operate at LOS E or LOS F in the AM and PM peak hours. This is similar to existing conditions and is consistent with the urban nature of Windsor's central business district.
- The northbound approach to the 1st Street intersection with Main Street (#16) continues to operate at LOS F in the AM and PM peak hours. As noted in the short-term (2027) scenario, no improvements are recommended.
- The signalized intersection of Main Street and Hollister Lake Road (#17) drops to LOS F in the AM and PM peak hours with existing timings and geometry. Windsor is currently designing improvements at this location that are anticipated to result in acceptable short-term operations. However, long-term shortfalls have still been identified after completion of the planned short-term project. Improvements to address these long-term shortfalls have been identified as part of the current design effort, but these long-term improvements have not been committed to. After completion of the short-term improvements, the intersection should be monitored to determine the timing of the identified long-term improvements.



LEGEND

- X/X = AM/PM Peak Hour Signalized Intersection Level of Service
- x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service
- = Stop Sign
- = Traffic Signal
- = Roundabout



3.3.5 Volume to Capacity Ratio Analysis

The project team also reviewed the number of lanes and volume to capacity (v/c) ratios in the NFRMPO travel demand model to identify potential needs for roadway corridor improvements. The travel demand model reflects both the existing roadway network (as of year 2015) and committed long-term future improvements (assumed in year 2045) at a planning level.

Since the planning nature of the travel demand model does not provide LOS, v/c ratios have been used to reflect traffic operations. The v/c ratio is obtained by dividing the roadway volume by the roadway capacity. The resulting ratio indicates roadways where operations are reasonable (v/c ratios below 0.80), where operations are nearing capacity (v/c ratios between 0.80 and 0.95), where operations are at capacity (v/c ratios between 0.95 and 1.05), and where operations are over capacity (v/c ratios greater than 1.05).

Laneage Review

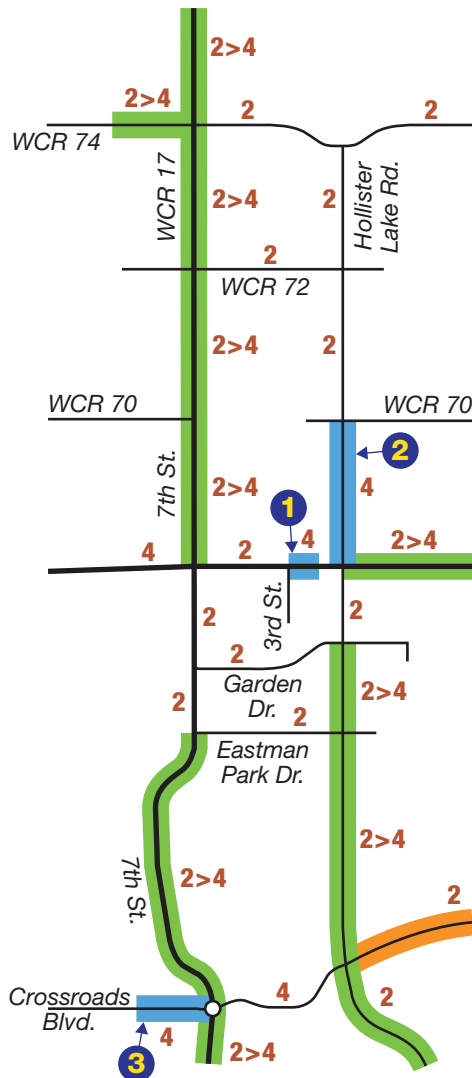
The first step in the v/c ratio analysis was to review the roadway laneage shown in the NFRMPO travel demand model for study area roadways. The results of this effort are shown on **Figure 22**. The following laneage observations were made about the existing conditions model:

- Most study area roadways are 2-lane facilities (one lane per direction) in the existing year model, consistent with current conditions.
- Four-lane roadway segments include SH 392 (Main Street) west of 7th Street and Crossroads Boulevard between SH 257 and 7th Street.
- Three roadway laneage inconsistencies were noted in the existing conditions model:
 - ◆ Crossroads Boulevard west of 7th Street is shown in the model as a 2-lane facility. However, this roadway is currently 4 lanes. This widening was constructed after the 2015 travel demand model was developed.
 - ◆ Main Street between 1st Street and 3rd Street is shown in the model as a 4-lane facility. However, this roadway is currently 2 lanes. This segment was reduced to 2 lanes when downtown parking and roadway improvements were extended east past the Great Western Railroad crossing as part of the Windsor Mill redevelopment.
 - ◆ Hollister Lake Road between Main Street and WCR 70 is shown in the model as a 2-lane facility. However, significant portions of this segment are 4 lanes today, and plans exist to widen the northbound side of Hollister Lake Road between Main Street and Sundance Lane to 4 lanes. With these changes, Hollister Lake Road would be 4 lanes throughout this segment, except for the 2-lane structure over Consolidated Law Ditch.

The following laneage observations were made about the long-term future conditions model:

- The roadway laneage inconsistencies noted in the existing conditions model were unchanged in the future year model.
- The following roadway segment upgrades are shown in the future year model:
 - ◆ WCR 74 is shown to be upgraded from 2 lanes to 4 lanes from SH 257 westward out of the study area.
 - ◆ 7th Street (SH 257) is shown to be upgraded from 2 lanes to 4 lanes from Main Street north through WCR 70 and WCR 72, and the widening continues northward out of the study area past WCR 74.
 - ◆ 7th Street is shown to be upgraded from 2 lanes to 4 lanes from south of the study area northward past Crossroads Boulevard to Eastman Park Drive.
 - ◆ Hollister Lake Road (SH 257) is shown to be upgraded from 2 lanes to 4 lanes from south of the study area northward past Crossroads Boulevard and Eastman Park Drive to Garden Drive.
 - ◆ Crossroads Boulevard is shown to be extended east as a new roadway past SH 257 to at least WCR 23 as a 2-lane facility.
 - ◆ Main Street (SH 392) is shown to be upgraded from 2 lanes to 4 lanes from Hollister Lake Road eastward out of the study area past WCR 21.

Laneage

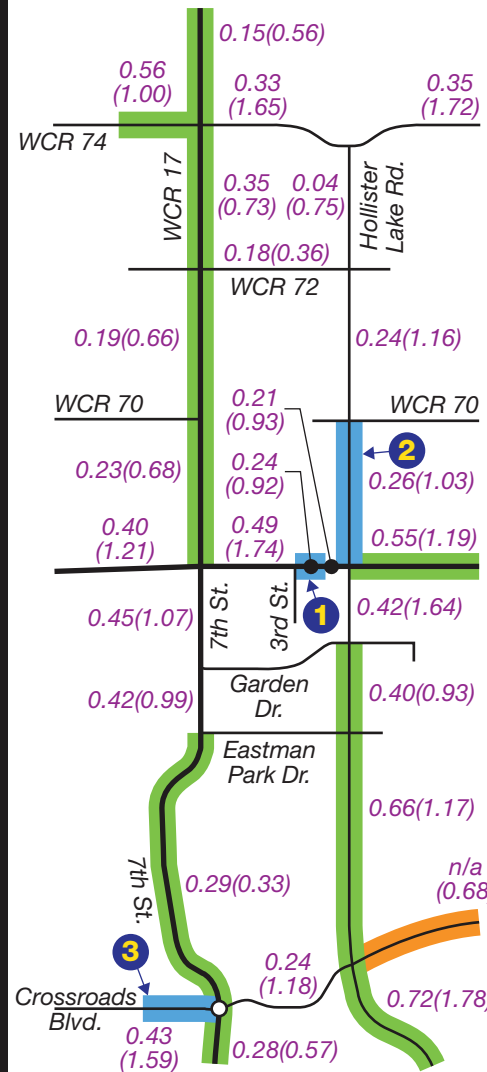


LEGEND

- XX** = Number of Lanes
- = Modeled Roadway Widening
- = Model Inconsistency
- = Modeled New Facility

- 1** The model shows Main Street as 4 lanes, while this segment is 2 lanes.
- 2** The model shows Hollister Lake Road as 2 lanes between Main Street and WCR 70. The majority of this segment is 4 lanes and remaining 2 lane segments are being widened.
- 3** The model shows Crossroads Boulevard west of 7th Street as 2 lanes. This segment is currently 4 lanes.

V/C Ratios



LEGEND

- X.XX** = Existing(Future) V/C Ratio
- (X.XX)** = Modeled Roadway Widening
- = Model Inconsistency
- = Modeled New Facility

- 1** As a 2-lane facility, Main Street between 1st Street and 3rd Street has modeled v/c ratios of 0.52(2.00).
- 2** As a 4-lane facility, Hollister Lake Road between Main Street and WCR 70 has modeled v/c ratios of 0.13(0.52).
- 3** As a 4-lane facility, Crossroads Boulevard west of 7th Street has modeled v/c ratios of 0.22(0.80).

V/C Ratios

Based on the laneage and volumes described previously, v/c ratios were calculated along key study area roadways. The calculated v/c ratios for existing conditions were in the reasonable range (at or below 0.85). In the long-term future year, many segments dropped below the reasonable range, as indicated on **Figure 22**:

- WCR 74 west of SH 257 is shown to be at capacity even with the future widening to 4 lanes. Further, the segments from SH 257 eastward past Hollister Lake Road to the easterly study limit are shown to be over capacity. As noted in the intersection analysis, Severance's TMP identifies future WCR 74 widening in this area. The TMP improvements are not captured in the model.
- 7th Street (SH 257) north of Main Street to the northerly study limit (past WCR 74) is shown to be in the reasonable range with the anticipated widening to 4 lanes.
- 7th Street between Eastman Park Drive and Main Street is shown to be at or slightly over capacity. No widening is assumed in this segment. Further south, 7th Street between Crossroads Boulevard and Eastman Park Drive is shown to be in the reasonable range with the anticipated widening to 4 lanes. Given the low v/c ratios with the anticipated widening and the surrounding open space and residential developments, it is assumed that the widening could be delayed until after the 2045 travel demand model horizon. This would also reduce through traffic volume pressure on 7th Street between Eastman Park Drive and Main Street. Further south, 7th Street from the southern study area limit to Crossroads Boulevard is shown to be in the reasonable range with the anticipated widening to 4 lanes. However, because the v/c ratio would be over capacity if the widening were delayed, this widening should be completed by year 2045.
- Main Street (SH 392) from the westerly study limit to 7th Street is shown to be over capacity assuming the existing 4-lane section in the future year. Main Street from 7th Street to 3rd Street is shown to be substantially over capacity assuming the existing 2-lane section in the future year. This is expected given the congested nature of the downtown area. Main Street from 3rd Street to 1st Street is shown to be approaching capacity assuming the modeled 4-lane section in the future year. However, this segment is currently 2 lanes. Widening is not anticipated due to the existing surrounding development. As a 2-lane facility, the v/c ratio is over capacity. Main Street from 1st Street to Hollister Lake Road is approaching capacity in the future year with the modeled 4-lane section. Main Street (SH 392) from Hollister Lake Road to the eastern study area limit is over capacity in the future year even with the forecasted widening to 4 lanes.
- Hollister Lake Road between WCR 72 and WCR 74 is shown to be in the reasonable range with 2 lanes. Hollister Lake Road between WCR 70 and WCR 72 is shown to be over capacity with 2 lanes. Hollister Lake Road between Main Street and WCR 70 is shown to be at capacity with 2 lanes. However, as noted previously, this segment is already 4 lanes. With 4 lanes, this segment is in the reasonable range. As development occurs along Hollister Lake Road between WCR 70 and WCR 72, the roadway should be widened to 4 lanes to provide

adequate operations. This would result in reasonable operations along Hollister Lake Road from Main Street north to WCR 74.

- Hollister Lake Road (SH 257) between Garden Drive and Main Street is shown to be over capacity with 2 lanes. Windsor has acknowledged the need for improvements in this area as part of the Hollister Lake Road / Main Street intersection improvement project. That study identified converting the existing single lane roundabout at Hollister Lake Road / Pointe Plaza Drive to a 2-lane roundabout by year 2040. Hence, it is recommended that this segment be widened to 4 lanes by 2045. As a 4-lane facility, the v/c ratio would be approaching capacity. Hollister Lake Road (SH 257) between Eastman Park Drive and Garden Drive is shown to be approaching capacity with the forecasted widening to 4 lanes. Hollister Lake Road (SH 257) from the southerly study limit through Crossroads Boulevard to Eastman Park Drive is shown to be over capacity even with the forecasted widening to 4 lanes.
- Crossroads Boulevard from the westerly study limit to 7th Street is shown to be over capacity assuming the modeled 2-lane cross-section in the future year. However, this roadway is currently 4 lanes. With a 4-lane cross-section, the future v/c ratio is approaching capacity. Crossroads Boulevard from 7th Street to Hollister Lake Road (SH 257) is shown to be over capacity with the future 4-lane cross-section. Crossroads Boulevard east of Hollister Lake Road (SH 257) is a new roadway in the future year model. It is shown to operate reasonably with the planned 2-lane cross-section.

3.4 Operational Summary

The various analyses described previously provide a snapshot of what may be needed to support traffic operations in the Windsor area over the study's future timeline. **Table 9** summarizes future improvements.

Table 9. Future Improvements

Project	Timing	Responsibility
Improve intersection of Main Street / Hollister Lake Road and complete Hollister Lake Road widening to 4 lanes between Main Street and Sundance Lane	Short-term (part of current Main Street / Hollister Lake Road intersection project)	Windsor
Replace and widen Hollister Lake Road structure to 4 lanes over Consolidated Law Ditch	Short-term (planned)	Windsor
Widen WCR 74 west of SH 257 from 2 to 4 lanes	Long-term	Windsor
Widen WCR 74 east of SH 257 from 2 to 4 lanes	Long-term	Severance
Widen 7 th Street (SH 257) between Main Street and north of WCR 74 from 2 to 4 lanes	Long-term	Windsor, CDOT
Widen 7 th Street south of Crossroads Boulevard from 2 to 4 lanes	Long-term	Windsor
Restripe westbound approach to 7 th Street / Crossroads Boulevard intersection to provide 2 lanes	Mid-term, when operations degrade below LOS D	Windsor
Reduce Main Street from 4 lanes to 2 lanes between 2 nd Street and Greenspire Drive Extension (restriping)	Short-term	Windsor, CDOT
Widen Hollister Lake Road to 4 lanes between WCR 70 and WCR 72	Mid-term, as development warrants	Windsor, Severance, developers
Widen Hollister Lake Road (SH 257) to 4 lanes from south of Crossroads Boulevard to Main Street	Long-term	Windsor
Extend Crossroads Boulevard eastward from Hollister Lake Road (SH 257) to WCR 21 or beyond	Long-term	Windsor, Weld County

CDOT = Colorado Department of Transportation
SH = State Highway

LOS = Level of Service
WCR = Weld County Road

These results guide the potential for alternate routes in Windsor as follows:

- Main Street is congested today and is forecasted to remain that way. Hence, motorists preferring less congested routes are likely already avoiding downtown unless their destination is along Main Street.
- 7th Street (SH 257) from Main Street north to and past WCR 74 is operating reasonably today, supporting diversions away from downtown. With a widening to 4 lanes by 2045 shown in the travel demand model, operations will continue to be reasonable allowing diverted trips to continue using this route. However, if this widening is not realized, congestion may limit this route's effectiveness as an alternate route.
- 7th Street from south of Crossroads Boulevard to Main Street is operating reasonably today, supporting diversions away from downtown. Although the travel demand model includes a future widening to 4 lanes between Crossroads Boulevard and Eastman Park Drive, this widening is not expected to be required, as reasonable operations can be maintained with a 2-lane cross-section in this segment. Operations are expected to be at or slightly over capacity between Eastman Park Drive and Main Street in the future. Given the residential nature of this segment with some blocks providing only 60 to 70 feet of right-of-way, widening to 4 lanes is not feasible. The congestion in this area will deter through trips between areas to the south and the Main Street / 7th Street intersection.
- Hollister Lake Road from Main Street north to WCR 74 is operating reasonably today, supporting diversions away from downtown. With a widening to 4 lanes by 2045 between Main Street and WCR 72 shown in the travel demand model, operations will continue to be reasonable allowing diverted trips to continue using this route. However, if this widening is not realized, congestion may limit this route's effectiveness as an alternate route.
- Hollister Lake Road (SH 257) from south of Crossroads Boulevard north to Main Street is one of the busiest arterials studied, but it is operating reasonably today and supporting diversions away from downtown. Even with a widening to 4 lanes by 2045 between Crossroads Boulevard and Garden Drive as shown in the travel demand model, operations will be over capacity from south of Crossroads Boulevard to Eastman Park Drive. The planned extension of Crossroads Boulevard to the east may be one way to mitigate this congestion, although the easterly endpoint will dictate how much traffic could be diverted away from Hollister Lake Road. The widening to 4 lanes between Eastman Park Drive and Garden Drive would result in reasonable operations in this segment. Although the future conditions in the model do not include widening between Garden Drive and Main Street, this widening has been contemplated in other Windsor planning documents, and it would also result in reasonable operations. Hence, widening Hollister Lake Road (SH 257) from south of Crossroads Boulevard north to Main Street is recommended in the future to support alternate routes.

- WCR 74 from west of 7th Street to east of Hollister Lake Road is operating reasonably today, supporting diversions away from downtown. Future operations assuming the 4-lane section west of 7th Street shown in the travel demand model are forecasted to be at capacity. Future operations east of 7th Street as a 2-lane facility are forecasted to be congested in the travel demand model. Various Severance planning documents show a potential widening to 4 lanes. With these improvements, reasonable operations can be obtained, and they are recommended to support ongoing use of WCR 74 as an alternate route.
- WCR 72 between 7th Street and Hollister Lake Road is operating reasonably today and is forecasted to continue reasonable operations in the future year. Intersection improvements at 7th Street and Hollister Lake Road may be required as part of the widening for those corridors to retain the ability of WCR 72 to function as an alternate route.
- WCR 70 does not exist between 7th Street (SH 257) and Hollister Lake Road today, and it is not included in either the existing year or the future year travel demand model. Windsor is currently working with the development community to preserve this right-of-way, with an eventual goal of creating a new east-west roadway along this corridor. If completed, this would provide another east-west alternate route that connects 7th Street and Hollister Lake Road.
- Garden Drive connects 7th Street and Hollister Lake Road (SH 257) through residential neighborhoods today. Operational concerns have been identified at both 7th Street and Hollister Lake Drive intersections. Hence, it is not a feasible alternate route.
- Eastman Park Drive also connects 7th Street and Hollister Lake Road (SH 257) through residential neighborhoods today. Although operations along this corridor were not explicitly evaluated in the Alternate Route Study, the future year model shows it to be either approaching capacity or at capacity with the existing 2-lane cross-section. Given the residential nature of the surrounding development, widening to 4 lanes is not recommended. Hence, the utility of Eastman Park Drive as an alternate route is limited.
- Crossroads Boulevard from west of 7th Street to Hollister Lake Road (SH 257) is operating reasonably today, supporting diversions away from downtown. Future operations assuming the 4-lane section west of 7th Street shown in the travel demand model are forecasted to be reasonable. Future operations between 7th Street and Hollister Lake Road are forecasted to be congested in the travel demand model. A 2-lane extension to the east is anticipated to operate reasonably in the travel demand model. Although there are operational concerns between 7th Street and Hollister Lake Road, this corridor is recommended to support ongoing use as an alternate route. It may be feasible for another east-west route to the south or for enhanced connections to and from Crossroads Boulevard to address the identified shortfalls between 7th Street and Hollister Lake Road.

3.5 Pedestrian Circulation Evaluation

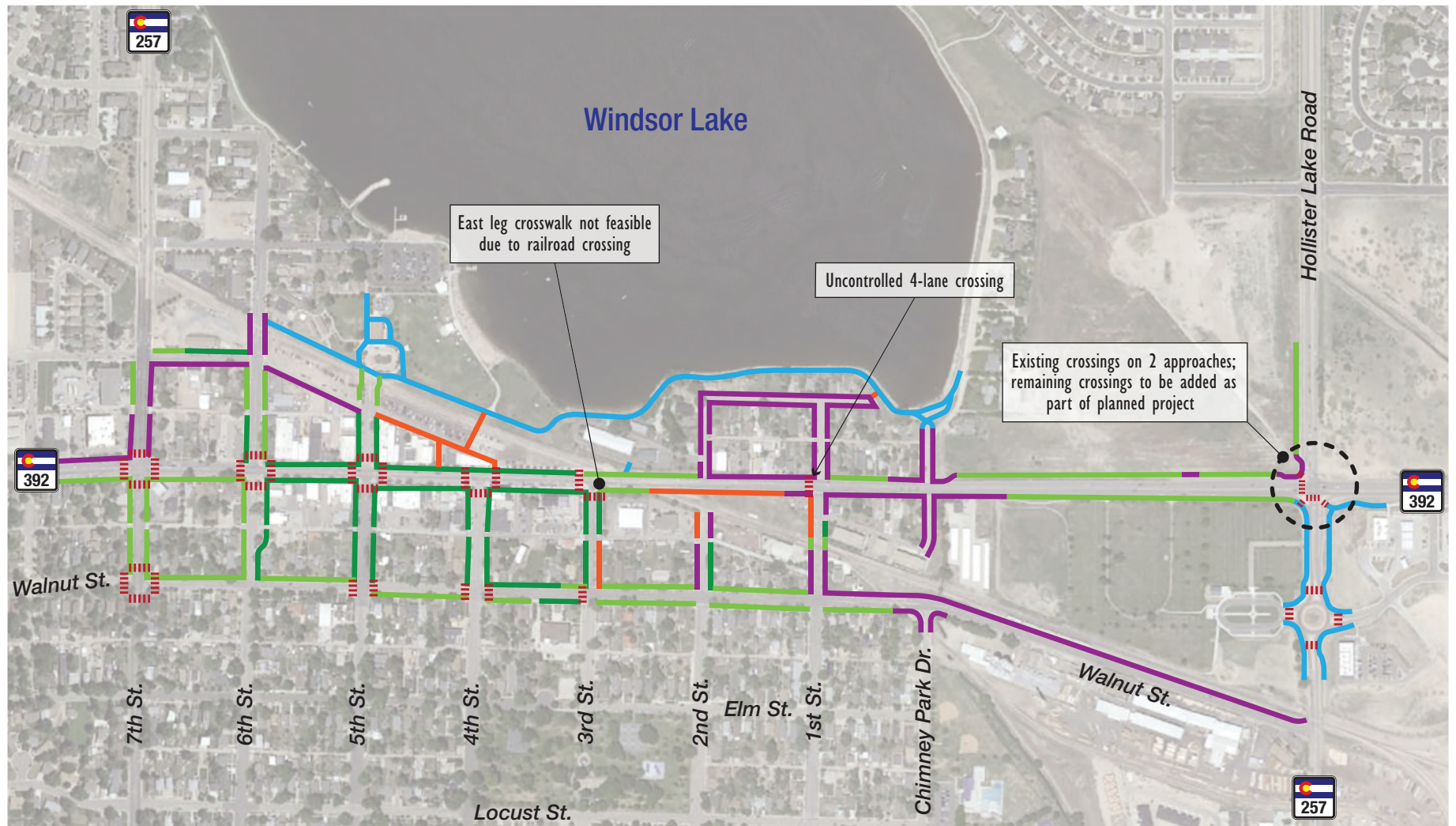
Downtown pedestrian access and mobility are key interests for the Windsor community, as shown in the survey results from the project's public engagement process. Concerns generally focus on pedestrian safety and the interaction between pedestrians and other modes using the Main Street corridor. The project team evaluated the existing pedestrian network in the Main Street study area. Various amenities and shortfalls were identified, as shown on **Figure 23**.

3.5.1 Main Street

East-west connectivity is provided on both sides of Main Street between 7th Street and 3rd Street, including crossings of each side street. North-south pedestrian crossings are provided every block between 7th Street and 3rd Street. East of 3rd Street, east-west connectivity is limited from 3rd Street to Hollister Lake Road, with continuous sidewalks along only the north side of Main Street. Some sidewalk segments exist on the south side between 1st Street and Hollister Lake Road. There is one north-south crossing in this segment at 1st Street. This crossing, approximately ¼ mile from 3rd Street and almost ½ mile from Hollister Lake Road, is the only 4-lane roadway crossing in the study area.

3.5.2 South of Main Street

East-west connectivity is provided on both sides of Walnut Street between 7th Street and Chimney Park Drive, including north-south crossings at 7th Street, 5th Street, 4th Street, and 3rd Street. East of Chimney Park Drive, east-west connectivity is limited, with continuous sidewalk on only the north side of Walnut Street between Chimney Park Drive and Hollister Lake Road. Portions of this sidewalk can be uncomfortable, as it is within 20 feet of the adjacent railroad tracks. Because of the railroad tracks, there is no north-south pedestrian connectivity in this area and, therefore, no pedestrian crossings.



LEGEND

- = Dirt Path or No Connection
- = Attached Walk
- = Detached Walk
- = Walk Behind Angled Parking (attached or detached)
- = Hard Surface
- ⋈ = Crosswalk

3.5.3 North of Main Street

East-west connectivity is provided along both sides of Ash Street between 7th Street and 6th Street, and a narrow sidewalk is provided along the south side of Ash Street between 6th Street and 5th Street. No east-west connectivity is provided on the north side of Ash Street between 6th Street and 5th Street, and no pedestrian connectivity is provided through the parking areas between 5th Street and 3rd Street. No north-south crossings of Ash Street are provided. North of the railroad, east-west connectivity from 6th Street to Chimney Park Drive is provided via a trail in Boardwalk Park. Sidewalks are also provided on both sides of the short segment of Ash Street between 2nd Street and 1st Street, but the connection between these sidewalks and the Boardwalk Park Trail is limited due to grade issues.

No north-south crossings of Ash Street are provided at 6th Street or 5th Street. Chimney Park Drive provides an uninterrupted north-south connection between the Boardwalk Park Trail and Main Street. However, this does not align with the north-south crossing of Main Street at 1st Avenue. A new development is occurring between Chimney Park Drive and Hollister Lake Road on the north side of Main Street that may enhance east-west connections in this area.

3.5.4 Recommendations

Several gaps in the pedestrian network along and surrounding Main Street have been identified. The following recommendations are provided to address them:

- The Windsor Transportation Master Plan (TMP)² recommends a 6-foot detached sidewalk³ along both sides of Main Street between 7th Street and Hollister Lake Road. Improvements between 3rd Street and Hollister Lake Road are identified as part of the Pedestrian Priority area in the TMP.⁴ Some segments may be improved as development and/or redevelopment occurs.⁵ This will extend the established network between 7th Street and 3rd Street east to Hollister Lake Road and should be advanced.
- The Windsor TMP also recommends 5-foot attached sidewalks⁶ along other streets in the study area. Again, improvements along these roadways are identified as part of the Pedestrian Priority area in the TMP,⁷ and some segments may be improved as development and/or redevelopment occurs.⁸ These should be advanced.
- The north-south 1st Street corridor surrounding Main Street has several pedestrian shortfalls, including missing sidewalk segments and a difficult crossing at Main Street. It is assumed that 5-foot attached sidewalks will be provided along the corridor over time in accordance with the Windsor TMP. However, the TMP does not address the Main Street crossing. Detailed recommendations for this crossing are provided at the end of this chapter.

² *Transportation Master Plan*, Fehr & Peers and Fox Tuttle for the Town of Windsor, Colorado, March 2020. Available at https://www.windsorgov.com/DocumentCenter/View/23356/Windsor-TMP-Final-Report_03112020-reduced-size and accessed February 20, 2023.

³ Ibid, Figure 23, page 39.

⁴ Ibid, Figure 24, page 40.

⁵ Ibid, Action Item #3, page 112.

⁶ Ibid, Figure 23, page 39.

⁷ Ibid, Figure 24, page 40.

⁸ Ibid, Action Item #3, page 112.

3.6 Bicycle Circulation Evaluation

Downtown bicycle access and mobility were not identified as key concerns during the project's public engagement process. The project team evaluated the existing bicycle network in the Main Street study area in parallel with the pedestrian evaluation. Various amenities and shortfalls were identified. Refer to **Figure 24**.

3.6.1 Main Street

The downtown Main Street environment is not well suited for commuter cyclists. Alternate commuter routes are available on Walnut Street and on the trails in Boardwalk Park. However, cyclist connectivity to/from Main Street should be maintained. The Windsor TMP identifies connections to Main Street at 7th Street, 5th Street, and 1st Street.⁹

3.6.2 South of Main Street

East-west bicycle connectivity is provided between 7th Street and Hollister Lake Road along Walnut Street through a combination of marked bike lanes and sharrows. North-south connections are provided at 7th Street, 5th Street, and 1st Street. Bicycle connections are provided through the Hollister Lake Road / Pointe Plaza Drive / Cemetery roundabout. Additional amenities are planned along other portions of Hollister Lake Road to complete the north-south connection between Walnut Street and Main Street.

3.6.3 North of Main Street

East-west commuter cyclist connectivity is provided between 6th Street and Chimney Park Drive in Boardwalk Park. The gazebo area at 5th Street may create congestion during peak times. There is no direct connectivity between this facility and 7th Street (to the west) or Hollister Lake Road (to the east).

3.6.4 Recommendations

Several gaps in the bicycle network surrounding Main Street have been identified. The following recommendations are provided to address them:

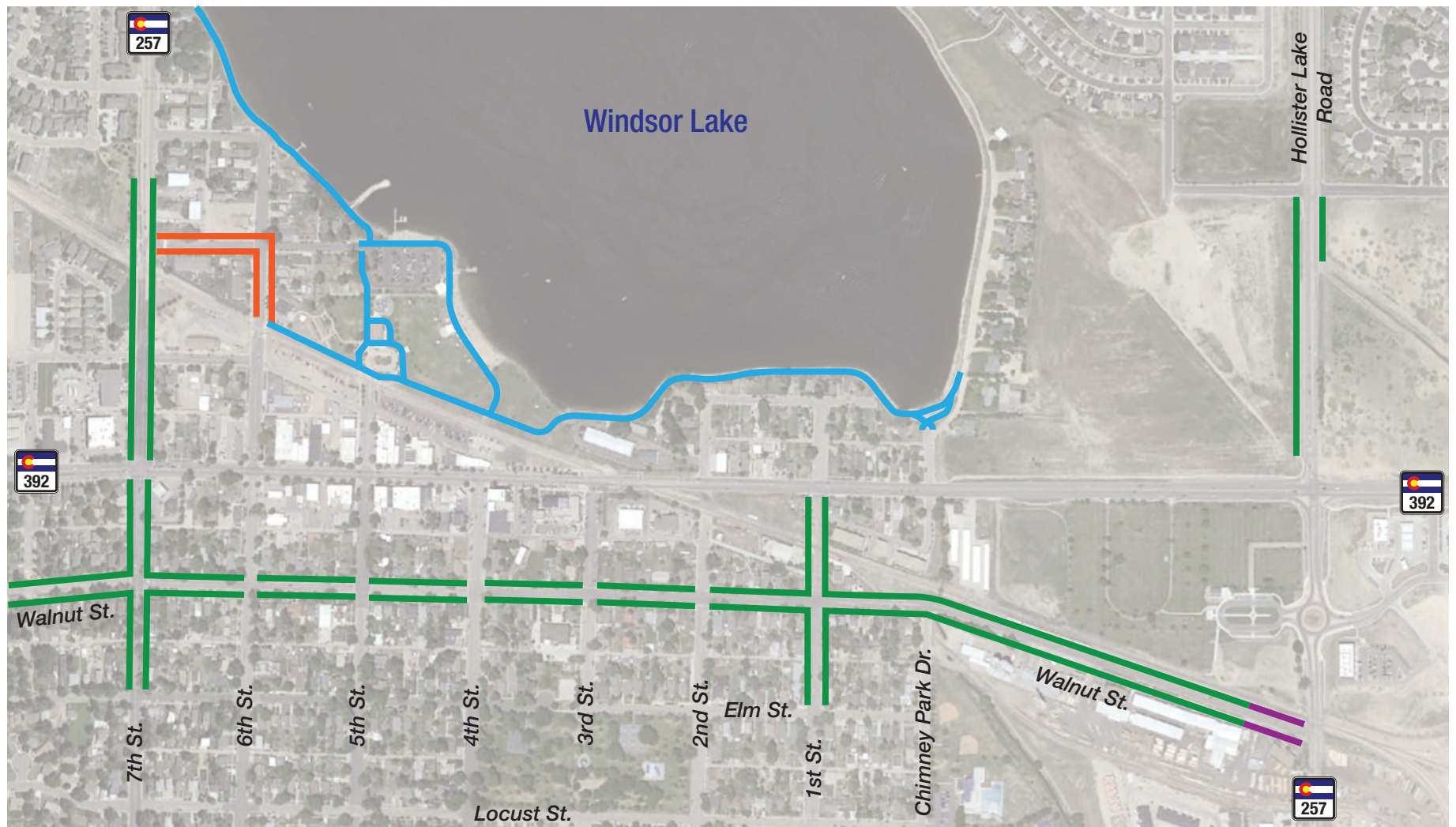
- The Windsor TMP recommends a hard surface trail along the south side of Main Street from Chimney Park Road to and beyond the east end of the study area.¹⁰ This should be advanced.
- The Windsor TMP recommends a bicycle connection between the Boardwalk Park Trail at 6th Street (just north of the railroad) and existing bicycle facilities along 7th Street.¹¹ This should be advanced.
- The Windsor TMP recommends bike lanes on 1st Street from Walnut Street north across Main Street to Boardwalk Park.¹² However, it does not provide details about the Main Street crossing. Recommendations for this crossing are provided in the study conclusions.

⁹ *Transportation Master Plan*, Fehr & Peers and Fox Tuttle for the Town of Windsor, Colorado, March 2020, Figure 27, page 44.

¹⁰ Ibid, Figure 27, page 44.

¹¹ Ibid, Figure 27, page 44.

¹² Ibid, Figure 27, page 44.



LEGEND

- = Sharrows
- = Striped Bike Lanes
- = Hard Surface Trails
- = Windsor TMAP Recommendations

3.7 Truck Access Evaluation

Downtown truck traffic was identified as a key concern during the project's public engagement process, including restricting access for large trucks and the related noise and emissions. The project team evaluated alternate routes separately (refer to **Chapter 4**). However, the need for and effects of trucks in downtown Windsor have been evaluated here. Refer to **Figure 25**.

3.7.1 Need for Trucks in Downtown

The Windsor downtown area is a vibrant neighborhood providing employment, shopping, food, and entertainment for residents and visitors. Goods need to move into and out of downtown in support of these activities. Some of the land uses with higher amounts of bi-directional commercial traffic include the Post Office (6th Street south of Main Street), the auto parts store (3rd Street south of Main Street), and the equipment rental store (2nd Street south of Main Street). Each of these facilities creates commercial traffic both in and out of the site. A larger group of land uses take in deliveries but do not necessarily generate outbound commercial trips, including restaurants, retail shops, gas stations, and light industrial uses. Overall, downtown has a mix of uses that will draw a variety of truck traffic that cannot be eliminated. Hence, a full restriction on truck traffic would have a negative effect on the downtown area.

Some public comments included a distinction between overall truck traffic and “large” trucks. As noted in **Chapter 2**, large trucks make up slightly more than 2 percent of traffic on Main Street east of 5th Street. The busiest hours for trucks are in the morning peak period (from 5:00 AM to 9:00 AM) and in the midday peak period (from 11:00 AM to 1:00 PM). These five busiest hours average one large truck every 2 to 3 minutes along Main Street. The hours with the fewest trucks (late at night) average one large truck every 10 to 15 minutes.



LEGEND

- = Commercial with High Delivery Needs
- = Commercial with Consistent Delivery Needs
- = Commercial with Limited Delivery Needs

3.7.2 Effects of Trucks in Downtown

The existing truck traffic in downtown affects several elements along Main Street, including traffic flow, noise and air quality, and community context:

- **Traffic flow:** As noted in the operational analyses, trucks affect traffic flow. The HCM acknowledges that heavy vehicles accelerate and decelerate more slowly than passenger cars and occupy more roadway space. The HCM uses a passenger car equivalent (PCE) to account for these effects. On generally level roadways such as Main Street in the study area, the HCM defines a PCE of 2.0, meaning that each truck represents two passenger cars on the roadway.¹³ This has the effect of increasing congestion both along Main Street and at intersections.
- **Noise and air quality:** Trucks add to noise and affect air quality in downtown. The diesel engines often used in trucks normally produce more noise and emissions than gasoline engines used in automobiles. These make multimodal activities (such as biking and walking) less comfortable, particularly for residents who are susceptible to these emissions.
- **Community context:** There was significant public input regarding the effect of trucks on the downtown context in Windsor. A few quotes from the project's community survey are reproduced below:
 - ◆ *Our family loves getting ice cream in town but sitting alongside a highway isn't ideal for encouraging foot traffic.*
 - ◆ *I feel it is ridiculous to have semis drive on Main Street by schools.*
 - ◆ *How much more time and money would I spend downtown if it was more pleasant?*

These quotes identify quality of life concerns created by the truck traffic on Main Street, including community feel, walkability, and accessibility.

3.7.3 Recommendations

Although truck traffic is necessary along Main Street, there are tools that the Town can use to minimize the effects of these vehicles along the corridor:

- **Through Truck Traffic Management:** Although the Main Street congestion noted in public comments and the traffic analyses is a concern, it also discourages through truck trips from using Main Street. As noted in **Chapter 4**, less than 15 percent of SH 257 trips are using Main Street to connect between the Hollister Lake Road and 7th Street alignments. Similarly, less than 30 percent of trips between SH 392 (east) and SH 257 or WCR 74 (northwest) and between Crossroads Boulevard (southwest) and WCR 74 (northeast) use Main Street. Hence, improvements to through traffic operations along Main Street may increase truck traffic and are not recommended to mitigate truck traffic.

¹³ *Transportation Master Plan*, Fehr & Peers and Fox Tuttle for the Town of Windsor, Colorado, March 2020, Exhibit 12-25, page 12-35.

- **Local Truck Management:** Several tools can be used to manage truck trips that still travel along Main Street:
 - **Loading Zone Management:** In most cases, downtown Windsor businesses have alleys available for deliveries. Some businesses provide space for deliveries on their property. However, it is unclear how many businesses take advantage of the alleys and on-site loading areas versus having delivery trucks stop along Main Street. The Town recently completed the Downtown Windsor Parking Plan.¹⁴ An evaluation of downtown truck loading zones that builds on the Parking Plan could better define loading zones, reduce truck circulation looking for loading zone space, and help manage truck impacts along Main Street.
 - **Noise:** The most common traffic noise mitigation option is a noise barrier or wall. When structures 3 feet high or taller are placed at the edge of the roadway, they can provide a noticeable reduction in noise. Given concerns with traditional noise walls along Main Street, smaller structures such as raised planters or low walls could be considered. Some existing bulb-outs already include short walls that could be expanded to increase noise mitigation. Requiring the use of engine brake mufflers would directly target truck-specific noise along Main Street. The Town has already implemented an engine brake muffler requirement along LCR 5. CDOT is currently developing statewide guidance for engine brake mufflers along state highways, which would include SH 257 and SH 392. Lower speed limits also reduce traffic noise. The existing 30 mph speed limit between 7th Street and 1st Street alleviates speed-related noise in downtown, but the higher speed limit to the east could be reduced to mitigate noise between 1st Street and Hollister Lake Road.
 - **Air quality:** On-road sources account for varying amounts of overall air pollutant emissions but tend to be declining even though vehicle miles of travel have more than doubled nationally over the past 30 years. Advances in vehicle technology and cleaner fuels have been major reasons for reductions in overall emissions. Recent federal vehicle emissions regulations are expected to continue the trend of improvement and further lower future vehicle emissions. Specific air quality mitigation options for Main Street include optimizing the existing traffic signals at 7th Street and at Hollister Lake Road, reducing the number of trucks on the roads during congested periods, and reducing or prohibiting unnecessary idling. Intersection improvements are currently being designed at the Main Street / Hollister Lake Road intersection to enhance operations at that location. The development and implementation of a truck loading plan could provide additional benefits by reducing truck circulation looking for loading zone opportunities and reducing idling in the loading zones.

¹⁴ *Downtown Windsor Parking Plan*, Mead & Hunt for the Town of Windsor, Windsor, Colorado, July 2022.

4. Alternate Route Evaluation

The potential for alternate route diversions away from Main Street was based on Bluetooth data collected for the project. Refer to **Appendix D, Diversion Potential Summary Technical Memorandum**. Daily Bluetooth-based origin / destination data were collected at eight study area locations, as described in **Section 2.5.4**. The dataset was summarized and filtered, resulting in approximately 3,600 vehicle trips that passed more than one data collection location in the study area network over the course of the study day. These 3,600 trips were examined to determine the potential for diversion away from the Main Street corridor.

4.1 Diversion Paths

The project team further evaluated key origin / destination pairs from this dataset to determine the potential for diversion if an alternate route (yet to be determined) is provided. It is understood that each potential alternate route may have a different level of attraction, but attraction is expected to act upon a baseline of trips that could be diverted. These paths are shown on **Figure 26**.

The potential for diversion has been calculated for the following trip patterns:

- SH 257 southeast of downtown to SH 257 northwest of downtown (trips following SH 257 through Windsor and points north)
- SH 257 southeast of downtown to WCR 74 northwest of downtown (trips following SH 257 through Windsor and points west)
- SH 392 east of downtown to SH 257 northwest of downtown (trips following SH 392 and SH 257 through Windsor and points north)
- SH 392 east of downtown to WCR 74 northwest of downtown (trips following SH 392 and SH 257 through Windsor and points west)
- SH 392 east of downtown to SH 392 west of downtown (trips following SH 392 through Windsor)
- Crossroads Boulevard southwest of downtown to WCR 74 northeast of downtown (trips from Loveland to Severance)

For each identified path, the number of trips traveling between the endpoint origin / destination stations was extracted from the dataset. Within this total number of trips, the number and percentage of trips that passed through downtown were also calculated. These data are summarized in **Table 10**. It is assumed that the trips between these pairs that traveled through downtown would be subject to diversion.

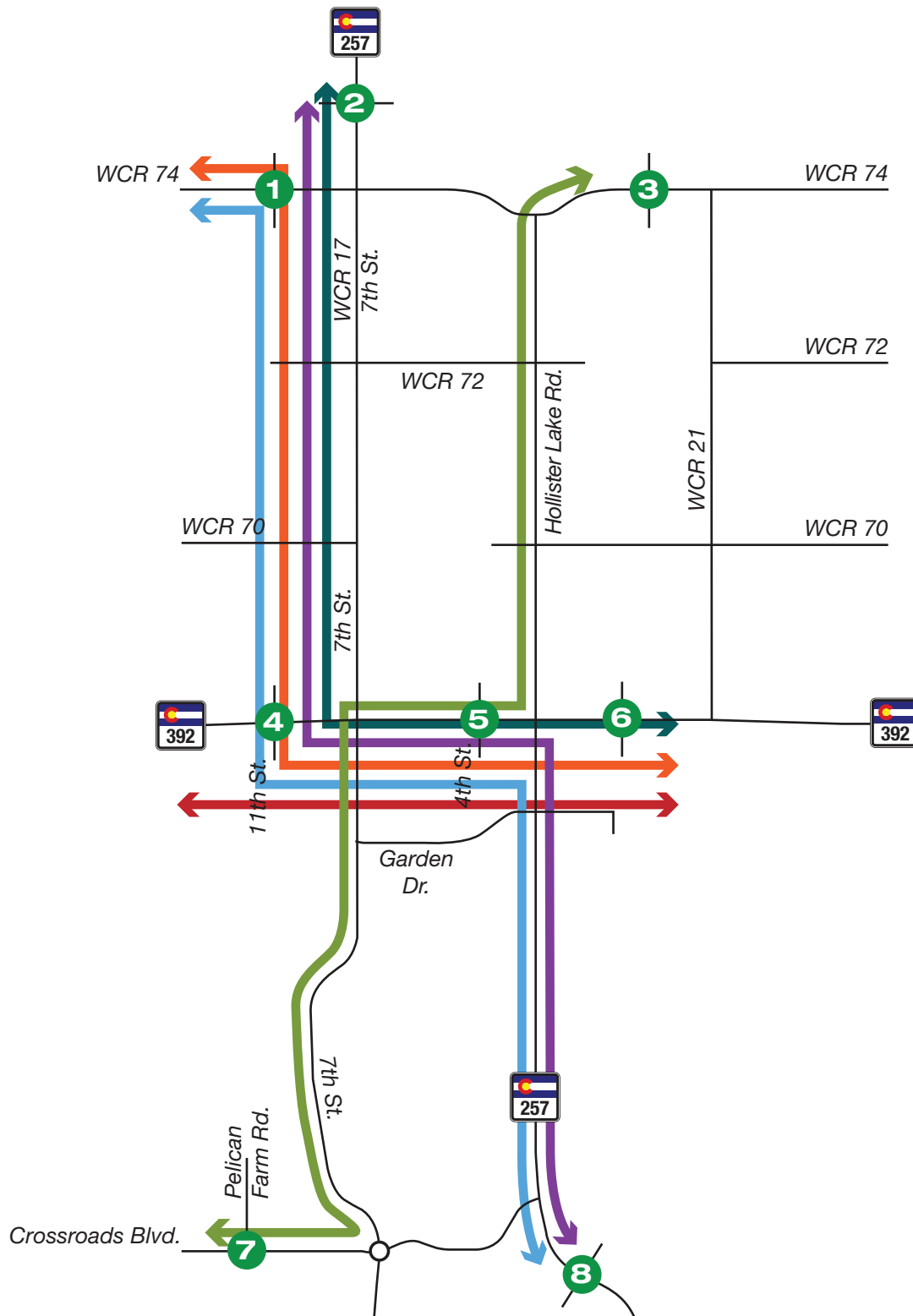


Table 10. Diversion Path Volumes

Between		Origin / Destination Data		
		Total Trips	Trips through Downtown	Percent through Downtown
SH 257 (southeast)	SH 257 (northwest)	102	17	17%
SH 257 (southeast)	WCR 74 (northwest)	76	7	9%
SH 392 (east)	SH 257 (northwest)	177	50	28%
SH 392 (east)	WCR 74 (northwest)	175	44	25%
SH 392 (east)	SH 392 (west)	649	441	68%
Crossroads Boulevard (southwest)	WCR 74 (northeast)	42	10	24%

SH = State Highway

WCR = Weld County Road

As shown in **Table 10**, the highest number of trips recorded between origin / destination pairs is along SH 392 between east of downtown and west of downtown. This pair also has the highest percentage of trips that pass through downtown (68 percent). The second busiest trip pairs are between SH 392 to the east and either SH 257 or WCR 74 to the northwest. These pairs also have the second highest percentage of trips that pass through downtown (between 25 percent and 28 percent, respectively). The pair with the fewest trips is between Crossroads Boulevard southwest of downtown and WCR 74 northeast of downtown. Again, about 25 percent of trips on this pair pass through downtown. The pairs between the southeast and the northwest see between 76 and 102 trips, but the percentage of trips through downtown is comparatively small (less than 20 percent).

4.2 Affinity for Diversion

It is recognized that outside forces will affect the desire for a given motorist to divert from their current route between the origin / destination pairs to a new route. The affinity for diversions for each pair is discussed below and the results are summarized in **Table 11**:

- **SH 257 southeast of downtown to SH 257 northwest of downtown:** Trips traveling between this origin / destination pair will pass a range of potential alternate routes and using an alternate route will not significantly lengthen or shorten these trips. This route also connects two state highway endpoints. State highway guide signing would enhance the use of this route (particularly for trucks). Hence, the affinity is assumed to be above average, and about three-quarters of trips going through downtown are forecasted to shift to an alternate route.
- **SH 257 southeast of downtown to WCR 74 northwest of downtown:** Trips traveling between this origin / destination pair will pass a range of potential alternate routes and using an alternate route will not significantly lengthen or shorten these trips. Hence, the affinity is

assumed to be average, and about one-half of trips going through downtown are forecasted to shift to an alternate route.

- **SH 392 east of downtown to SH 257 northwest of downtown:** Trips traveling between this origin / destination pair will pass a range of potential alternate routes and using an alternate route will not significantly lengthen or shorten these trips. This route also connects two state highway endpoints. State highway guide signing would enhance the use of this route (particularly for trucks). Hence, the affinity is assumed to be above average, and about three-quarters of trips going through downtown are forecasted to shift to an alternate route.
- **SH 392 east of downtown to WCR 74 northwest of downtown:** Trips traveling between this origin / destination pair will pass a range of potential alternate routes and using an alternate route will not significantly lengthen or shorten these trips. Hence, the affinity is assumed to be average, and about one-half of trips going through downtown are forecasted to shift to an alternate route.
- **SH 392 east of downtown to SH 392 west of downtown:** Trips traveling between this origin / destination pair will not pass potential alternate routes and using an alternate route will be out of direction. Hence, the affinity is assumed to be below average, and about one-quarter of trips going through downtown are forecasted to shift to an alternate route.
- **Crossroads Boulevard southwest of downtown to WCR 74 northeast of downtown:** Trips traveling between this origin / destination pair will pass a range of potential alternate routes and using an alternate route will not significantly lengthen or shorten these trips. Hence, the affinity is assumed to be average, and about one-half of trips going through downtown are forecasted to shift to an alternate route.

Table 11. Affinity for Diversion

Between		Affinity for Diversion	
		Qualitative Assessment	Percent
SH 257 (southeast)	SH 257 (northwest)	Higher than Average	75%
SH 257 (southeast)	WCR 74 (northwest)	Average	50%
SH 392 (east)	SH 257 (northwest)	Higher than Average	75%
SH 392 (east)	WCR 74 (northwest)	Average	50%
SH 392 (east)	SH 392 (west)	Below Average	25%
Crossroads Boulevard (southwest)	WCR 74 (northeast)	Average	50%

SH = State Highway

WCR = Weld County Road

4.3 Potential for Diverted Trips

The project team prepared a forecast of potential diverted trips combining the number of trips through downtown on each origin / destination pair with the affinity for diversion for each pair. To match this forecast with real-world conditions, the following supplemental inputs were developed:

- The origin / destination data represent only a sample of all trips that occur on the roadway network. Both volume data and origin / destination data were collected in downtown Windsor along Main Street. The origin / destination data represent between 28 percent and 29 percent of the daily volume at this location. Hence, multiplying the origin / destination data by a factor of 3.51 is anticipated to expand the origin / destination forecasts to daily volumes.
- The classification counts conducted along Main Street (described in **Chapter 2**) indicate that large trucks make up 3.6 percent of the overall traffic stream.

The project team combined these data with the information in **Table 10** and **Table 11** to calculate the potential for diversion away from Main Street if a feasible alternate route is developed. These results are summarized in **Table 12**. As shown, 672 daily trips have the potential to be diverted away from Main Street, or about 4.2 percent of daily traffic on Main Street. This includes 27 large trucks per day. These values are subject to change based on the alternate route(s) under consideration.

Table 12. Diversion Potentials

Between		O / D Trips on Main Street	Expanded Trips on Main Street	Affinity for Diversion	Diversion Potential*
SH 257 (southeast)	SH 257 (northwest)	17	60	75%	45 (2)
SH 257 (southeast)	WCR 74 (northwest)	7	25	50%	13 (2)
SH 392 (east)	SH 257 (northwest)	50	176	75%	132 (5)
SH 392 (east)	WCR 74 (northwest)	44	154	50%	77 (3)
SH 392 (east)	SH 392 (west)	441	1,548	25%	387 (14)
Crossroads Boulevard (southwest)	WCR 74 (northeast)	10	35	50%	18 (1)

* Total trips (Truck Trips)

O / D = Origin / Destination

SH = State Highway

WCR = Weld County Road

The diversion potential shown in **Table 12** represents only a small portion of total traffic on Main Street and would not reduce congestion significantly if traffic were diverted. Further, constructing a new facility would cost \$2 million to \$3 million per mile or more¹⁵, resulting in a very low benefit/cost ratio with this roadway volume.

¹⁵ Town of Windsor Roadway Improvement Plan, Felsburg Holt & Ullevig for the Town of Windsor, Windsor, CO, September 2017, Table 4, page 17.

5. Stakeholder Engagement

The project team conducted two rounds of public engagement and engaged with stakeholders as part of the Downtown Alternate Route Study. The initial round of public engagement was tailored to learn about the activities on and desires for Main Street. The second round was intended to provide information about the study effort and resulting conclusions.

The project team also worked with Town of Windsor staff to develop and maintain a project website. The website was live throughout the project and shared project information, meeting notices, and project conclusions. It is located at <https://windsorprojectconnect.com/downtown-alternative-route-study>.

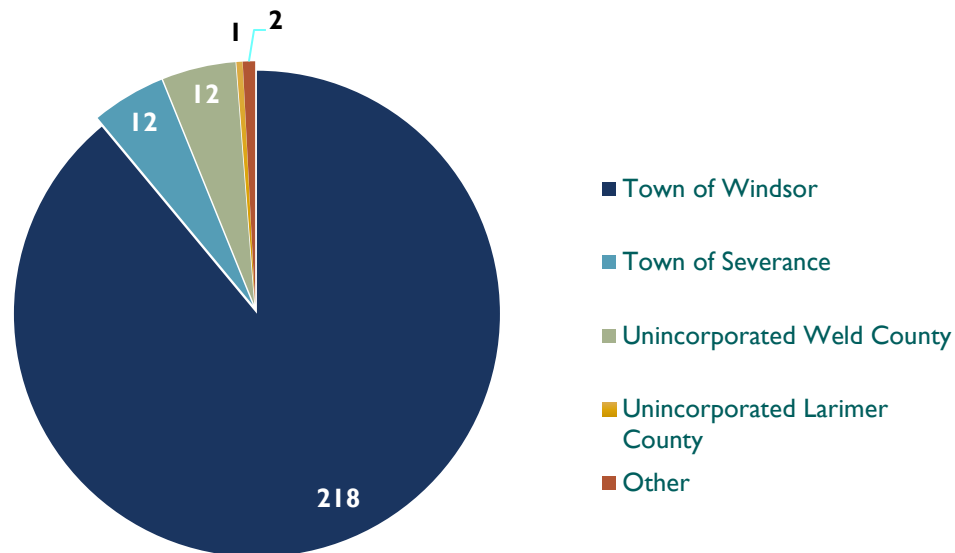
5.1 Phase I Engagement

The first round of public engagement was completed early in the Alternate Route Study to allow the community to provide input and steer the study process. It consisted of an online public survey and an in-person open house at Boardwalk Park.

5.1.1 Online Public Survey

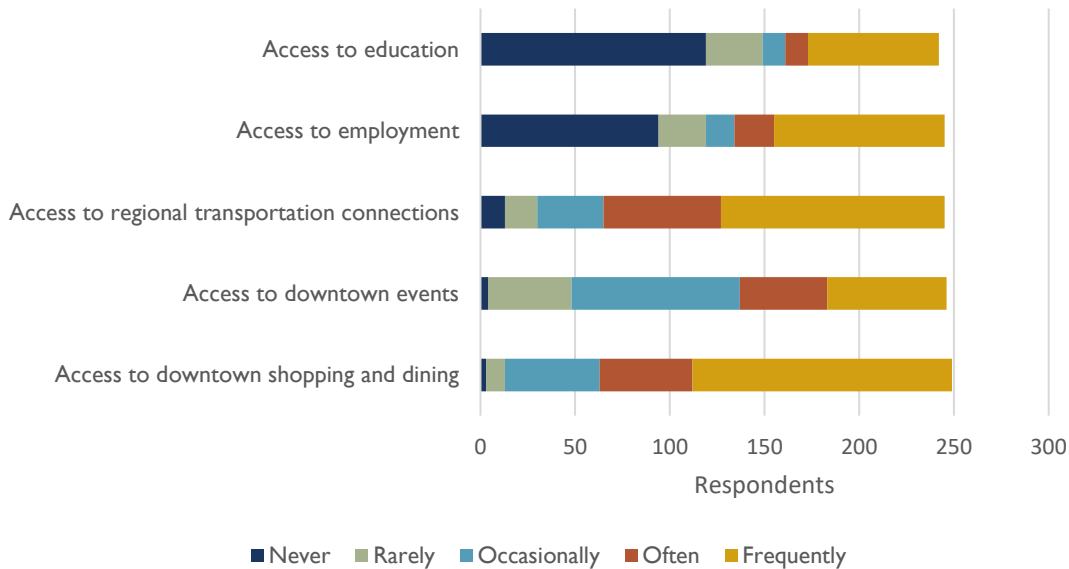
To support the Downtown Alternate Route Study, a public survey was conducted in September 2022. It was advertised through the project page on the City's website. The primary intent of this survey was to gather initial thoughts from the community on Main Street as it operates today. A total of 245 people participated in the survey. Most respondents (approximately 89 percent) were residents of Windsor, as indicated on **Figure 27**.

Figure 27. Residency of Survey Respondents

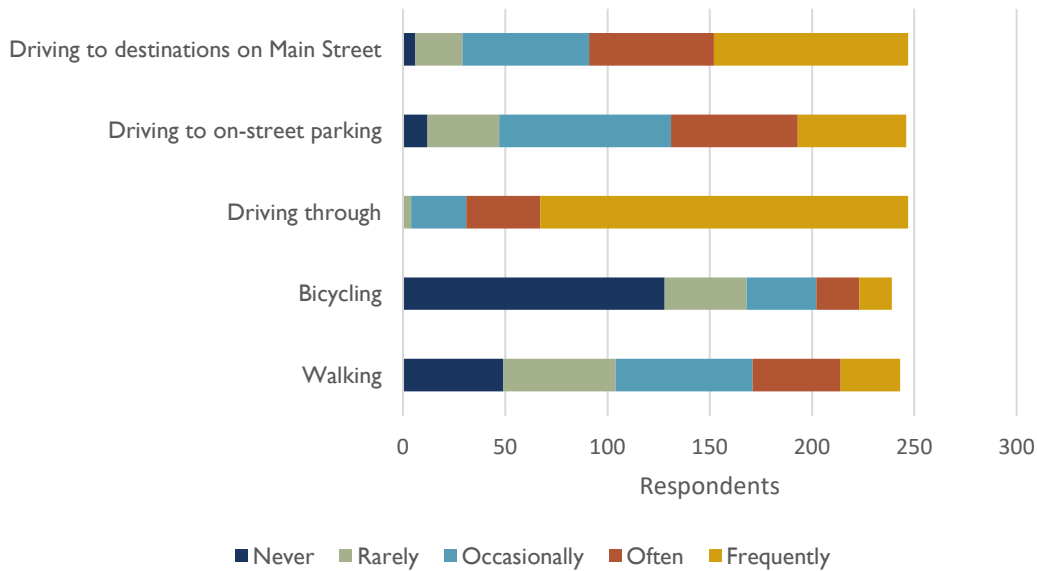


When asked how they typically use Main Street, respondents identified access to downtown shopping/dining and regional transportation connections (e.g., I-25, US 85) as their most frequent trip purposes. More than 75 percent of respondents use Main Street for both purposes at least once a week (Often or Frequently), as shown on **Figure 28**. Most respondents use Main Street at least once a month (Occasionally) to access downtown events. Access to employment and education are not common Main Street trip purposes for most.

Figure 28. Reasons Respondents Use Main Street

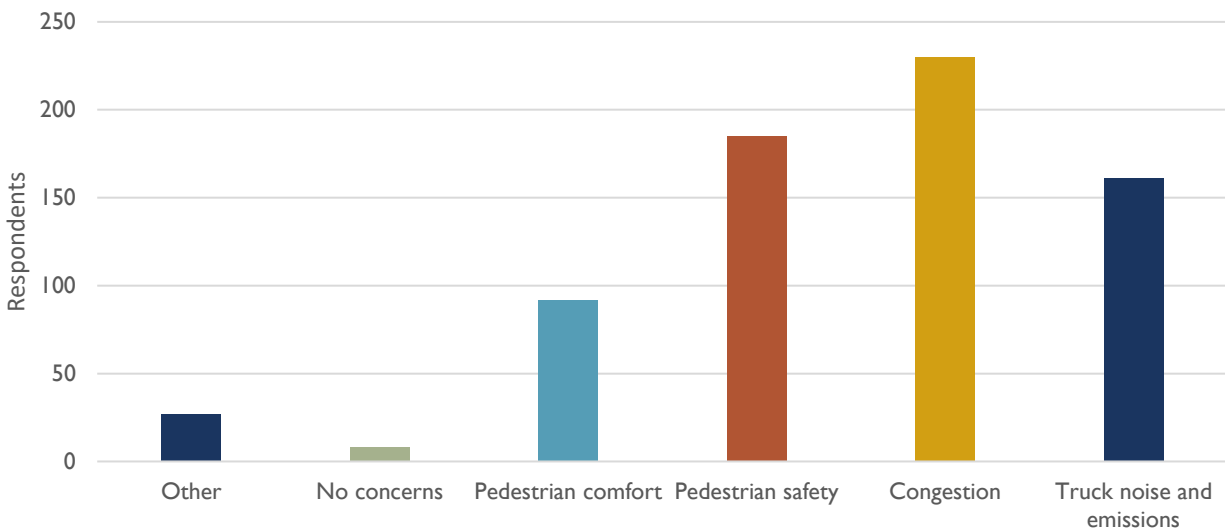


In terms of mode choice, driving is by far the most common way that respondents use Main Street, as indicated on **Figure 29**. Nearly 75 percent drive through the corridor multiple times per week, and about 64 percent drive to destinations on Main Street at least once a week. About half of respondents never bike along Main Street, and only 15 percent bike along Main Street at least once a week. Walking along Main Street is more common: 57 percent of respondents do so at least once a month and 30 percent at least once a week.

Figure 29. Mode Choice of Respondents

The fourth survey question presented a series of four potential concerns with Main Street traffic and asked respondents to indicate which they felt were actually concerns. Respondents could select more than one option.

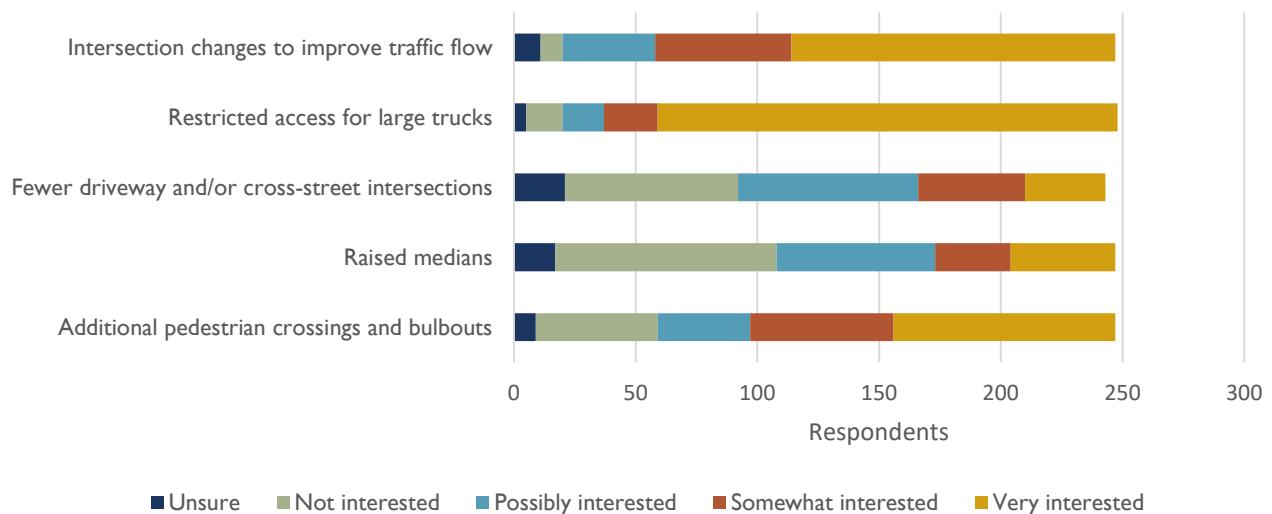
Congestion was by far the most selected option, with nearly 95 percent of respondents indicating it as a concern (**Figure 30**). Large majorities also indicated pedestrian safety (75 percent) and truck noise/emissions (66 percent) as concerns. Only eight respondents indicated they have no concerns with Main Street traffic.

Figure 30. Traffic Concerns Noted by Respondents

The final two questions presented a series of potential solutions to be explored through this study and asked respondents to indicate their level of support for each solution.

Of the potential changes to Main Street, exploring access restrictions for large trucks was the most popular, with 77 percent of respondents indicating they were very interested. Interest in intersection changes and additional pedestrian crossings was also relatively high, while there was less support for fewer driveway/cross-street intersections and raised medians (though over half of respondents still indicated they would possibly be interested in those).

Figure 31. Level of Support for Main Street Solutions



When presented a list of possible alternate routes that will be evaluated for the study, respondents were generally supportive of shifting more truck and commuter traffic to all of them. Approximately 48 percent said they would be at least somewhat supportive of all five potential alternate routes, with WCR 74 (67 percent) and Crossroads Boulevard (60 percent) drawing the most support.

5.1.2 Open House

Project team members staffed a booth at the Windsor Farmers Market in Boardwalk Park on August 29, 2022. This event was intended to help get word out about the study and to provide community members an opportunity to share their thoughts in-person. It was advertised on the project page of the City's website. Shared at the event were printed boards with information about the background and goals of the study and project business cards with links to the study webpage.

Several dozen people stopped by the project booth to review the boards, talk with the project team, and/or take business cards to participate in the online survey later. Although most did not have specific comments to share during the event, there was consensus that downtown traffic is a concern for safety and connectivity reasons and that this study would be useful to identify opportunities for improvement.

5.1.3 Phase I Engagement Summary

The Phase I engagement process reached several hundred community members between the online survey and the in-person open house. More than 200 engagement survey responses were received. The survey results indicate that most respondents use Main Street to access shopping / dining and regional transportation connections. Access to education is not a common Main Street trip purpose for most respondents, potentially indicating that many residents are avoiding downtown when accessing Windsor Middle School and Windsor High School. Driving is the most common way that respondents use Main Street, while walking is also important. Cycling along Main Street was not common among survey respondents.

The survey also gauged community concerns and solutions along Main Street. Congestion was by far the most common concern. Other significant concerns included pedestrian safety and truck noise / emissions. The most common solution was exploring access restrictions for large trucks. Interest in intersection changes and additional pedestrian crossings was also common. Respondents were generally supportive of shifting more truck and commuter traffic to alternate routes, with WCR 74 and Crossroads Boulevard drawing the most support as alternate routes.

The Open House also gathered in-person input, although it was not as detailed as the responses received through the survey. Several dozen community members stopped by the booth and provided general input about truck traffic, pedestrian safety, and rush hour congestion.

5.2 Phase 2 Engagement Summary

The second round of public engagement was completed near the end of the Alternate Route Study to share results of the project with the community and elected officials.

5.2.1 Town Council Presentation

The project team worked with Town staff to present the analysis and conclusions from the Alternate Route Study to the Windsor Town Board. The presentation occurred at the regularly scheduled Town Board work session on January 9, 2023. The presentation slides are included in **Appendix E, Public Involvement**. At the conclusion of the meeting, the following recommendations were made:

- Proceed with the design and acquisition of right-of-way for WCR 70 between SH 257 and Hollister Lake Road
- Reduce the speed limit on Main Street, in coordination with CDOT
- Provide more areas of friction to reduce the propensity to drive through Main Street

5.2.2 Magazine Article

The project team also developed an article for the Town's printed quarterly magazine that will be distributed in April 2023. The article is reproduced in **Appendix E, Public Involvement**.

6. Conclusions

The Windsor Downtown Alternate Route Study has collected data about traffic and travel patterns, evaluated traffic operations, examined potential alternate routes, and gathered community input about travel along Main Street. The results of these efforts are described below.

6.1 Data Collection

A wide range of transportation data was collected in support of the Alternate Route Study, as summarized in the following subsections.

6.1.1 Available Data

The project team collected historic traffic count data in or near the Windsor Downtown Alternate Route Study area. Based on these data, the project team drew the following conclusions:

- The morning peak hour volumes are typically lower than the evening peak hour volumes.
- Daily volumes are highest in the summer months and lowest in the winter months.
- No pandemic adjustments were necessary for project count data collected in 2022.
- Truck percentages in the downtown Windsor area vary between 3.3 percent and 7.1 percent.
- The traffic growth rate in downtown Windsor varies between 2.0 percent per year and 2.4 percent per year.

6.1.2 Project-Specific Data

The project team also collected project-specific data in the Windsor Downtown Alternate Route Study area. A review of these data led to the following conclusions:

- Daily traffic volumes vary from about 2,500 vpd to almost 18,000 vpd. Main Street carries approximately 16,800 vpd between 7th Street and Hollister Lake Road.
- Most vehicle movements in the study area roadway network are passenger vehicles. Single Unit trucks typically make up less than 4 percent of the traffic stream, and Articulated trucks make up less than 3 percent of the traffic stream. Main Street in downtown Windsor carries about 1.5 percent Single Unit trucks and 2.1 percent Articulated trucks.
- Average speeds were lower than posted speed limits. The average and 85th percentile speeds along Main Street near 5th Street were below the posted speed limit by 8 to 16 mph.
- Most vehicles that travel through downtown Windsor have origins and/or destinations along Main Street. Travel between other locations and downtown Windsor represents only a fraction of the east/west movements along Main Street. These data indicate that motorists familiar with Windsor use alternate routes to avoid Main Street during congested periods.

6.2 Main Street Evaluation

An evaluation of Main Street between 7th Street and Hollister Lake Road was conducted using data collected for the Alternate Route Study. The evaluation included compiling existing traffic volumes; forecasting future volumes using a 2 percent annual growth rate plus additional traffic from planned roadway connections; analyzing vehicular traffic flow using nationally accepted methodologies; and reviewing bicycle, pedestrian, and truck operations. The following conclusions were reached:

- Main Street through downtown is congested today, and congestion is expected to increase over time. Mitigating this congestion in the downtown context is not feasible, as it would require removal of current parking, elimination of existing bicycle / pedestrian amenities, and otherwise would negatively affect downtown. Given the congestion between 3rd Street and 7th Street, it is proposed that the segment of Main Street between 2nd Street and Greenspire Drive (extended) also be reduced to a 2-lane cross-section with a center turn lane. This would be consistent with the cross-section west of 2nd Street, slow traffic between 2nd Street and Hollister Lake Road, and further discourage through trips. Reducing the number of lanes would also provide opportunities for enhanced pedestrian and bicycle amenities in this area, reflecting commitments in the Windsor TMP.
- The Town is currently working with CDOT to reduce speed limits along Main Street in the study area. These reductions are intended to slow travel speeds in downtown and encourage through traffic to use higher speed alternate routes.
- Several roadway improvements along alternate routes have been identified and are shown in **Table 9**. Improvements include roadway segment widening and intersection modifications to enhance traffic flow in areas outside downtown. As noted in the alternate route evaluation, many north-south through trips are already using these routes and the proposed improvements would enhance traffic operations for these users.
- Pedestrian improvements are recommended along Main Street from 3rd Street east to Hollister Lake Road, including a detached 6-foot sidewalk per the Windsor TMP and improvements to the north-south Main Street crossing at 1st Street. The enhanced Main Street crossing would benefit from the proposed narrowing of Main Street in this area. Further use of enhanced pedestrian crossing treatments (such as Rectangular Rapid Flashing Beacons [RRFBs]) is also encouraged.
- Bicycle improvements are recommended along Main Street from 1st Street east to Hollister Lake Road along the existing cemetery. These improvements would also benefit from the proposed narrowing of Main Street in this area. Other improvements along Main Street further to the east and between Boardwalk Park and 7th Street are also proposed.
- The Main Street evaluation also examined truck needs and related access in the downtown area. Various downtown businesses rely on truck access. Tools for managing these trucks include loading zone management, noise abatement, and traffic signal improvements.

6.3 Alternative Route Evaluation

An evaluation of possible alternate routes around downtown Windsor was also conducted. The evaluation considered several routes that connect key origin and destination points surrounding the downtown area. The following conclusions were reached:

- Six potential routes were evaluated, including both state highways through downtown, Main Street, 7th Street, and Hollister Lake Road. A total of over 1,200 trips were identified along these six routes. Less than half of these trips use Main Street in downtown as part of their travel route.
- Each of the six routes was assessed to define a potential for diversion away from Main Street. The assessment considered directionality, length of diversions, and number of diversion options.
- The portion of identified trips on Main Street and the potential for diversion were combined to assess how many trips could be diverted away from downtown if an alternate route were provided. It was concluded that just over 4 percent of the traffic on Main Street or about 675 daily trips could be diverted if an alternate route were provided. This value represents only a small portion of traffic in downtown and would not substantially reduce congestion. Further, it represents less than 30 trucks per day removed from downtown. Hence, an investment in a diversion route for truck traffic would provide only limited benefits.

6.4 Public Engagement

The public engagement for the project included a wide range of approaches to reach as many community members as possible. Approaches included a public open house, an online survey, a website, a presentation to the Town Board, and an article documenting the study results in the Town's quarterly magazine. Through these avenues, several hundred residents and elected officials learned about the project, provided input, and informed the study recommendations.

Appendix A. Available Traffic Count Technical Memorandum

MEMORANDUM

TO:	Project File
FROM:	Paul Brown, PE, PTOE, and Yory Moncada
DATE:	October 6, 2022
SUBJECT:	Windsor Downtown Alternate Route Study – Available Traffic Count Technical Memorandum (FHU Project Number 121464-04)

The Downtown Windsor Alternate Route Study is evaluating traffic flows along Main Street in Windsor, Colorado. Main Street is part of two Colorado Department of Transportation (CDOT) state highways: SH 257 and SH 392. The project team collected CDOT volume data for these highways from the Online Transportation Information System (OTIS) for the last four years. This memorandum summarizes data for use as the project moves forward.

I. SH 257 – MRM 8 to MRM 15

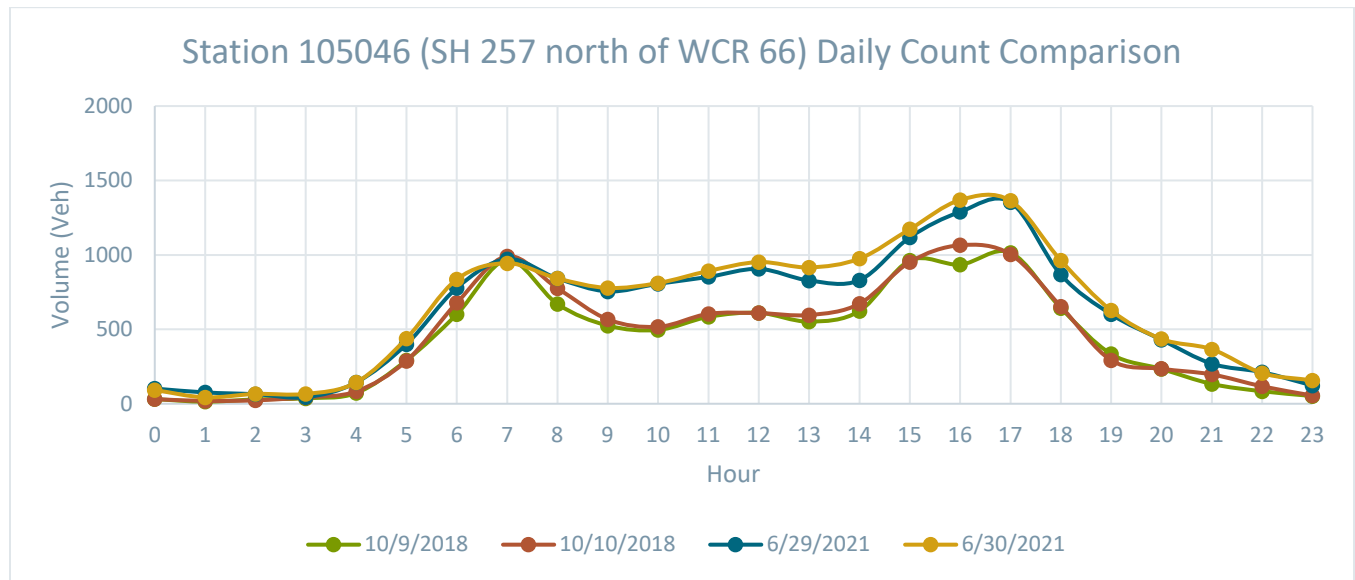
The Windsor study area along SH 257 extends from south of Crossroads Boulevard (approximately MRM 7.9) to Weld County Road (WCR) 74 (approximately MRM 14.5), about 7 miles. To provide a more complete picture of travel along SH 257, the project team collected OTIS data from SH 34 (Greeley) to SH 14 (Fort Collins) as summarized below.

I.1 Short-Duration Count Stations

There are six short-duration count stations along SH 257 from where data were collected.

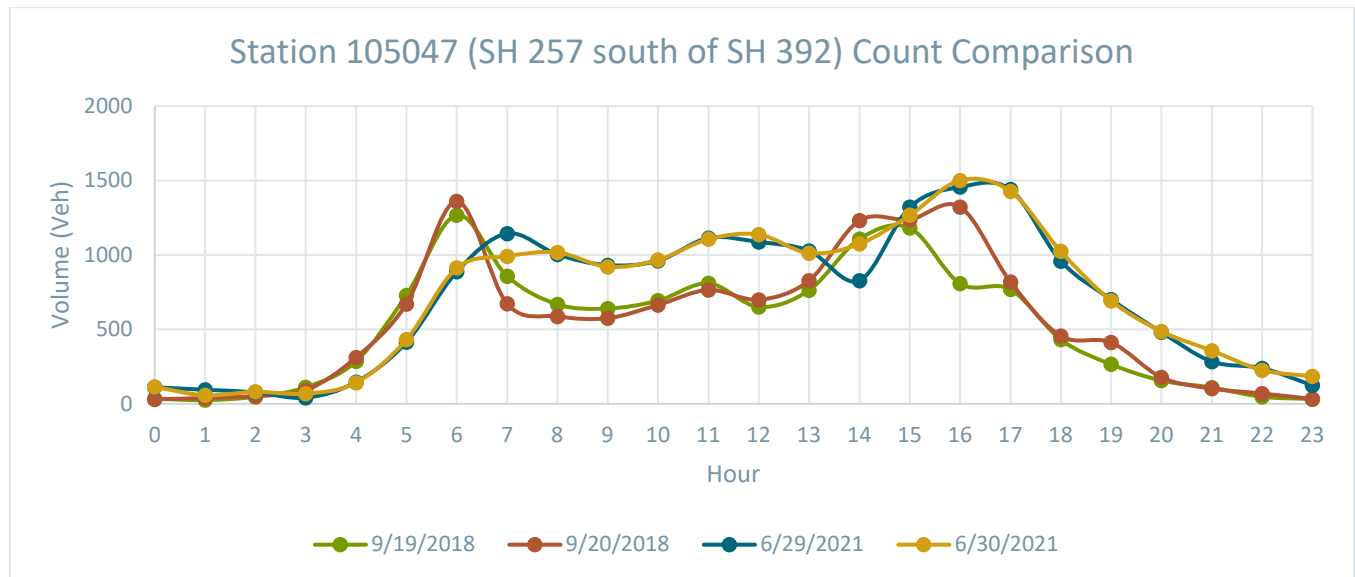
- Station 105046 is north of WCR 66 / Eastman Park Road. Short-duration count data are available for 2-day periods in 2018 and 2021 as shown on **Figure I**.

Figure 1. Station 105046 Daily Count Comparison



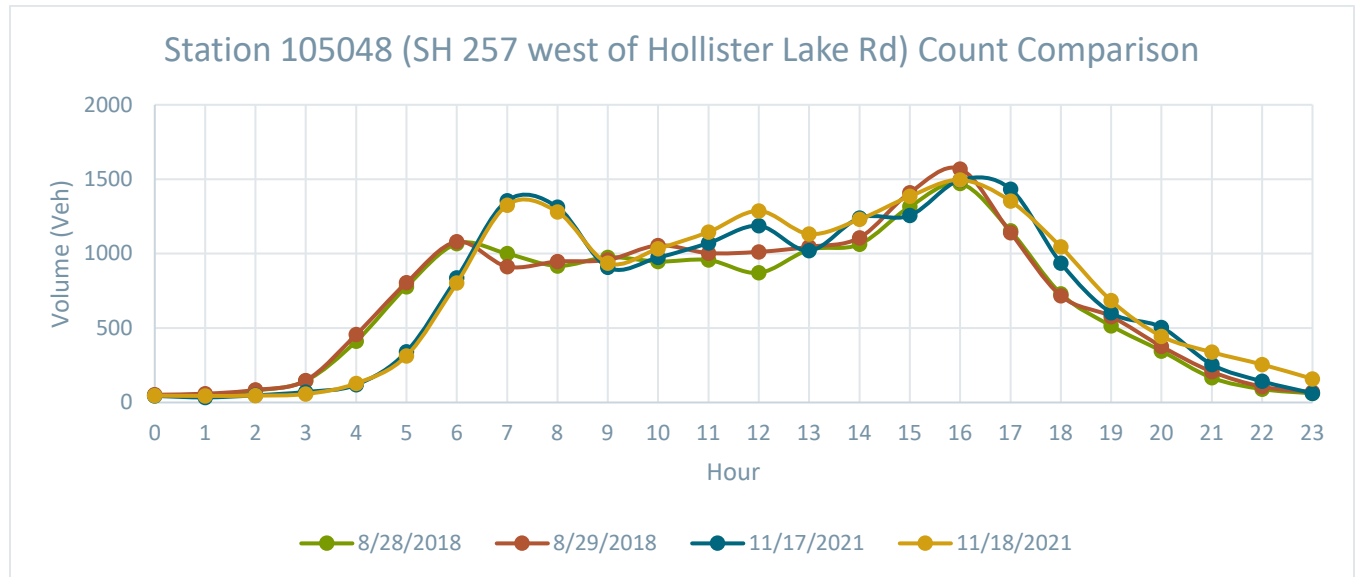
- Station 105047 is south of SH 392 / Main Street. Short-duration count data are available for 2-day periods in 2018 and 2021, as shown on **Figure 2**.

Figure 2. Station 105047 Count Comparison



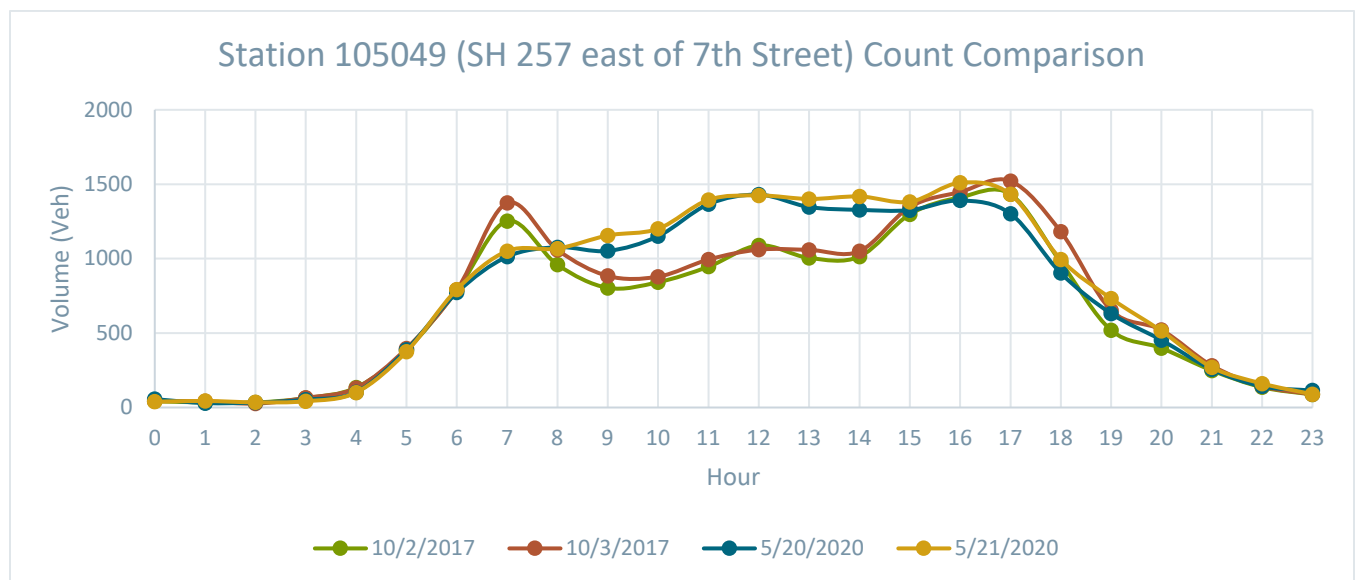
- Station 105048 is on Main Street west of Hollister Lake Road. Short-duration count data are available for 2-day periods in 2018 and 2021, as shown on **Figure 3**.

Figure 3. Station 105048 Count Comparison



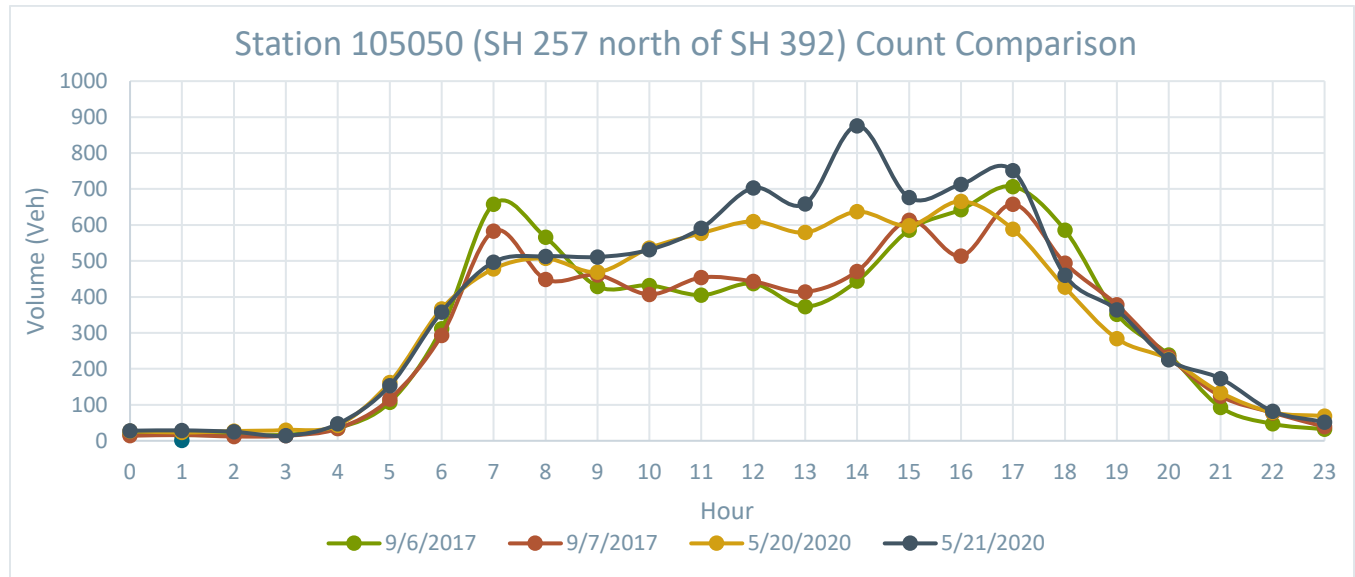
- Station 105049 is on Main Street east of 7th Street. Short-duration count data are available for 2-day periods in 2017 and 2020, as shown on **Figure 4**.

Figure 4. Station 105049 Count Comparison



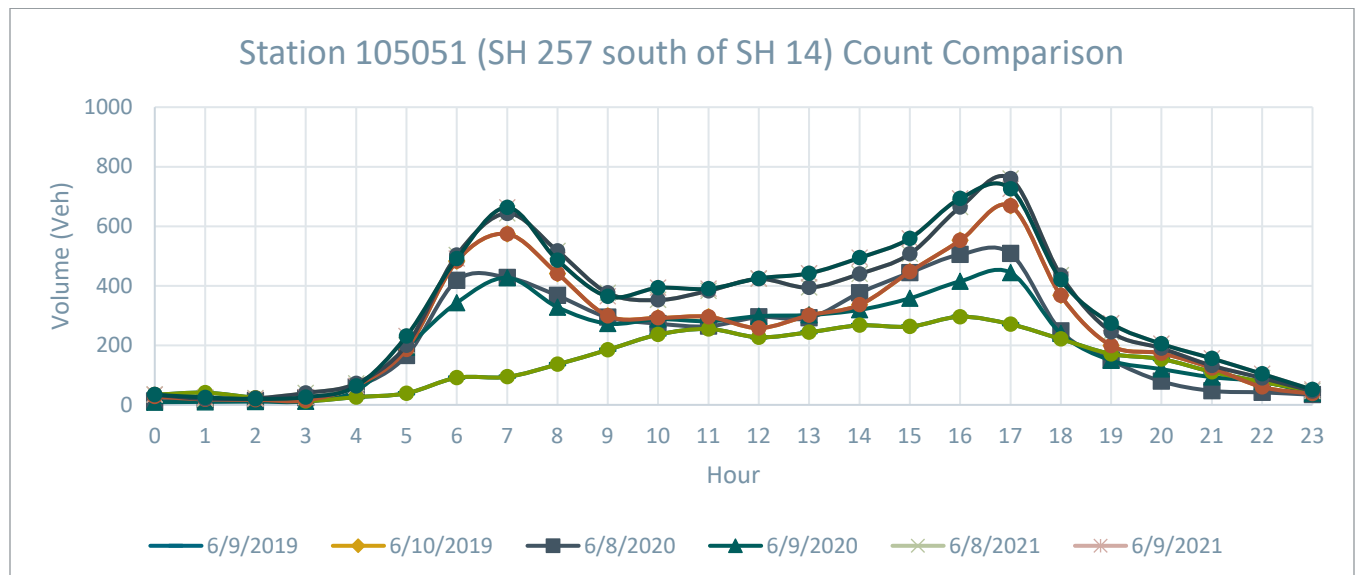
- Station 105050 is north of Main Street on SH 257. Short-duration count data are available for 2-day periods in 2017 and 2020, as shown on **Figure 5**.

Figure 5. Station 105050 Count Comparison



- Station 105051 is south of SH 14. Short-duration count data are available for multiple 2-day periods in various years. For consistency with other stations, count data for two days in 2019, 2020, and 2021 are shown on **Figure 6**.

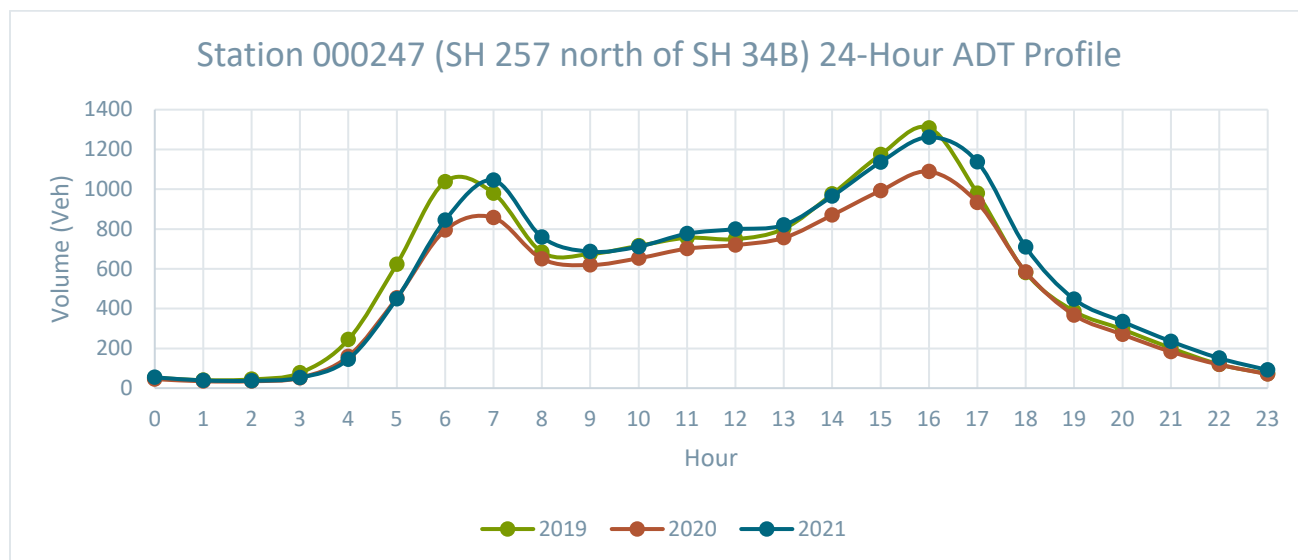
Figure 6. Station 105051 Count Comparison



1.2 Continuous Count Stations

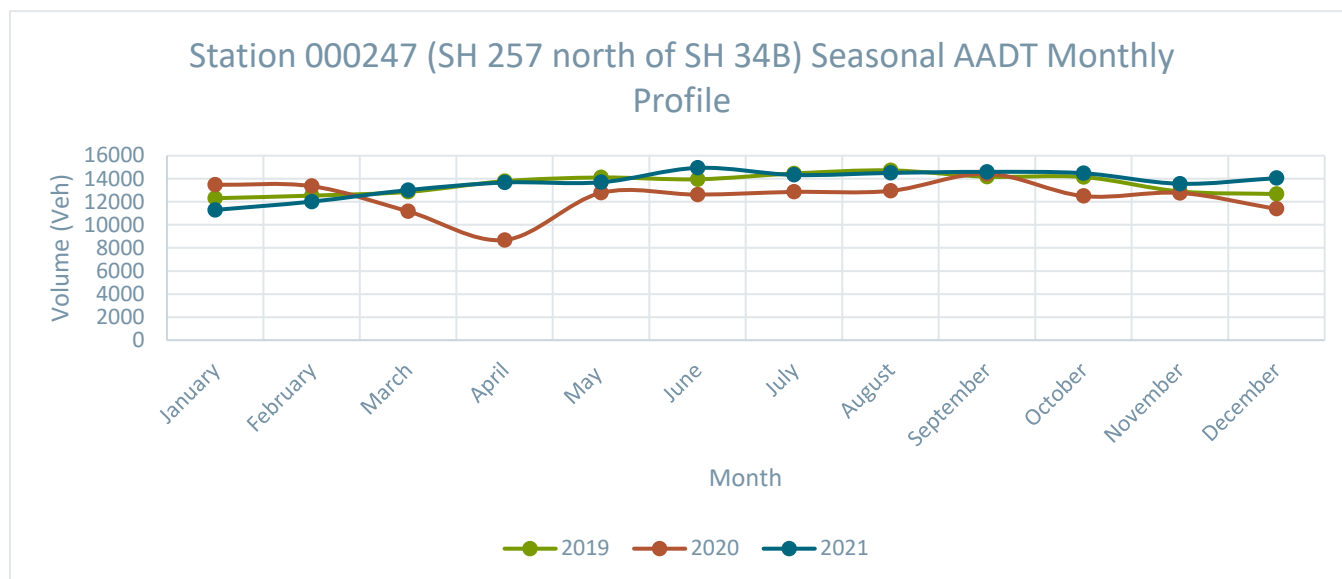
Since there are no continuous count stations in the study area, the project team reviewed the CDOT OTIS dataset for nearby continuous stations. The nearest continuous count station is Station 000247, located on SH 257 just north of US 34 (Business) on the western fringe of Greeley (about 2.5 miles south of Crossroads Boulevard along SH 257). Yearly data were downloaded for 2019, 2020, and 2021, the most recent three years where data were available, as shown on **Figure 7**.

Figure 7. Continuous Count Station 000247 ADT Profile



The project team prepared a second graph showing seasonal variations at this station (**Figure 8**). The 2019 data show little seasonal variation at this count station, except for minor decreases in winter volumes when compared to the remaining seasons. The 2020 data show a dip related to the pandemic in March and April. The 2021 data generally mirror the 2019 data.

Figure 8. Continuous Count Station 000247 Seasonal Profile



1.3 Supplemental Data

The project team collected data regarding average annual daily traffic (AADT), truck percentages, and traffic growth at each count station identified above, as shown in **Table I**. The AADT ranges from 5,900 to 18,000 vehicles per day (vpd), the truck percentage ranges from 3.3 to 13.8, and the annual growth rate ranges from 2.08 percent to 2.60 percent per year.

Table I. SH 257 Supplemental OTIS Data

Station	2020 AADT	Percent Trucks	20-Year Factor (Annual Growth Rate)
I05046	10,000	6.4	1.51 (2.08% per year)
I05047	12,000	7.5	1.51 (2.08% per year)
I05048	16,000	4.4	1.53 (2.15% per year)
I05049	18,000	3.3	1.52 (2.12% per year)
I05050	8,300	7.1	1.54 (2.18% per year)
I05051	5,900	13.8	1.60 (2.38% per year)
000247*	14,000	5.9	1.67 (2.60% per year)

* Continuous count station outside the project study area

1.4 SH 257 Data Summary

Based on the SH 257 data presented in this memorandum, the project team has drawn the following conclusions.

1.4.1 Volume Peaking

The peaking characteristics at the count stations identified in this memorandum show distinct AM and PM peak hours. The morning peak hour volumes are typically lower than the evening peak hour volumes.

The morning peak hour is typically 7:00 AM to 8:00 AM, except on SH 257 south of SH 392, where it is 6:00 AM to 7:00 AM. The evening peak hour varies across count stations, with 4:00 PM to 5:00 PM and 5:00 PM to 6:00 PM being the most common.

1.4.2 Pandemic Impacts

The continuous count station on SH 257 near Greeley west of Airpark Road shows that 2021 volumes are similar to the 2019 volumes. The short-duration count stations had available data collected in 2020, after the pandemic began. These volumes are typically lower than those in the data collected before the pandemic, which is consistent with 2020 data shown at the continuous count station. Based on these data, it is assumed that no pandemic adjustments are needed.

1.4.3 Seasonal Peaking

The continuous count station data show that summer months (July, August, and September) are the highest volume months in the Windsor area. The winter months (December, January, and February) are the lowest volume months. **Table 2** presents seasonal factors based on 2019 data.

Table 2. Seasonal Adjustment Factors

Month	Adjustment Factor
January	1.101
February	1.081
March	1.054
April	0.983
May	0.961
June	0.971
July	0.937
August	0.920
September	0.956
October	0.958
November	1.051
December	1.069

2. SH 392 from MRM 79 to MRM 84

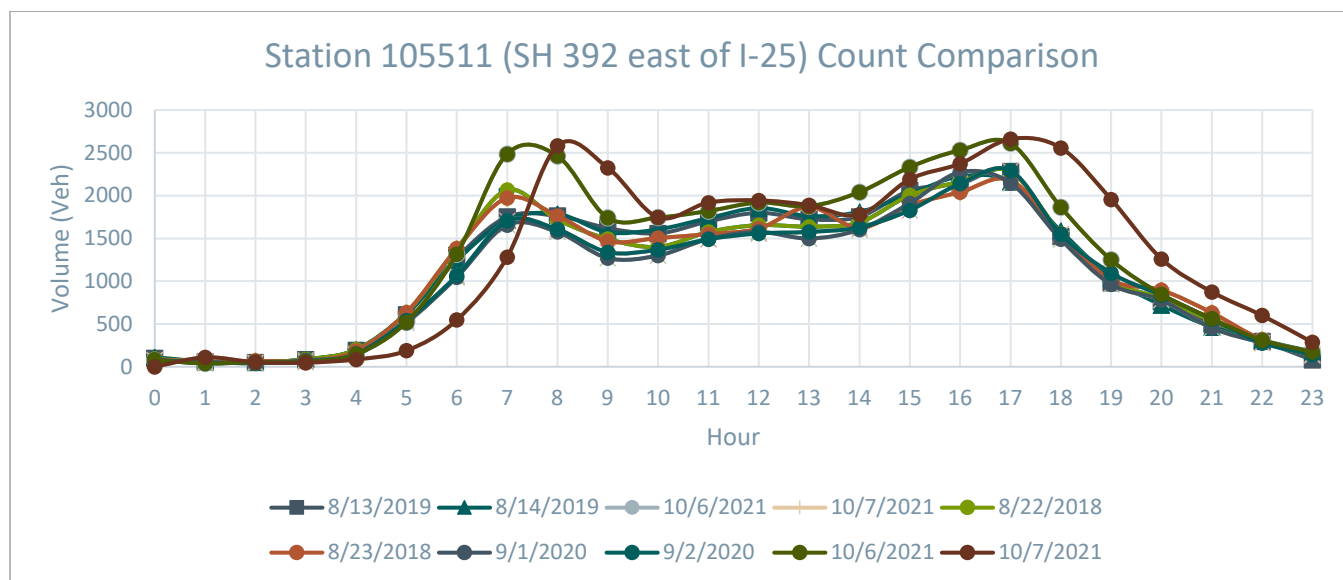
The Windsor study area along SH 392 extends from west of 15th Street (WCR 15) (approximately MRM 103.3) to WCR 23 (approximately MRM 107.2), about 4 miles. To provide a more complete picture of travel along SH 392, OTIS data were collected from I-25 to WCR 27 (east of Severance) and are summarized below.

2.1 Short Duration Count Stations

There are four short-duration count stations in the study area.

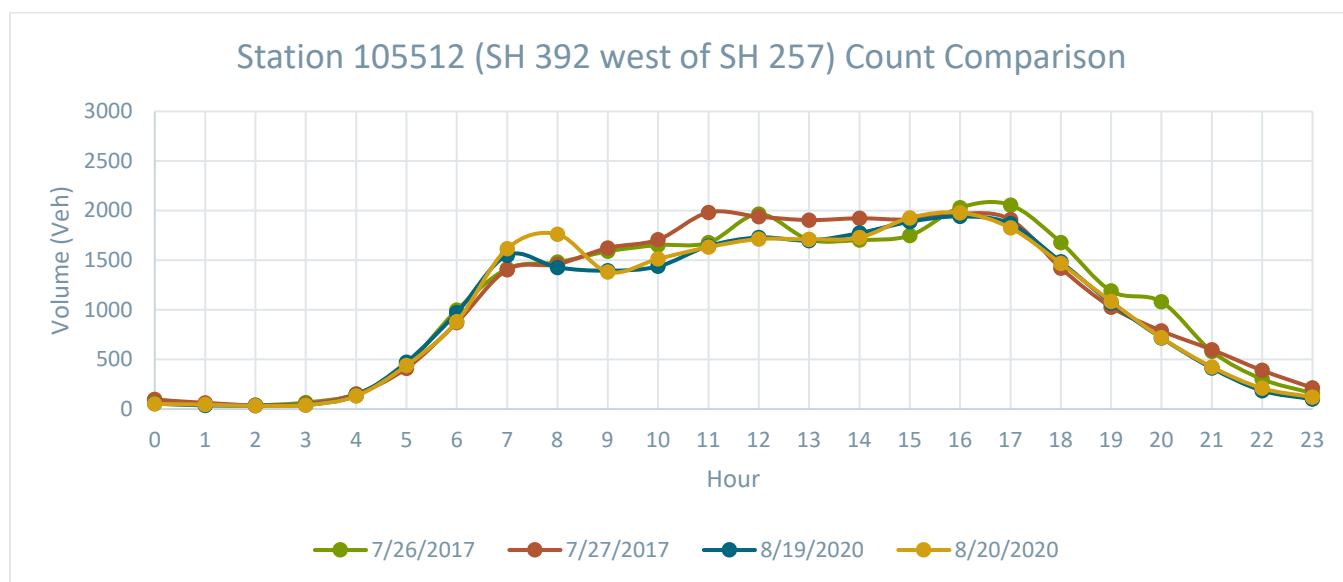
- Station 105511 is east of the I-25 interchange. Short-duration count data are available for four 2-day periods in 2018, 2019, 2020, and 2021, as shown on **Figure 9**. The 2021 data are notably higher than those of previous years, which may be related to construction along I-25 near this count station.

Figure 9. Station 105511 Count Comparison



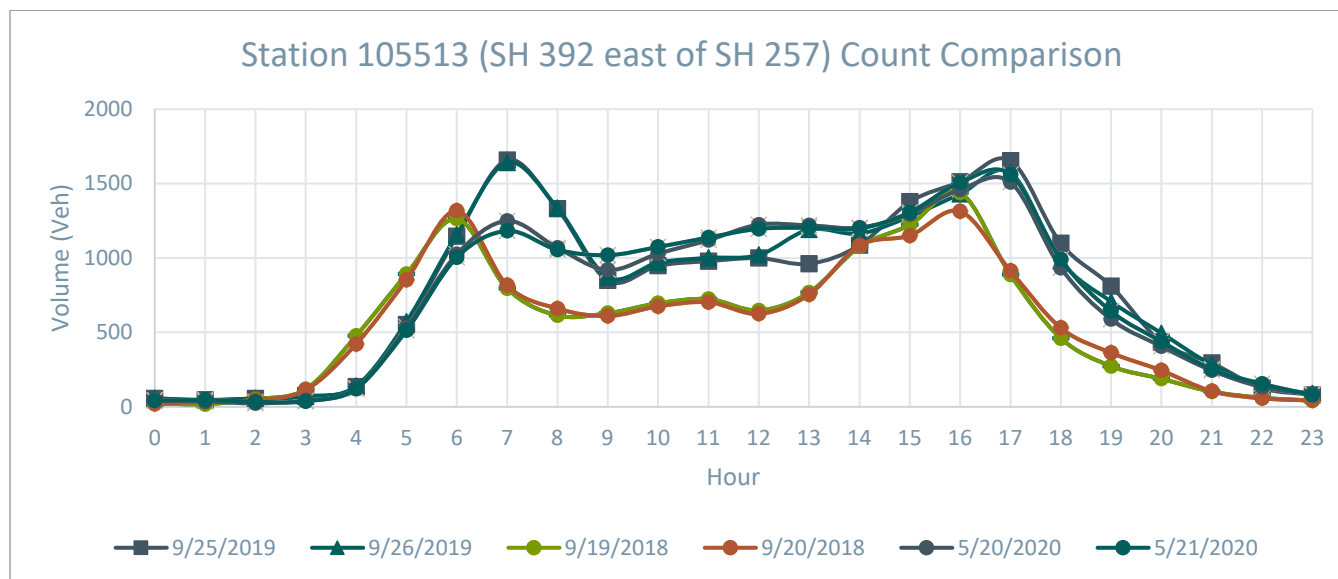
- Station 105512 is west of WCR 17 / SH 257. Short-duration count data are available for two 2-day periods in 2017 and 2020, as shown on the following graph. No anomalies were noted.

Figure 10. Station 105512 Count Comparison



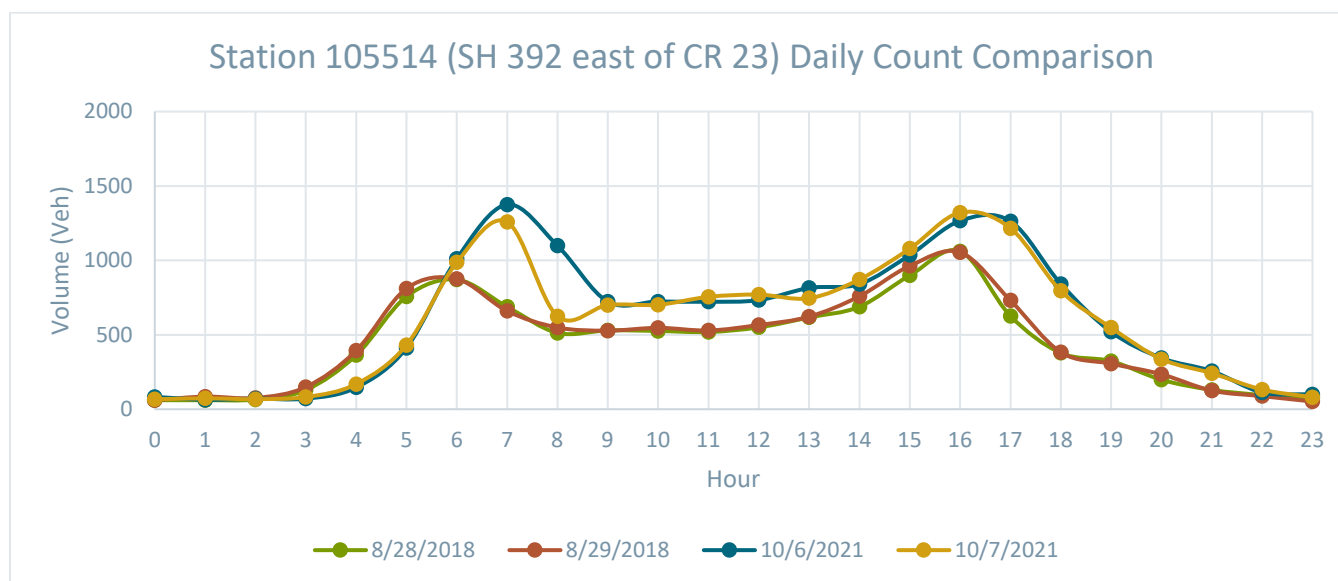
- Station 105513 is east of Hollister Lake Road / SH 257. Short-duration count data are available for three 2-day periods in 2018, 2019, and 2020, as shown on **Figure 11**. The 2018 data appear shifted earlier than the 2019 and 2020 data, but no reason could be found.

Figure 11. Station 105513 Count Comparison



- Station 105514 is east of WCR 23. Short-duration count data are available for two 2-day periods in 2018 and 2021, as shown on **Figure 12**. The 2021 data are significantly higher than the 2018 data.

Figure 12. Station 105514 Count Comparison



2.2 Continuous Count Stations

CDOT does not have any continuous count stations on SH 392. The nearest continuous count stations are on SH 257 north of US 34 and on US 34 near WCR 15. Since there are no continuous count stations on SH 392, the SH 257 continuous count station north of US 34 was assumed to be representative of seasonal trends on SH 392. See **Section 1.2** for details.

2.3 Supplemental Data

The project team also collected data regarding AADT, truck percentages, and traffic growth at each count station identified in this memorandum. These data are shown in **Table 3**. The AADT ranges from 10,000 to 23,000 vpd, the truck percentage ranges from 4.3 to 8.9, and the annual growth rate ranges from 1.44 percent to 2.05 percent per year.

Table 3. SH 392 Supplemental OTIS Data

Station	2020 AADT	Percent Trucks	20-Year Factor (Annual Growth Rate)
I05511	23,000	4.4	1.33 (1.44% per year)
I05512	20,000	4.3	1.50 (2.05% per year)
I05513	15,000	5.6	1.49 (2.01% per year)
I05514	10,000	8.9	1.46 (1.91% per year)

2.4 SH 392 Data Summary

Based on the SH 392 data presented in this memorandum, the project team has drawn the following conclusions.

2.4.1 Volume Peaking

Peaking characteristics at the count stations identified in this memorandum show general AM and PM peak hours. The morning peak hour volumes are typically lower than the evening peak hour volumes.

The morning peak hour varies across the count stations, with some counts showing morning peaks as early as 6:00 AM to 7:00 AM and other counts not showing a true AM peak hour. The evening peak hour also varies across the count stations but is typically either 4:00 PM to 5:00 PM or 5:00 PM to 6:00 PM.

2.4.2 Pandemic Impacts

As noted in **Section 2.2**, there is no continuous count station available along SH 392 to evaluate pandemic impacts. Two of the short-duration count stations had 2021 data available, and these counts are typically higher than 2018 or 2019 data.

2.4.3 Seasonal Peaking

As noted in **Section 2.2**, there is no continuous count station available along SH 392 to evaluate seasonal peaking.

3. Conclusions

The project team collected historic traffic count data at 11 locations in or near the Windsor Downtown Alternate Route Study area, including one continuous count station. Based on these data, the project team has drawn the following conclusions.

3.1 Volume Peaking

A review of traffic peaks revealed the following information:

- The morning peak hour volumes are typically lower than the evening peak hour volumes.
- Most short duration count sites had at least one day with a distinct morning peak hour between 6:00 AM and 7:00 AM or 7:00 AM and 8:00 AM.
- Most short duration count sites had at least one day with a distinct evening peak hour between 4:00 PM and 5:00 PM or 5:00 PM and 6:00 PM

It should be noted that most of the historic count data are presented in hourly format. Due to this, some resolution in the count data is lost. For example, a 7:45 AM to 8:45 AM peak may show up in hourly data as 8:00 AM to 9:00 AM, while a 7:30 AM to 8:30 AM peak may show up as a 7:00 AM to 8:00 AM peak depending on data just outside the peak. Further, peak hours can shift over time, with differing peaks in summer and winter months.

The project team will collect AM peak period count data from 6:30 AM to 8:30 AM and evening peak period count data from 4:00 PM to 6:00 PM. These data will be used to define uniform AM and PM peak hours for traffic analysis purposes.

3.2 Pandemic Impacts

A review of pandemic-related volume data revealed the following information:

- The continuous count station northwest of Greeley shows that 2021 volumes are similar to or greater than 2019 volumes, and consistently greater than 2020 volumes.
- Data from short-duration count stations show constant or increasing volumes in 2021 when compared to pre-pandemic data.

Based on these data, no pandemic adjustments are anticipated for project-specific count data collected in 2022.

3.3 Seasonal Peaking

One continuous count station was available to provide seasonal adjustment factors. Based on this count station, **Table 2** provides seasonal adjustment factors for use in the Downtown Alternate Route Study. As described previously, these data indicate that volumes are highest in the summer months and lowest in the winter months.

3.4 Supplemental Data

A review of the truck percentages across the various count stations reveals that they range from approximately 3 percent to 14 percent, with higher percentages at the more rural count stations. The truck percentages in the downtown Windsor area vary between 3.3 percent and 7.1 percent.

The growth rates typically range between 1.4 percent per year and 2.6 percent per year. The growth rates are more consistent along SH 257. The growth rate in the downtown Windsor area varies between 2.0 percent per year and 2.4 percent per year.

Appendix B. Project Data Collection Technical Memorandum

MEMORANDUM

TO:	Study Advisory Team
FROM:	Paul Brown, PE, PTOE and Rich Follmer, PE, PTOE
DATE:	October 6, 2022
SUBJECT:	Windsor Downtown Alternate Route Study – Existing Data Collection Summary Technical Memorandum (FHU Project Number 121464-04)

This memorandum summarizes recent data collection efforts to support upcoming analyses and future decision-making for the project team. It also includes information on existing traffic volumes and existing travel patterns:

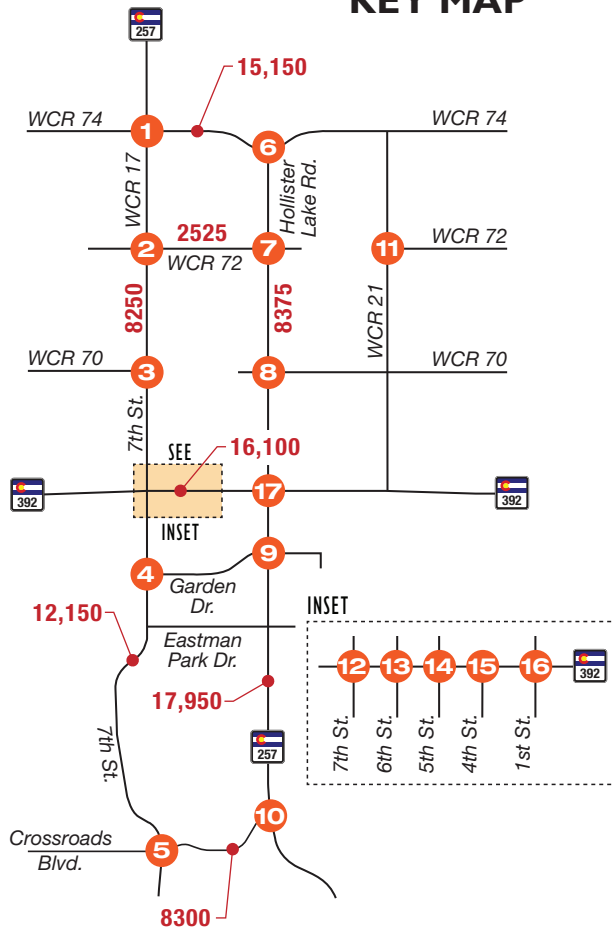
- Daily traffic volume levels at 8 locations,
- Vehicle classification and speed information at the same 8 locations,
- Vehicle turning movements at 17 intersections, and
- Travel pattern information using Bluetooth™ recording methods.

The project team worked with the Town of Windsor to define traffic data collection locations throughout the study area. Analyses of existing operational conditions will be provided in a subsequent memorandum. Following is more information on the collected data.

I. Daily Traffic Volumes

Twenty-four-hour vehicle volumes in vehicles per day (vpd) were recorded at the locations shown on **Figure I**. These volumes are also shown in **Table I**, which summarizes the volumes by direction.

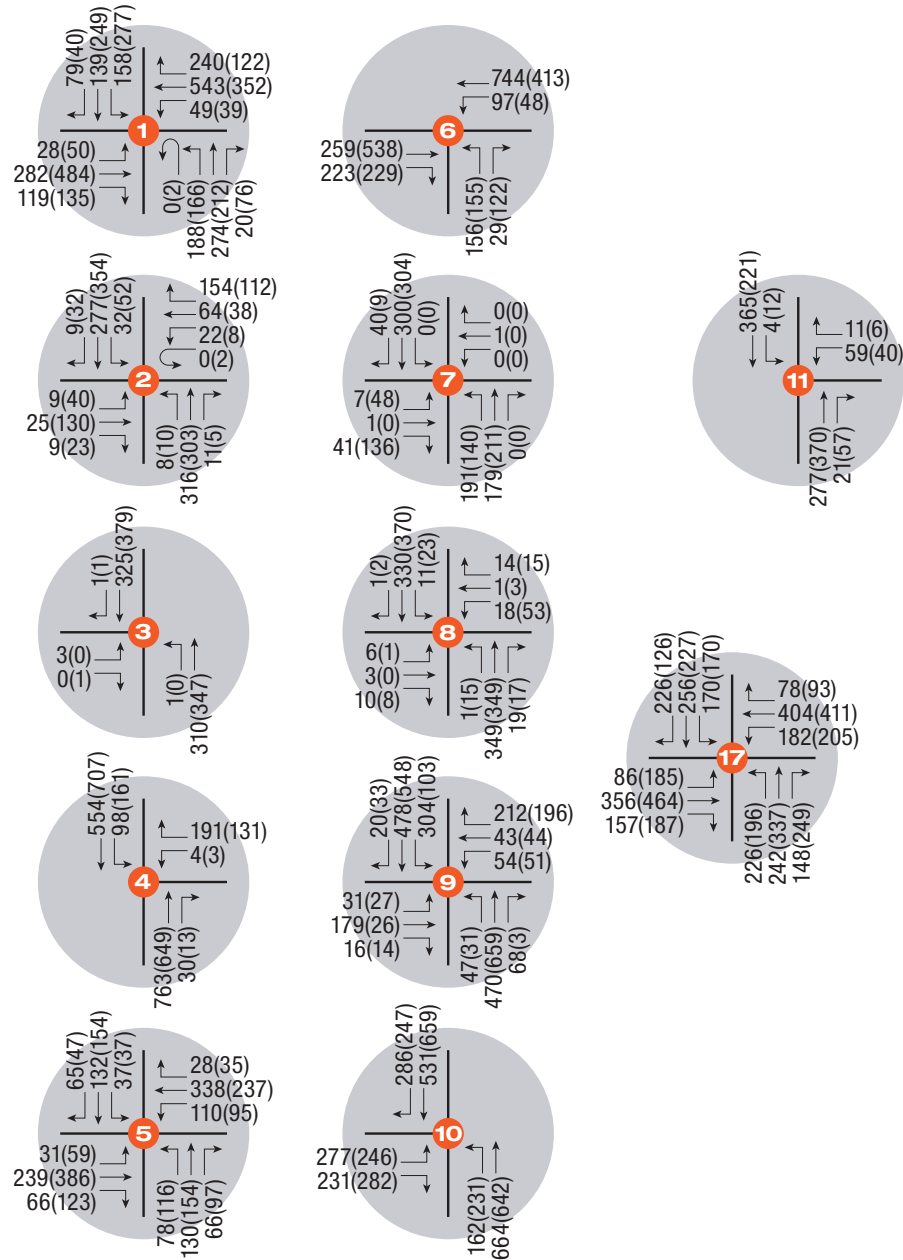
KEY MAP



LEGEND

xxx(xxx) = AM(PM) Peak Hour Traffic Volumes

XXXX = Daily Traffic Volumes



INSET INTERSECTIONS

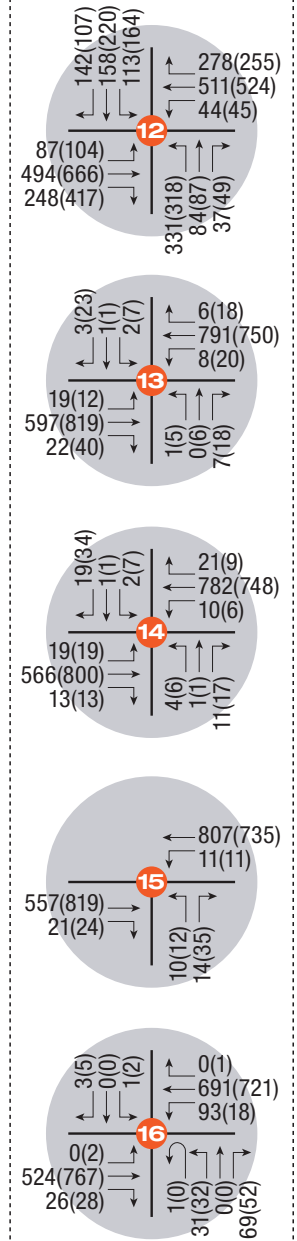


Table I. Daily Traffic Volumes

Location	Direction		TOTAL
	Northbound	Southbound	
7 th Street – South of Eastman Park Drive	6,100	6,050	12,150
SH 257 – Between WCR 70 & WCR 72	3,925	4,325	8,250
SH 257 – South of Eastman Park Drive	9,050	8,900	17,950
Hollister Lake Rd. – Between WCR 70 & WCR 72	3,950	4,425	8,375
	Eastbound	Westbound	
Crossroads Boulevard – East of 7 th Street	4,300	4,000	8,300
Main Street (SH 257 / SH 392) – East of 5 th Street	7,850	8,250	16,100
WCR 72 – East of SH 257	1,150	1,375	2,525
WCR 74 – East of SH 257	7,775	7,375	15,150

As shown in **Table I**, daily traffic volumes vary from about 2,500 vehicles per day (vpd) to almost 18,000 vpd depending on the street segment. The lowest daily volume is along Weld County Road (WCR) 72 to the east of State Highway (SH) 257, which does not have a significant level of east/west continuity. The highest levels are along the state highway segments on Main Street in downtown Windsor and south of Eastman Park Drive on SH 257, and on WCR 74 to the east of SH 257.

2. Intersection Turning Movements

Vehicle movements were recorded at 17 intersections along several main travel routes during the AM and PM peak hours of vehicle activity on a typical weekday. Data were collected from 6:30 AM to 8:30 AM (AM peak) and from 4:00 PM to 6:00 PM (PM peak). The peak one-hour of activity within the recorded hours can vary from intersection to intersection due to the intersection's location in relationship to the downtown core of Windsor and on intersection travel patterns. The AM peak hour is typically between 7:00 AM and 8:30 AM, while the PM peak hours varies within the two-hour recording window.

Figure I also shows the AM and PM peak hour traffic volumes. The level of vehicle movements can differ considerably with some movements being almost zero (e.g., turning movements at the 7th Street/WCR 70 intersection), while the main through movements range from less than 50 vehicles per hour (vph)(eastbound/westbound on SH 257 at Garden Drive) to over 800 vph (westbound during the AM peak hour at the SH 392/4th Street intersection). The highest levels of through movements are typically along Main Street between 1st and 6th Streets.

Some left turn or right turn movements are somewhat significant (greater than 200 vph):

- Westbound right turn from WCR 74 onto SH 257 (AM peak hour)
- Eastbound right turn from WCR 74 onto Hollister Lake Road (AM & PM peak hours)
- Westbound right turn from Garden Drive onto SH 257 (AM peak hour)

- Eastbound left turn (AM & PM peak hours) and northbound left turn (AM peak hour) at the Crossroads Boulevard/SH 257 intersection
- Eastbound and westbound right turns, and northbound left turn, at the SH 392/7th Street intersection (AM & PM peak hours)
- Southbound right turn, northbound left turn (AM peak hour), and westbound left turn (PM peak hour) at the SH 392/SH 257/Hollister Lake Road intersection

Of note, a few left turn movements exceed 300 vph (northbound 7th Street onto SH 392 – both peak periods) and southbound left turn on SH 257 at Garden Drive. The eastbound right turn from SH 392 onto 7th Street exceeds 400 vph during the PM peak hour.

3. Vehicle Classifications and Speeds

As part of the daily traffic volume data collection, vehicle classification and speed data were recorded (refer to **Table 2**). The recorded data allow the summation of the typical types of vehicles using the local and state highway network. The vehicle classifications can be divided into three main categories:

1. Articulated vehicles (tractor-trailer type)
2. Single Unit vehicles (3 or 4 axle trucks)
3. Passenger vehicles (motorcycles, passenger cars, pick-up trucks, vans, school buses)

Not surprisingly, most vehicle movements in the study area roadway network are passenger vehicles (about 95 percent to 99 percent) reflecting the residential nature of the towns of Windsor and Severance and the surrounding neighborhoods. Very few Single Unit vehicle types are found, with the majority likely being smaller delivery type vehicles. They make up 2.2 percent or less of the total number of vehicles. The highest value is 3.3 percent southbound on Hollister Lake Road south of WCR 72. The percentage of tractor-trailer type vehicles is relatively small also. The highest percentage of articulated trucks (2.9 percent) is found along SH 257 south of Eastman Park Drive, near the commercial areas associated with the Great Western Industrial Park.

Table 2. Vehicle Classification Summary

Location/Vehicle Type	Direction		Average Percentage
	Northbound	Southbound	
7 th Street – South of Eastman Park Drive			
Passenger Vehicles	99.1%	99.4%	99.2%
Single Unit Trucks	0.5%	0.4%	0.5%
Articulated Trucks	0.4%	0.2%	0.3%
SH 257 – Between WCR 70 & WCR 72			
Passenger Vehicles	97.3%	97.5%	97.4%
Single Unit Trucks	1.1%	2.0%	1.6%
Articulated Trucks	1.6%	0.5%	1.0%
SH 257 – South of Eastman Park Drive			
Passenger Vehicles	95.2%	95.6%	95.4%
Single Unit Trucks	1.7%	1.7%	1.7%
Articulated Trucks	3.1%	2.7%	2.9%
Hollister Lake Rd. – Between WCR 70 & WCR 72			
Passenger Vehicles	95.8%	95.3%	95.5%
Single Unit Trucks	1.0%	3.3%	2.2%
Articulated Trucks	3.2%	1.4%	2.3%
Location/Vehicle Type	Eastbound	Westbound	Average Percentage
Crossroads Boulevard – East of 7 th Street			
Passenger Vehicles	96.8%	96.8%	96.8%
Single Unit Trucks	1.1%	0.9%	1.0%
Articulated Trucks	2.1%	2.3%	2.2%
Main Street (SH 257 / SH 392) – East of 5 th Street			
Passenger Vehicles	95.6%	97.2%	96.4%
Single Unit Trucks	1.7%	1.3%	1.5%
Articulated Trucks	2.7%	1.5%	2.1%
WCR 72 – East of SH 257			
Passenger Vehicles	98.8%	99.1%	98.9%
Single Unit Trucks	0.6%	0.6%	0.6%
Articulated Trucks	0.6%	0.3%	0.5%
WCR 74 – East of SH 257			
Passenger Vehicles	96.8%	97.7%	97.2%
Single Unit Trucks	0.9%	0.7%	0.8%
Articulated Trucks	2.3%	1.6%	2.0%

Vehicle speeds were recorded on the same days as the traffic volume and vehicle classification data and represent all vehicle types. The speed data are presented in three categories in this memorandum:

- Average Speed (the average speed of all vehicles)
- 85th Percentile Speed (the speed at which 85 percent of all vehicles are traveling at or below)
- Highest Speed (the recorded highest speed in either direction)

Table 3 summarizes the collected speed data. Key points from the collected data include:

- Average speeds were always lower than the posted speed, likely related to varying congestion issues.
- The 85th percentile speeds, which are often used to set the posted speed, were at or below the posted speed. Only 7th Street south of Eastman Park Drive had 85th percentile speeds essentially the same as the posted speed. All others were 2 to 12 miles per hour (mph) below the posted speed limit.
- A few motorists were greatly exceeding the posted speed limit; in some cases, 25 to 30 mph above the posted speed (northbound on 7th Street, south of Eastman Park Drive).
- The average and 85th percentile speeds along SH 392 (Main Street) to the east of 5th Street were below the posted speed limit by 8 to 16 mph, possibly related to congestion levels in the downtown area which could possibly be related to interaction with diagonal parking maneuvers.

Table 3. Summary of Vehicle Travel Speeds (24-Hour Period)

Location	Posted Speed	Recorded Speeds (mph)					
		Average		85 th Percentile		Highest	
		NB	SB	NB	SB	NB	SB
7 th Street south of Eastman Park Drive	45 mph	41	40	45	44	71–75	61–65
SH 257 between WCR 70 & WCR 72	55 mph	34	35	44	48	>76	51–55
SH 257 south of Eastman Park Drive	55 mph	41	40	45	44	71–75	61–65
Hollister Lake Rd. between WCR 70 & WCR 72	45 mph	32	34	43	38	>76	51–55
		EB	WB	EB	WB	EB	WB
Crossroads Boulevard east of 7 th Street	45 mph	34	34	38	38	51–55	51–55
Main Street (SH 257 / SH 392) east of 5 th Street	30 mph	16	14	22	19	51–55	31–35
WCR 72 east of SH 257	55 mph	37	37	44	43	61–65	61–65
WCR 74 east of SH 257	55 mph	41	37	44	47	>76	66–70

4. Vehicle Origin/Destination Data

One of the issues to understand for this study is the routes that motorists are using to travel through the Town of Windsor, particularly along the one-mile segment of Main Street where the state highway designation is shared with both SH 257 and SH 392. To evaluate this information, data were collected via Bluetooth™ wireless technology, which uses short-range radio communications to record the locations of cell phones as motorists pass by Bluetooth™ data collection devices.

Bluetooth technology allows the number of vehicles passing a specific location to be matched to another specific location to understand how many vehicles traveled through these two data collection sites. Numerous data collection points can be used to understand specific travel patterns; however, the number of data collection points can become excessive to understand all possible patterns. For this project, data collection devices were placed at the following eight locations, which are shown on **Figure 2**. Bluetooth™ data were collected for the same 24-hour period at each location.

- | | |
|---|---|
| 1. WCR 74 west of SH 257 | 5. Main Street (SH 257 / SH 392) west of 4 th Street |
| 2. SH 257 north of WCR 74 | 6. SH 392 east of Hollister Lake Road |
| 3. WCR 74 east of Hollister Lake Road | 7. Crossroads Boulevard west of Pelican Farms Road |
| 4. SH 392 (Main Street) west of 11 th Street | 8. SH 257 south of Crossroads Boulevard |

It is important to note that Bluetooth™ data collection has various limitations. To be recorded, a vehicle must have a cell phone in it, the phone must be turned on, and the phone must be actively searching for a Wi-Fi connection. Hence, the Bluetooth™ data collection does not capture every vehicle. Even with these limitations, a total of approximately 472,500 data points were recorded.

These 472,500 data points also have limitations. When more than one person carrying an active cell phone is in a vehicle, more than one data point can be recorded for that vehicle at that location. During congested conditions, a slow-moving vehicle may be recorded numerous times at a given station while the cell phone is within range of that Bluetooth™ data collection device. Motorists can pass through a data collection station, stop at a destination, and return past the same data collection station, showing up as a duplicate record at a later time. The Bluetooth™ dataset was filtered to remove these duplicate records, resulting in unique records for each vehicle at each data collection point.

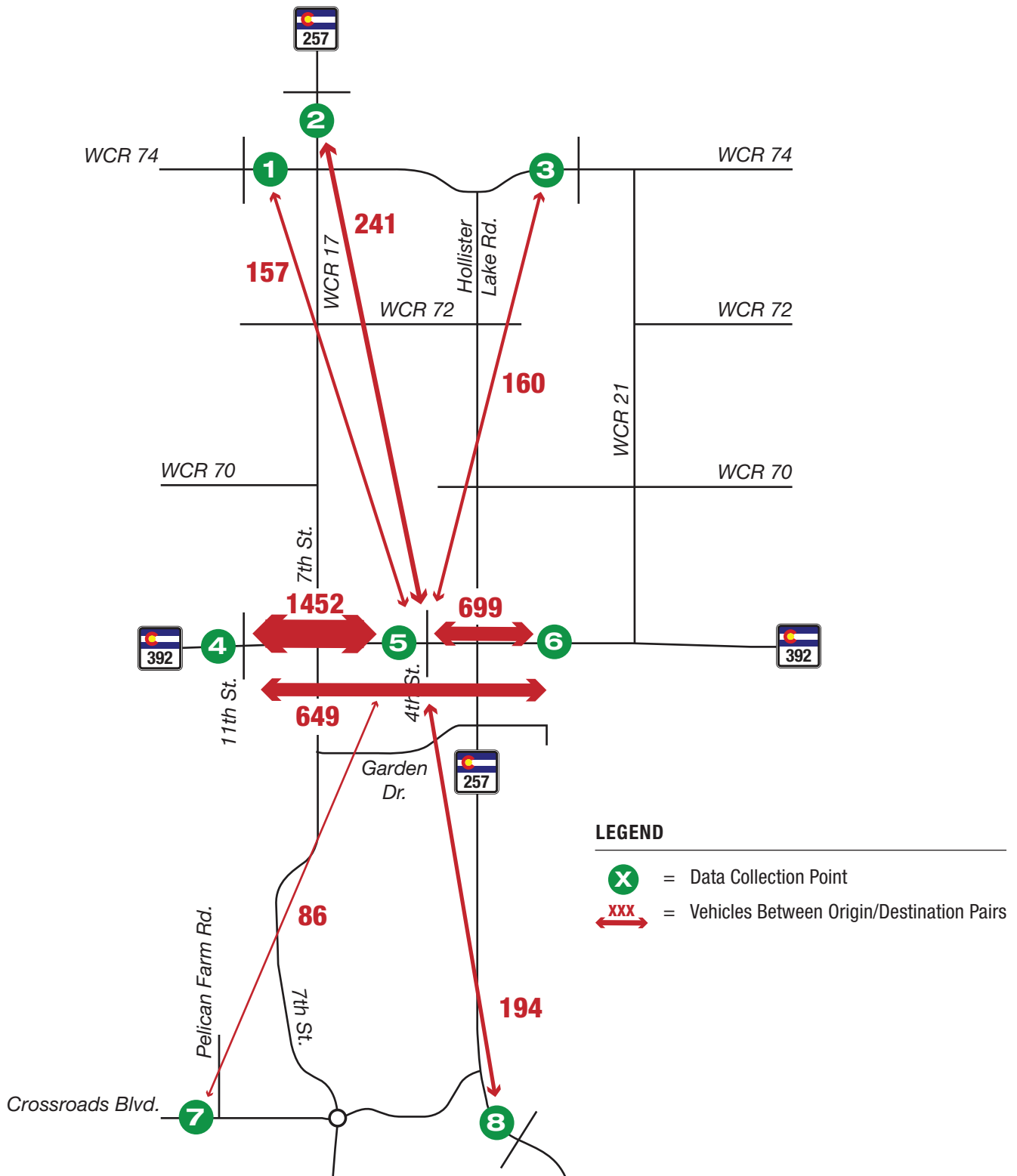
The next step in the analysis was to determine how many of the unique records appeared at more than one data collection point. Vehicles that showed up at several data collection stations give a snapshot of travel patterns, as they can be shown to go from one station to another. A total of about 3,600 individual data points were found to appear at multiple Bluetooth™ data collection points. These data are summarized on **Figure 2** and in the following bullets:

- Most vehicles that travel through the downtown Windsor data collection location (Main Street west of 4th Street) have origins and/or destinations along SH 392 (Main Street). Almost 1,500 vehicles travel between 11th and 4th Streets, while another 700 traveled between 4th Street and Hollister Lake Road. An additional 650 vehicles traveled through downtown

between 11th Street and Hollister Lake Road. This is intuitive since SH 392 is an important east/west route in northern Colorado.

- Travel between other data collection locations and the downtown Windsor data collection location represents only a fraction of the east/west movements along Main Street. About 200 vehicles traveled between SH 257 at Crossroads Boulevard and the downtown Windsor data collection location, while another 250 traveled between the downtown Windsor data collection location and SH 257 north of WCR 74. These data suggest that not many motorists follow SH 257 through downtown to travel between the Crossroads area and the WCR 74 area. Given the number of alternative routes (including 7th Street and Hollister Lake Road), it is not surprising that motorists familiar with Windsor avoid Main Street during times of anticipated congestion.

More detailed evaluations of the Bluetooth™ data will be conducted as the project effort moves forward. Regardless of potential limitations, the Bluetooth™ data will be a valuable resource to provide origin and destination information for the project.



Appendix C. Traffic Operations Technical Memorandum

MEMORANDUM

TO:	Study Advisory Team
FROM:	Paul Brown, PE, PTOE
DATE:	January 17, 2023
SUBJECT:	Windsor Downtown Alternate Route Study – Traffic Operations Summary Technical Memorandum (FHU Project Number 121464-04)

This memorandum summarizes the traffic operations analyses prepared for the Windsor Downtown Alternate Route Study. Traffic analyses are based on project traffic data summarized in the *Existing Data Collection Summary Technical Memorandum* (October 2022). They also use traffic signal timing data and geometric conditions information gathered in support of the traffic operational analysis process. The results are summarized in **Section 4** of this memorandum.

I. Existing Conditions Data

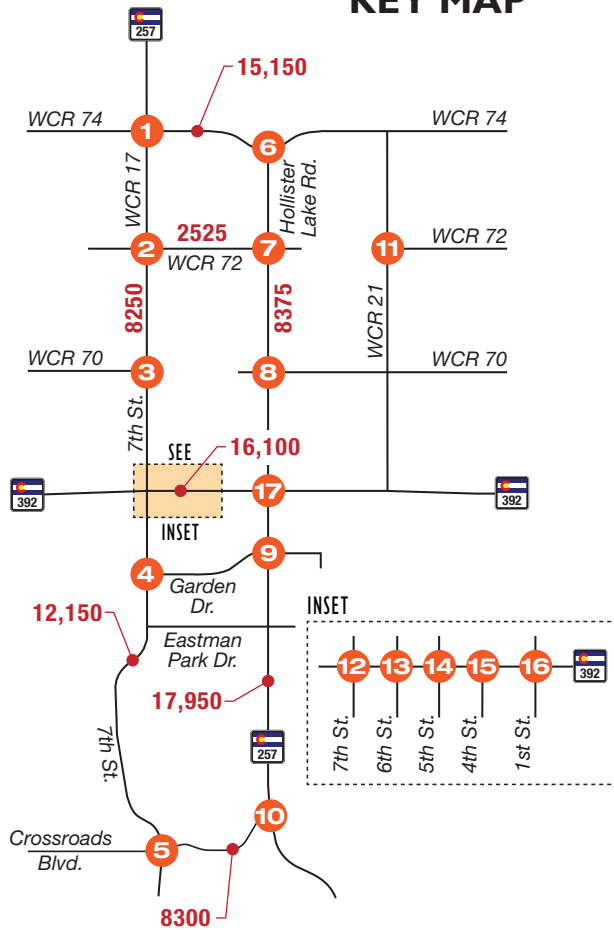
The traffic operations analyses for the Windsor Downtown Alternate Route Study began with the existing counts presented in the *Existing Data Collection Summary Technical Memorandum* dated October 2022. The project team reviewed these counts to determine the morning and afternoon peak hours to be evaluated. Peak hours were found to be:

- AM peak hour: 7:30am to 8:30am
- PM peak hour: 4:45pm to 5:45pm

Figure I shows the resulting existing condition volumes.

Using these peak hours, the project team calculated peak hour factors, percent heavy vehicles, and other operational inputs. The project team obtained existing traffic signal timings from the Colorado Department of Transportation (CDOT) for signalized intersections in the study area, while they obtained geometric data such as number of lanes, turn pocket lengths, and lane assignments from aerial photography.

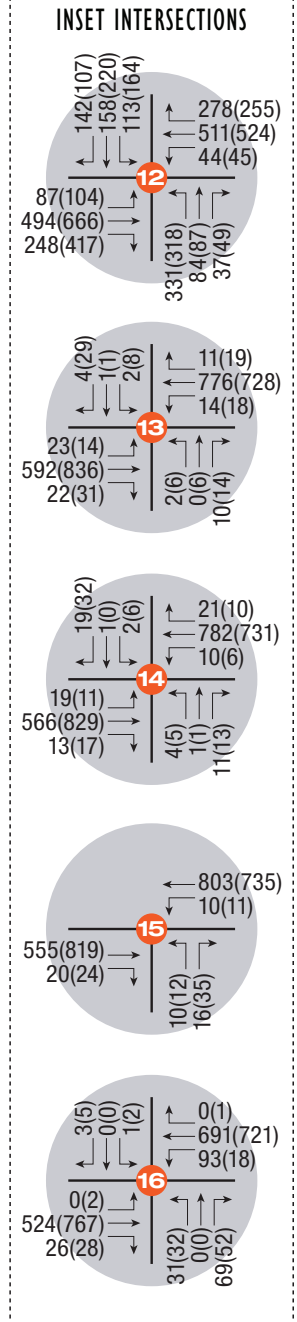
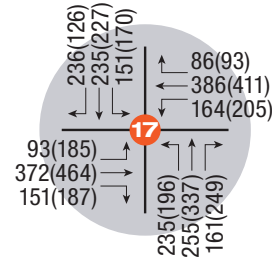
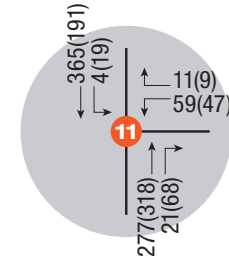
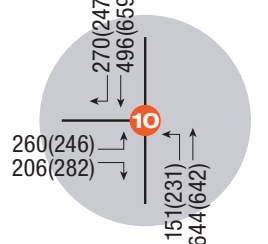
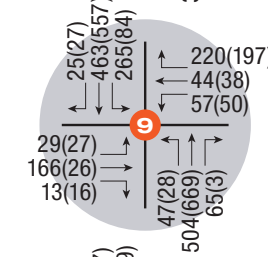
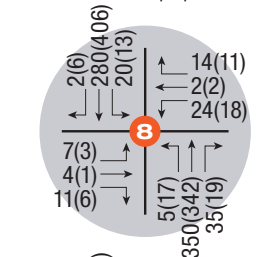
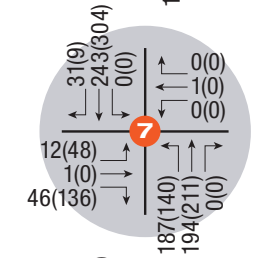
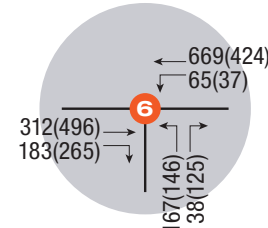
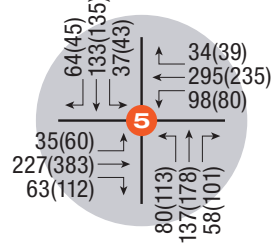
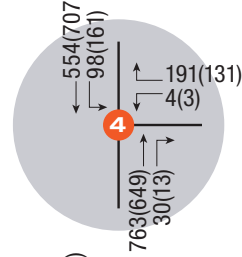
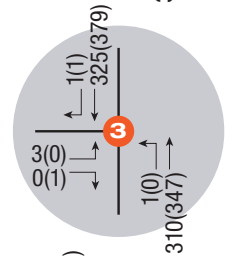
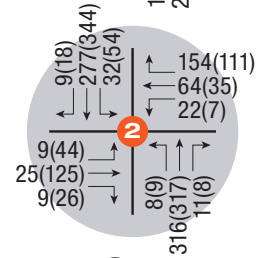
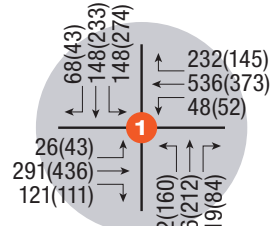
KEY MAP



LEGEND

xxx(xxx) = AM(PM) Peak Hour Traffic Volumes

XXXX = Daily Traffic Volumes



2. Future Year Forecasts

The Windsor Downtown Alternate Route Study is evaluating two future years: short-term (2027) and long-term (2042). Volume forecasts were developed for each future year. The project team evaluated two sources to determine an appropriate growth rate.

2.1 CDOT Growth Rates

Data from the *Existing Data Collection Summary Technical Memorandum* indicate an annual growth rate between 2.08 percent per year and 2.38 percent per year on State Highway (SH) 257 and between 1.44 percent per year and 2.05 percent per year on SH 392 in the Windsor area, as shown in **Table 1**. These data point to an overall annual growth rate of approximately 2 percent per year in the study area.

Table 1. State Highway Growth Rates

Route	Between		Annual Growth Rate
SH 257	Eastman Park Drive	E Garden Drive	2.08%
SH 257	E Chestnut Street	E Main Street / SH 392	2.08%
Main Street (SH 257)	Hollister Lake Road	1 st Street	2.15%
Main Street (SH 257)	6 th Street	7 th Street	2.12%
SH 257	7 th Street	Birch Street	2.18%
SH 257	WCR 80	SH 14	2.38%
SH 392	Westgate Drive	LCR 5	1.44%
Main Street (SH 392)	10 th Street	7 th Street	2.05%
Main Street (SH 392)	Hollister Lake Road	WCR 21	2.01%
SH 392	WCR 23	WCR 25	1.91%

LCR = Larimer County Road

SH = State Highway

WCR = Weld County Road

2.2 Travel Demand Model Growth Rates

The project team compiled data from the North Front Range Metropolitan Planning Organization (NFRMPO) travel demand model for 29 links in the study area, including state highways, county roads, and local streets. The goal of this effort was to expand the dataset used to determine the growth rate beyond the state highway data described in the *Existing Data Collection Summary Technical Memorandum*. As shown in **Table 2**, the growth rates range from 2.36 percent per year to 9.94 percent per year, with an average of 4.76 percent per year. These data point to a forecasted annual growth rate of between 4 percent and 5 percent per year across the study area.

Table 2. NFRMPO Growth Rates

Route	Between		Annual Growth Rate
SH 257	WCR 74	WCR 76	6.33%
WCR 74	Valleyview Circle	SH 257	4.13%
WCR 74	SH 257	Hollister Lake Road	5.32%
WCR 74	Hollister Lake Road	WCR 21	5.44%
SH 257	WCR 72	WCR 74	4.26%
Hollister Lake Road	WCR 72	WCR 74	9.94%
WCR 72	SH 257	Hollister Lake Road	2.36%
SH 257	WCR 70	WCR 72	6.06%
Hollister Lake Road	WCR 70	WCR 72	5.21%
SH 257	SH 392	WCR 70	6.08%
Hollister Lake Road	SH 392	WCR 70	4.67%
Main Street	10 th Street	7 th Street	3.74%
Main Street	7 th Street	3 rd Street	4.32%
Main Street	3 rd Street	1 st Street	4.56%
Main Street	1 st Street	Hollister Lake Road	5.19%
Main Street	Hollister Lake Road	Consolidated Law Ditch	5.03%
7 th Street	Walnut Street	Main Street	3.09%
SH 257	Walnut Street	Main Street	4.68%
7 th Street	Garden Drive	Stone Mountain Road	2.93%
SH 257	Garden Drive	Walnut Street	5.30%
7 th Street	Eastman Park Drive	Hemlock Drive	2.85%
SH 257	Eastman Park Drive	GWRR	5.22%
7 th Street	Crossroads Boulevard	Hilltop Drive	2.80%
SH 257	Crossroads Boulevard	Cache La Poudre River	4.29%
Crossroads Boulevard	WCR 15.75	7 th Street	4.46%
Crossroads Boulevard	7 th Street	New Liberty Road	4.88%
Crossroads Boulevard	New Liberty Road	SH 257	5.39%
7 th Street	WCR 60.5	Crossroads Boulevard	6.32%
SH 257	Rancho Drive	Crossroads Boulevard	3.07%

GWRR = Great Western Railroad

SH = State Highway

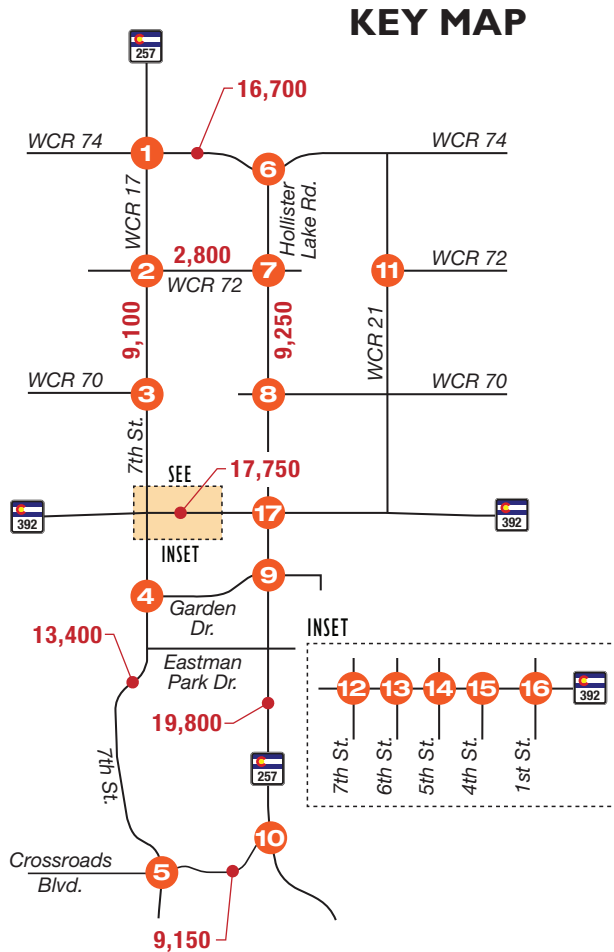
WCR = Weld County Road

2.3 Final Future Year Forecasts

The project team reviewed the CDOT growth rates and the NFRMPO travel demand model growth rates with Windsor staff. Based on this review, the project team developed the following approach to future year forecasts for the Windsor Downtown Alternate Route Study

- Apply a 2 percent annual growth rate to existing counts for both forecast years.
- Add supplemental traffic from the connection of Weld County Road (WCR) 72 to Hollister Lake Road from the east (Town of Severance) to the network. This connection does not currently exist and will bring traffic to the Windsor study area when it is completed.

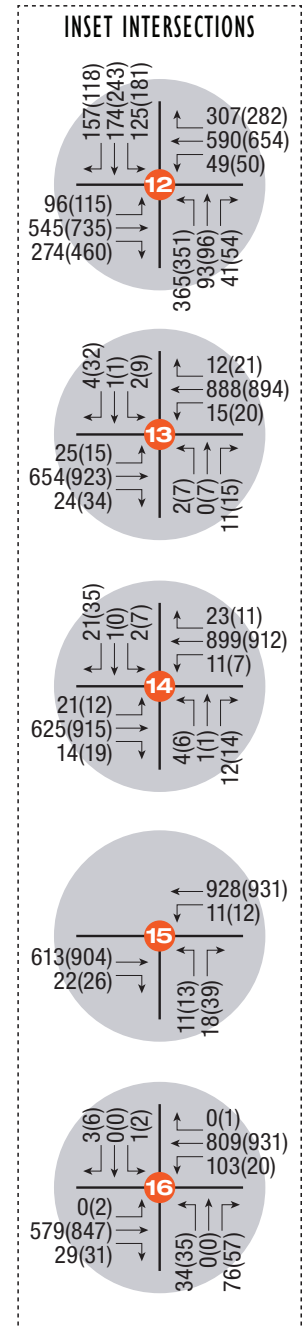
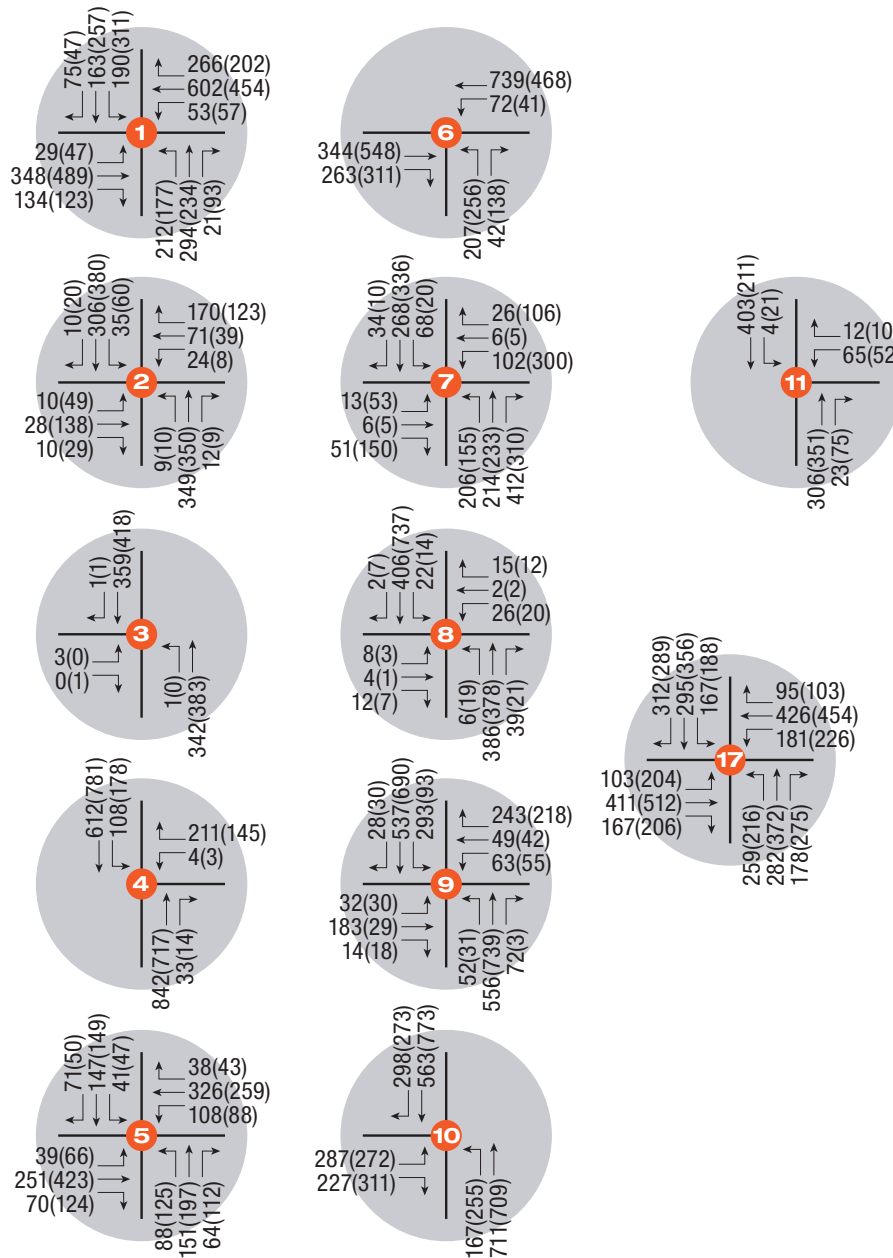
With this process, the CDOT 2 percent per year annual growth is increased somewhat by the addition of WCR 72 traffic, bringing overall growth closer to the forecasts from the NFRMPO travel demand model. The resulting annual growth is reasonable when compared to common traffic engineering practice. The forecasted volumes for 2027 and 2045 are presented on **Figure 2** and **Figure 3**, respectively.

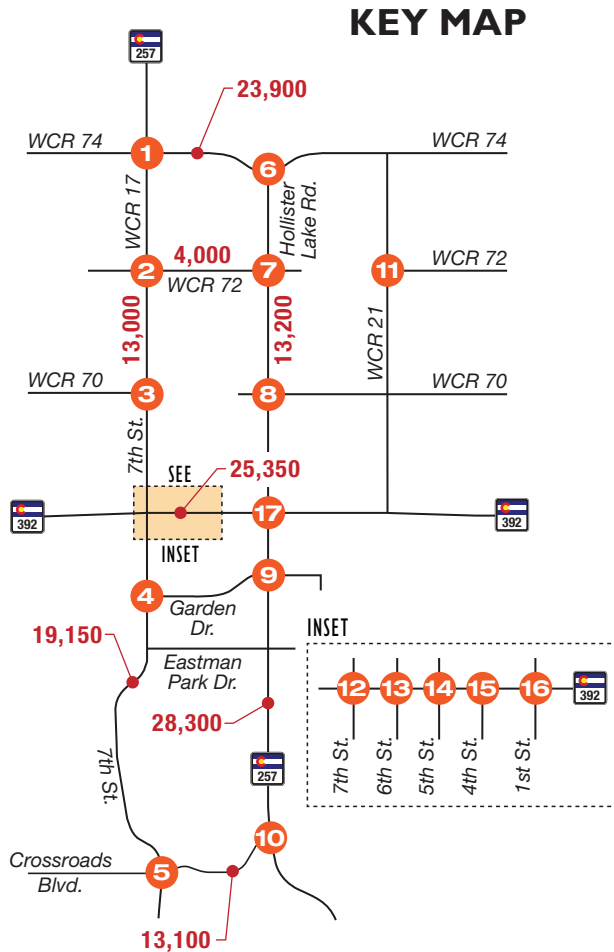


LEGEND

xxx(xxx) = AM(PM) Peak Hour Traffic Volumes

XXXX = Daily Traffic Volumes

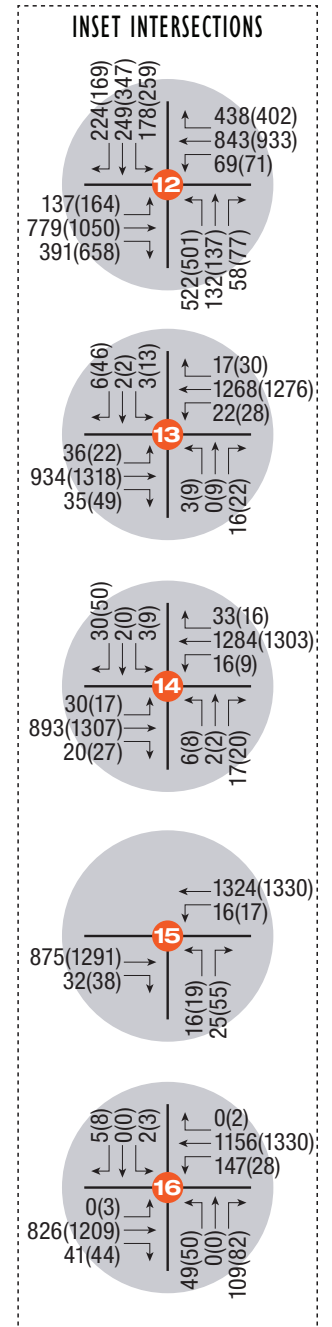




LEGEND

xxx(xxx) = AM(PM) Peak Hour Traffic Volumes

XXXX = Daily Traffic Volumes



3. Traffic Operations

The project team used the volumes and supporting data described previously to evaluate traffic operations under existing (2022) and future (short-term and long-term) scenarios.

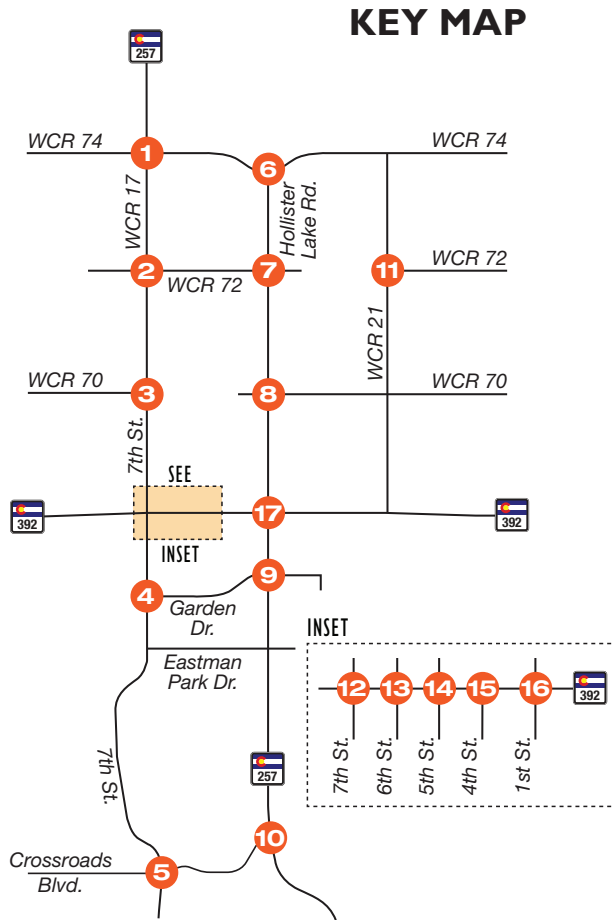
3.1 Analysis Methodology

Traffic operations within the study area were evaluated according to techniques documented in the Highway Capacity Manual, Sixth Edition (HCM). Synchro (version 11) and SIDRA Intersection (version 8) were used for the HCM evaluations. Level of Service (LOS), a qualitative measure of traffic operational conditions based on roadway capacity and vehicle delay, was determined for all movements that must yield right-of-way to other traffic movements. LOS is described by a letter designation ranging from LOS A to LOS F, with LOS A representing nearly free-flow travel and LOS F representing congested conditions. LOS D (or better) is considered adequate in most jurisdictions and was used to define acceptable operations in this study.

3.2 Existing Conditions

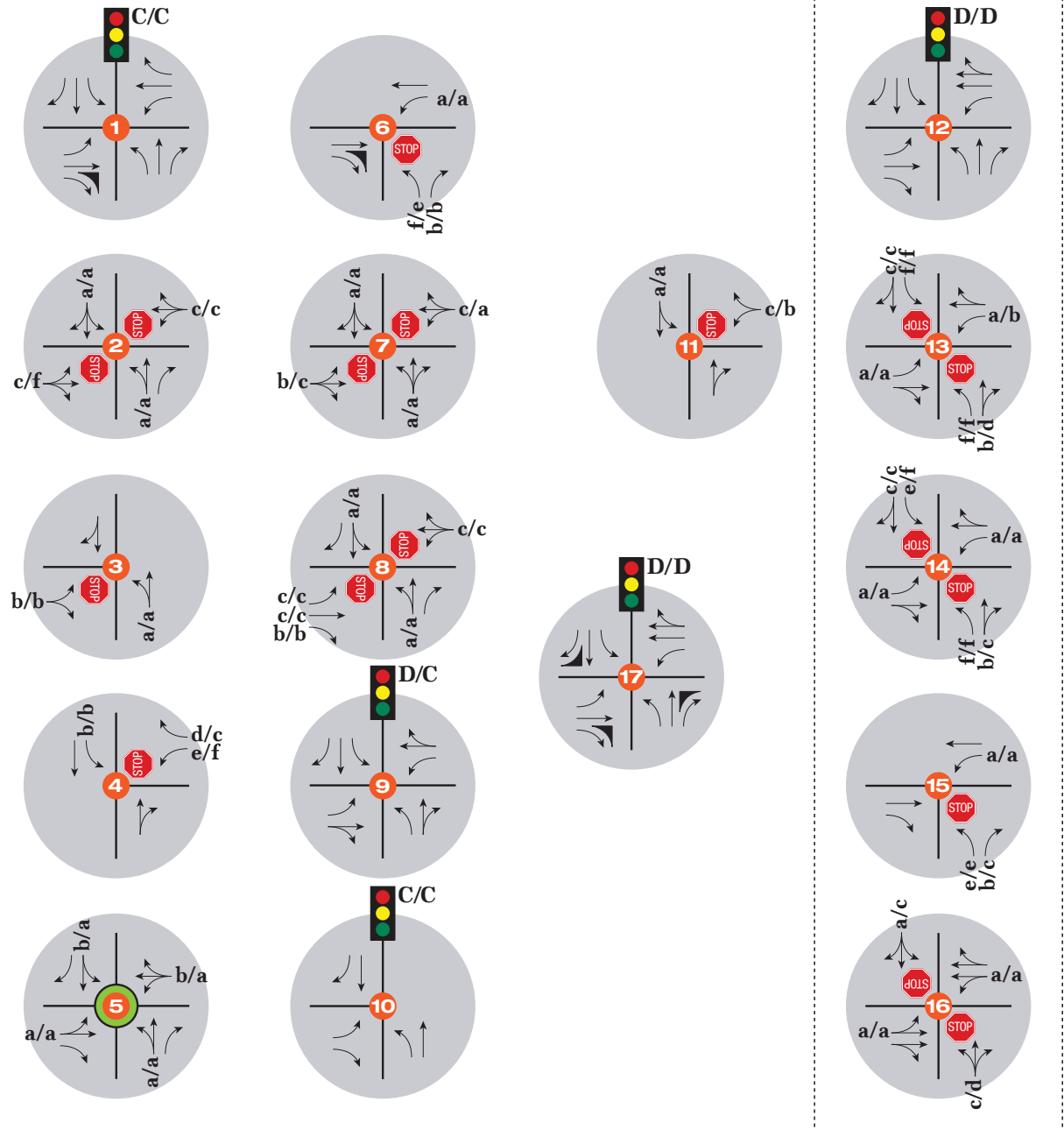
The existing conditions analysis used the year 2022 AM and PM peak hour volumes with existing geometry, signal timings, and other inputs to evaluate current traffic operations. The results of this process are shown on **Figure 4**. The signalized intersections operate at LOS D or better in both peak periods. The Crossroads Boulevard / 7th Street roundabout also operates acceptably. However, several stop-controlled intersections exhibit poor operations (LOS E or LOS F) on the side street approaches.

- The eastbound approach to the WCR 72 intersection with SH 257 (#2) operates at LOS F in the PM peak hour. Due to the flared nature of both the eastbound and westbound approaches to this intersection, actual operations may be better than indicated by the operational analysis.
- The westbound left turn lane at the Garden Drive intersection with 7th Street (#4) operates at LOS E in the AM peak hour and at LOS F in the PM peak hour. Although the left turn movement operates poorly, the left turning volume is low and the overall westbound approach operates acceptably.
- The northbound approach to the Hollister Lake Road intersection with WCR 74 (#6) operates at LOS F in the AM peak hour and at LOS E in the PM peak hour. This intersection is within the Town of Severance's Growth Boundary. Their Transportation Master Plan (TMP) identifies WCR 74 improvements through this intersection by year 2040.
- Various side street approaches from 4th Street, 5th Street, and 6th Street onto Main Street in downtown Windsor operate at LOS E or LOS F in the AM and PM peak hours. This is consistent with the urban nature of Windsor's central business district.



LEGEND

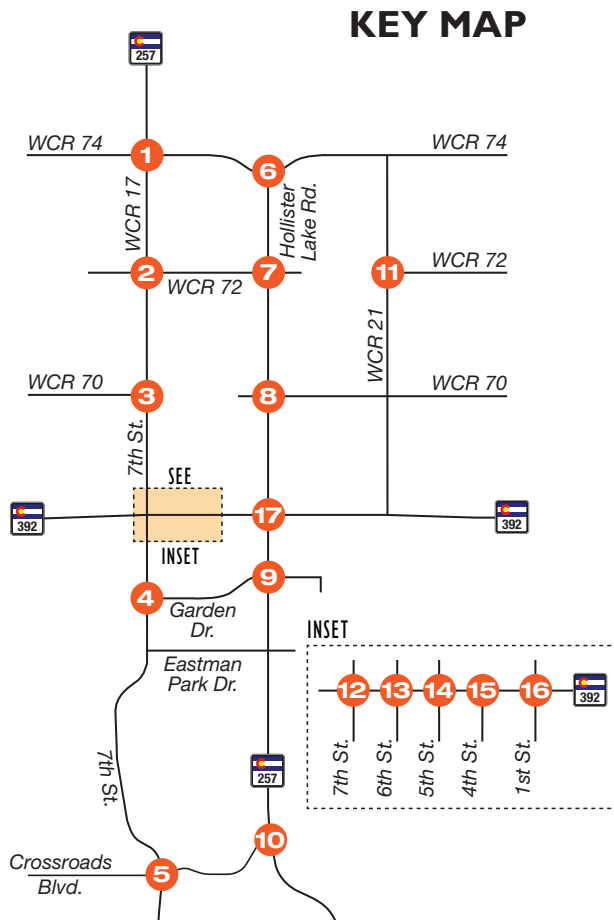
- X/X = AM/PM Peak Hour Signalized Intersection Level of Service
- x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service
- = Stop Sign
- = Traffic Signal
- = Roundabout



3.3 Short-Term (2027) Conditions

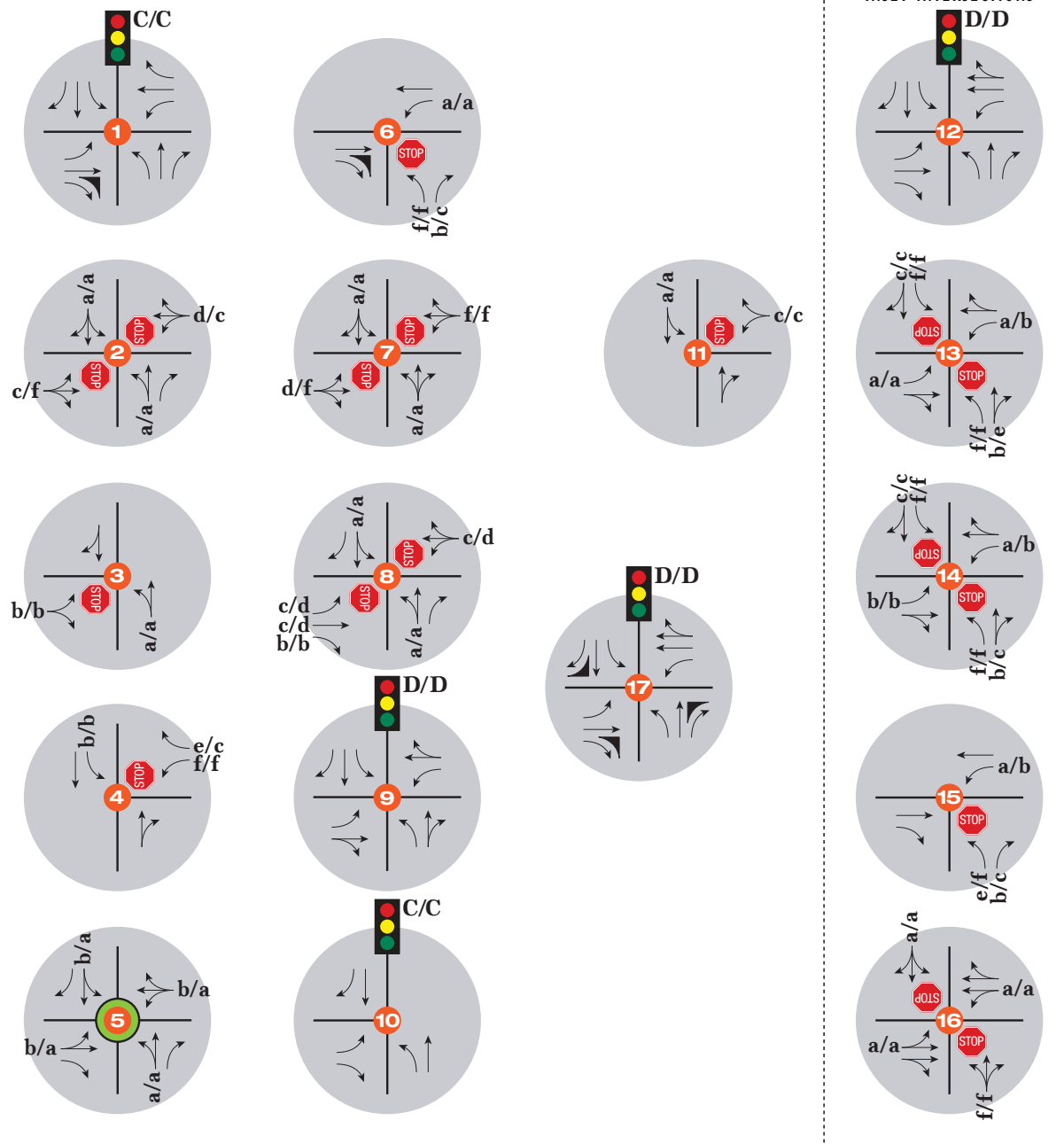
The short-term conditions analysis used the forecasted 2027 AM and PM peak hour volumes with existing geometry, signal timings, and other inputs to evaluate short-term traffic operations. The results of this process are shown on **Figure 5**. Several signalized intersections continue to operate at LOS D or better in both peak periods, but two signalized intersections drop to LOS E in at least one peak period. The Crossroads Boulevard / 7th Street roundabout continues to operate acceptably. Again, several stop-controlled intersections exhibit poor operations on the side street approaches.

- The eastbound approach to the WCR 72 intersection with SH 257 (#2) continues to operate at LOS F in the PM peak hour. Due to the flared nature of both the eastbound and westbound intersection approaches, actual operations may be better than indicated by the operational analysis.
- The westbound left turn lane at the Garden Drive intersection with 7th Street (#4) operates at LOS F in the AM and PM peak hours, and the westbound right turn lane operates at LOS E in the AM peak hour. Given existing constraints at the intersection, potential mitigations are limited. Since the neighborhood to the east along Garden Drive is essentially built out limiting future traffic growth along Garden Drive, no mitigations are recommended.
- The northbound approach to the Hollister Lake Road intersection with WCR 74 (#6) operates at LOS F in the AM and PM peak hours. As noted under existing conditions, Severance's TMP identifies future WCR 74 improvements in this area.
- The westbound approach to the Hollister Lake Road intersection with WCR 72 (#7) operates at LOS F in both the AM and PM peak hours, while the eastbound approach operates at LOS F in the PM peak hour. This intersection is also within the Town of Severance's Growth Boundary. Appropriate improvements should be considered when the westbound approach to this intersection is built.
- One approach of the signalized intersection of Main Street and 7th Street (#12) drops to LOS E in the PM peak hour with existing timings. Optimized signal timings can restore LOS D or better operations, but the intersection should be monitored for potential geometric improvements.
- Various side street approaches from 4th Street, 5th Street, and 6th Street onto Main Street in downtown Windsor operate at LOS E or LOS F in the AM and PM peak hours, similar to existing conditions and consistent with the urban nature of Windsor's central business district.
- The northbound approach to the 1st Street intersection with Main Street (#16) operates at LOS F in the AM and PM peak hours. Windsor recently resurfaced 1st Street between Main Street and Walnut Street. The project included striped bike lanes and parking on both sides of the street in accordance with Windsor's TMP. Although the restriping does not improve vehicular operations, it provides enhanced bicycle and pedestrian access. The bike lanes and parking should be retained in lieu of modifications that could improve LOS.
- The signalized intersection of Main Street and Hollister Lake Road (#17) drops to LOS E in the AM and PM peak hours with existing timings and geometry. Windsor is currently designing improvements at this location, which are anticipated to result in acceptable future year operations in the short-term horizon.



LEGEND

- X/X = AM/PM Peak Hour Signalized Intersection Level of Service
- x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service
- = Stop Sign
- = Traffic Signal
- = Roundabout



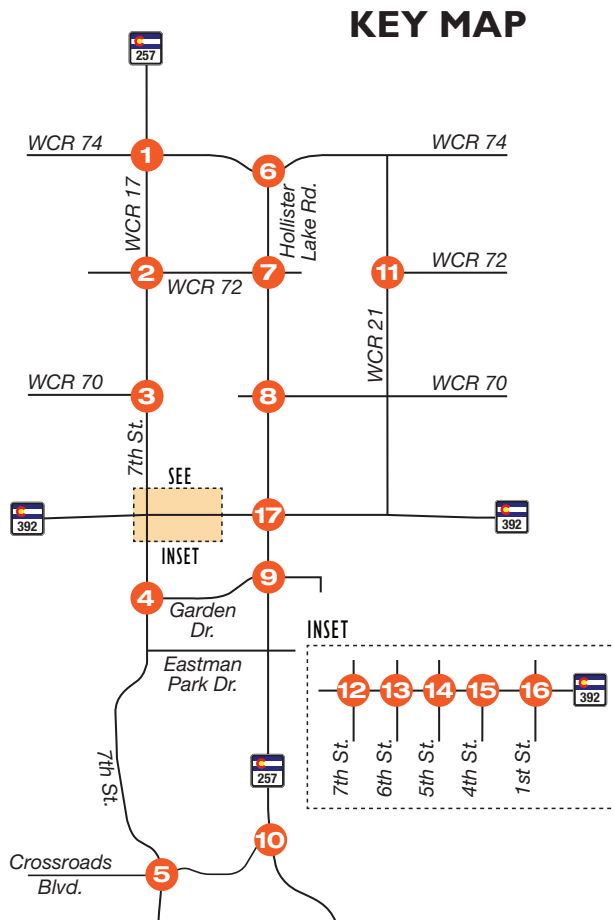
3.4 Long-Term (2045) Conditions

The long-term conditions analysis used the forecasted 2045 AM and PM peak hour volumes with existing geometry, signal timings, and other inputs to evaluate long-term traffic operations. The results of this process are shown on **Figure 6**. Most signalized intersections drop to LOS E or F in at least one peak period. The Crossroads Boulevard / 7th Street roundabout continues to operate acceptably overall, but one approach drops to LOS F. By 2045, most stop-controlled intersections exhibit poor operations on the side street approaches.

- The signalized intersection of WCR 74 and 7th Street (#1) drops to LOS F in the AM peak hour and LOS E in the PM peak hour, assuming traffic signal retiming but no changes to intersection geometry. As noted under existing conditions, Severance's TMP identifies future WCR 74 improvements in this area.
- The eastbound approach to the WCR 72 intersection with SH 257 (#2) operates at LOS F in the AM and PM peak hours, while the westbound approach operates at LOS F in the AM peak hour. Although the flared nature of both the eastbound and westbound approaches to this intersection will help, operations by 2045 deteriorate to the point where more substantial improvements may be necessary. These improvements may be coupled with development as it occurs along the WCR 72 corridor.
- Both the westbound left turn lane and the westbound right turn lane at the Garden Drive intersection with 7th Street (#4) operate at LOS F in the AM and PM peak hours. Given existing constraints at the intersection, potential mitigations are limited. Since the neighborhood to the east along Garden Drive is essentially built out limiting future traffic growth along Garden Drive, no mitigations are recommended.
- The westbound approach to the Crossroads Boulevard roundabout at 7th Street (#5) operates at LOS F in the AM peak hour. Because this roundabout has been constructed with additional pavement on the westbound approach, it can be restriped as a 2-lane approach to address the anticipated operational shortfall when needed.
- The northbound approach to the Hollister Lake Road intersection with WCR 74 (#6) operates at LOS F in the AM and PM peak hours. As noted under existing conditions, Severance's TMP identifies future WCR 74 improvements in this area.
- The eastbound and westbound approaches to the Hollister Lake Road intersection with WCR 72 (#7) operate at LOS F in the AM and PM peak hours. This intersection is also within the Town of Severance's Growth Boundary. Appropriate improvements should be considered when the westbound approach to this intersection is built.
- The signalized intersection of Garden Drive and SH 257 (#9) drops to LOS F in the AM and PM peak hours with existing timings and geometry. Retiming results in operational improvements, but LOS F remains in both peak hours. The intersection should be monitored for potential geometric improvements.
- The signalized intersection of Crossroads Boulevard and SH 257 (#10) drops to LOS F in the PM peak hour with existing timings and geometry, and retiming does not restore acceptable

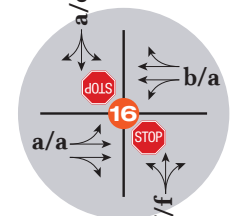
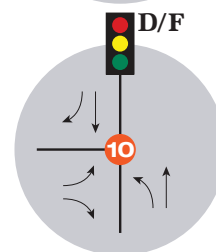
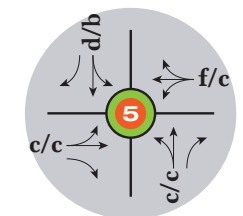
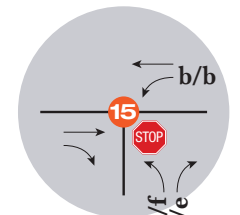
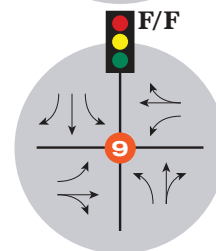
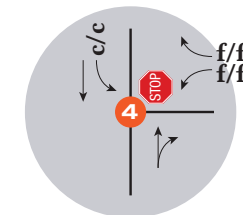
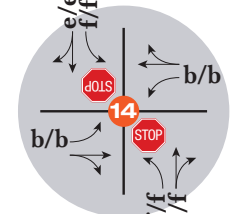
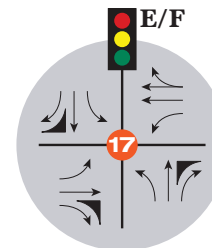
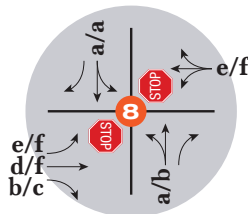
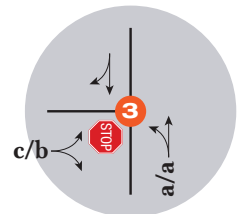
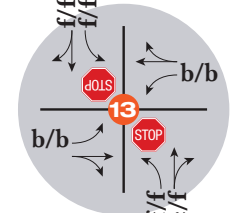
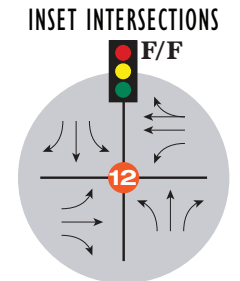
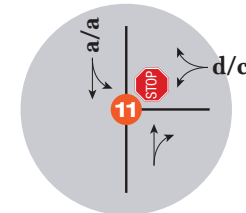
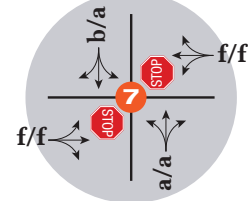
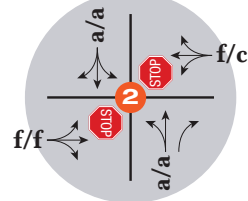
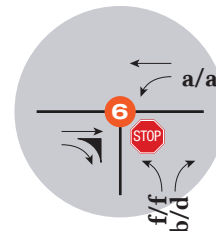
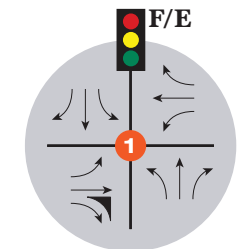
operations. The eastbound approach provides additional width that is currently striped out. This width, coupled with either widening along Hollister Lake Road or extension of Crossroads Boulevard to the east, could improve operations.

- The signalized intersection of Main Street and 7th Street (#12) drops to LOS F in the AM and PM peak hours with existing timings. Optimized signal timings can improve operations for some movements, but deficiencies will remain. The intersection should be monitored for potential geometric improvements.
- Various side street approaches from 4th Street, 5th Street, and 6th Street onto Main Street in downtown Windsor operate at LOS E or LOS F in the AM and PM peak hours. This is similar to existing conditions and is consistent with the urban nature of Windsor's central business district.
- The northbound approach to the 1st Street intersection with Main Street (#16) continues to operate at LOS F in the AM and PM peak hours. As noted in the short-term (2027) scenario, no improvements are recommended.
- The signalized intersection of Main Street and Hollister Lake Road (#17) drops to LOS F in the AM and PM peak hours with existing timings and geometry. Windsor is currently designing improvements at this location that are anticipated to result in acceptable short-term operations. However, long-term shortfalls have still been identified after completion of the planned short-term project. Improvements to address these long-term shortfalls have been identified as part of the current design effort, but these long-term improvements have not been committed to. After completion of the short-term improvements, the intersection should be monitored to determine the timing of the identified long-term improvements.



LEGEND

- X/X** = AM/PM Peak Hour Signalized Intersection Level of Service
- x/x** = AM/PM Peak Hour Unsignalized Intersection Level of Service
- = Stop Sign
- = Traffic Signal
- = Roundabout



3.5 Volume to Capacity Ratio Analysis

The project team also reviewed the number of lanes and volume to capacity ratios (v/c ratios) in the NFRMPO travel demand model to identify potential needs for roadway corridor improvements. The travel demand model reflects both the existing roadway network (as of year 2015) and committed future improvements (assumed in year 2045) at a planning level.

Since the planning nature of the travel demand model does not provide levels of service, v/c ratios are used to reflect traffic operations. The v/c ratio is obtained by dividing the roadway volume by the roadway capacity. The resulting ratio indicates roadways where operations are reasonable (v/c ratios below 0.80), where operations are nearing capacity (v/c ratios between 0.80 and 0.95), where operations are at capacity (v/c ratios between 0.95 and 1.05), and where operations are over capacity (v/c ratios greater than 1.05).

3.5.1 Laneage Review

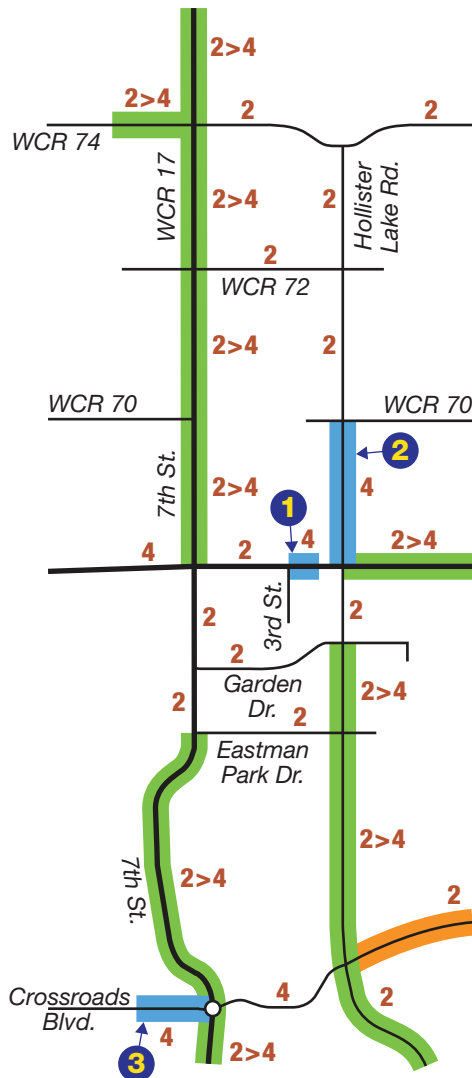
The first step in the v/c ratio analysis was to review the roadway laneage shown in the NFRMPO travel demand model for study area roadways. The results of this effort are shown on **Figure 7**. The following laneage observations were made about the existing conditions model:

- Most study area roadways are 2-lane facilities (one lane per direction) in the existing year model, consistent with current conditions.
- 4-lane roadway segments include SH 392 (Main Street) west of 7th Street and Crossroads Boulevard between SH 257 and 7th Street.
- Three roadway laneage inconsistencies were noted in the existing conditions model:
 - ◆ Crossroads Boulevard west of 7th Street is shown in the model as a 2-lane facility. However, this roadway is currently 4 lanes. This widening was constructed after the 2015 travel demand model was developed.
 - ◆ Main Street between 1st Street and 3rd Street is shown in the model as a 4-lane facility. However, this roadway is currently 2 lanes. This segment was reduced to 2 lanes when downtown parking and roadway improvements were extended east past the Great Western Railroad crossing as part of the Windsor Mill redevelopment.
 - ◆ Hollister Lake Road between Main Street and WCR 70 is shown in the model as a 2-lane facility. However, significant portions of this segment are 4 lanes today, and plans exist to widen the northbound side of Hollister Lake Road between Main Street and Sundance Lane to 4 lanes. With these changes, Hollister Lake Road would be 4 lanes throughout this segment except for the 2-lane structure over Consolidated Law Ditch.

The following laneage observations were made about the future conditions model:

- The roadway laneage inconsistencies noted in the existing conditions model were unchanged in the future year model.
- The following roadway segment upgrades are shown in the future year model:
 - ◆ WCR 74 is shown to be upgraded from 2 lanes to 4 lanes from SH 257 westward out of the study area.
 - ◆ 7th Street (SH 257) is shown to be upgraded from 2 lanes to 4 lanes from Main Street north through WCR 70 and WCR 72, and the widening continues northward out of the study area past WCR 74.
 - ◆ 7th Street is shown to be upgraded from 2 lanes to 4 lanes from south of the study area northward past Crossroads Boulevard to Eastman Park Drive.
 - ◆ Hollister Lake Road (SH 257) is shown to be upgraded from 2 lanes to 4 lanes from south of the study area northward past Crossroads Boulevard and Eastman Park Drive to Garden Drive.
 - ◆ Crossroads Boulevard is shown to be extended east as a new roadway past SH 257 to at least WCR 23 as a 2-lane facility.
 - ◆ Main Street (SH 392) is shown to be upgraded from 2 lanes to 4 lanes from Hollister Lake Road eastward out of the study area past WCR 21.

Laneage

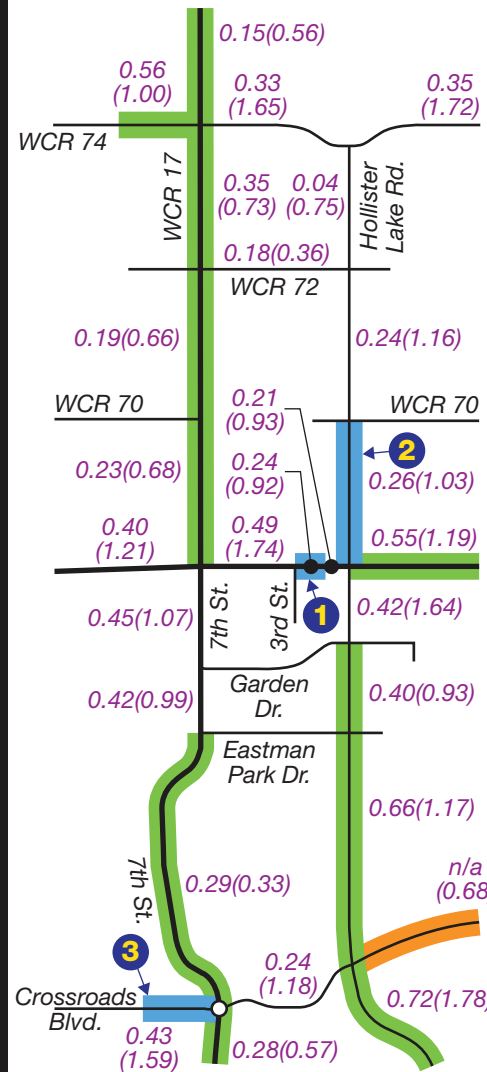


LEGEND

- XX** = Number of Lanes
- = Modeled Roadway Widening
- = Model Inconsistency
- = Modeled New Facility

- 1** The model shows Main Street as 4 lanes, while this segment is 2 lanes.
- 2** The model shows Hollister Lake Road as 2 lanes between Main Street and WCR 70. The majority of this segment is 4 lanes and remaining 2 lane segments are being widened.
- 3** The model shows Crossroads Boulevard west of 7th Street as 2 lanes. This segment is currently 4 lanes.

V/C Ratios



LEGEND

- X.XX** = Existing(Future) V/C Ratio
- (X.XX)** = Modeled Roadway Widening
- = Model Inconsistency
- = Modeled New Facility

- 1** As a 2-lane facility, Main Street between 1st Street and 3rd Street has modeled v/c ratios of 0.52(2.00).
- 2** As a 4-lane facility, Hollister Lake Road between Main Street and WCR 70 has modeled v/c ratios of 0.13(0.52).
- 3** As a 4-lane facility, Crossroads Boulevard west of 7th Street has modeled v/c ratios of 0.22(0.80).

3.5.2 V/C Ratios

Based on the laneage described in **Section 3.5.1**, v/c ratios were calculated along key study area roadways. The calculated v/c ratios for existing conditions were in the reasonable range (at or below 0.85). In the future year, many segments dropped below the reasonable range, as indicated on **Figure 7**.

- WCR 74 west of SH 257 is shown to be at capacity even with the future widening to 4 lanes. Further, the segments from SH 257 eastward past Hollister Lake Road to the easterly study limit are shown to be over capacity. As noted in the intersection analysis, Severance's TMP identifies future WCR 74 widening in this area not captured in the model.
- 7th Street (SH 257) north of Main Street to the northerly study limit (past WCR 74) is shown to be in the reasonable range with the anticipated widening to 4 lanes.
- 7th Street between Eastman Park Drive and Main Street is shown to be at or slightly over capacity. No widening is assumed in this segment. Further south, 7th Street between Crossroads Boulevard and Eastman Park Drive is shown to be in the reasonable range with the anticipated widening to 4 lanes. Given the low v/c ratios with the anticipated widening and the surrounding open space and residential developments, it is assumed that the widening could be delayed until after the 2045 travel demand model horizon. This would also reduce through traffic volume pressure on 7th Street between Eastman Park Drive and Main Street. Further south, 7th Street from the southern study area limit to Crossroads Boulevard is shown to be in the reasonable range with the anticipated widening to 4 lanes. However, because the v/c ratio would be over capacity if the widening were delayed, this widening should be completed by year 2045.
- Main Street (SH 392) from the westerly study limit to 7th Street is shown to be over capacity assuming the existing 4-lane section in the future year. Main Street from 7th Street to 3rd Street is shown to be substantially over capacity assuming the existing 2-lane section in the future year. This is expected given the congested nature of the downtown area. Main Street from 3rd Street to 1st Street is shown to be approaching capacity assuming the modeled 4-lane section in the future year. However, this segment is currently 2 lanes. Widening is not anticipated due to the existing surrounding development. As a 2-lane facility, the v/c ratio is over capacity. Main Street from 1st Street to Hollister Lake Road is approaching capacity in the future year with the modeled 4-lane section. Main Street (SH 392) from Hollister Lake Road to the eastern study area limit is over capacity in the future year even with the forecasted widening to 4 lanes.
- Hollister Lake Road between WCR 72 and WCR 74 is shown to be in the reasonable range with 2 lanes. Hollister Lake Road between WCR 70 and WCR 72 is shown to be over capacity with 2 lanes. Hollister Lake Road between Main Street and WCR 70 is shown to be at capacity with 2 lanes. However, as noted previously, this segment is already 4 lanes. With 4 lanes, this segment is in the reasonable range. As development occurs along Hollister Lake Road between WCR 70 and WCR 72, the roadway should be widened to 4 lanes to provide

adequate operations. This would result in reasonable operations along Hollister Lake Road from Main Street north to WCR 74.

- Hollister Lake Road (SH 257) between Garden Drive and Main Street is shown to be over capacity with 2 lanes. Windsor has acknowledged the need for improvements in this area as part of the Hollister Lake Road / Main Street intersection improvement project. That study identified converting the existing single lane roundabout at Hollister Lake Road / Pointe Plaza Drive to a 2-lane roundabout by year 2040. Hence, it is recommended that this segment be widened to 4 lanes by 2045. As a 4-lane facility, the v/c ratio would be approaching capacity. Hollister Lake Road (SH 257) between Eastman Park Drive and Garden Drive is shown to be approaching capacity with the forecasted widening to 4 lanes. Hollister Lake Road (SH 257) from the southerly study limit through Crossroads Boulevard to Eastman Park Drive is shown to be over capacity even with the forecasted widening to 4 lanes.
- Crossroads Boulevard from the westerly study limit to 7th Street is shown to be over capacity assuming the modeled 2-lane cross-section in the future year. However, this roadway is currently 4 lanes. With a 4-lane cross-section, the future v/c ratio is approaching capacity. Crossroads Boulevard from 7th Street to Hollister Lake Road (SH 257) is shown to be over capacity with the future 4-lane cross-section. Crossroads Boulevard east of Hollister Lake Road (SH 257) is a new roadway in the future year model. It is shown to operate reasonably with the planned 2-lane cross-section.

4. Summary

The various analyses described previously provide a snapshot of what may be needed to support traffic operations in the Windsor area over the study's future timeline. **Table 3** summarizes future improvements.

Table 3. Future Improvements

Project	Timing	Responsibility
Improve intersection of Main Street / Hollister Lake Road and complete Hollister Lake Road widening to 4 lanes between Main Street and Sundance Lane	Short-term (part of current Main Street / Hollister Lake Road intersection project)	Windsor
Replace and widen Hollister Lake Road structure to 4 lanes over Consolidated Law Ditch	Short-term (planned)	Windsor
Widen WCR 74 west of SH 257 from 2 to 4 lanes	Long-term	Windsor
Widen WCR 74 east of SH 257 from 2 to 4 lanes	Long-term	Severance
Widen 7 th Street (SH 257) between Main Street and north of WCR 74 from 2 to 4 lanes	Long-term	Windsor, CDOT
Widen 7 th Street south of Crossroads Boulevard from 2 to 4 lanes	Long-term	Windsor
Restripe westbound approach to 7 th Street / Crossroads Boulevard intersection to provide 2 lanes	Mid-term, when operations degrade below LOS D	Windsor
Reduce Main Street from 4 lanes to 2 lanes between 2 nd Street and Chimney Park Drive (restriping)	Short-term	Windsor, CDOT
Widen Hollister Lake Road to 4 lanes between WCR 70 and WCR 72	Mid-term, as development warrants	Windsor, Severance, developers
Widen Hollister Lake Road (SH 257) to 4 lanes from south of Crossroads Boulevard to Main Street	Long-term	Windsor
Extend Crossroads Boulevard eastward from Hollister Lake Road (SH 257) to WCR 21 or beyond	Long-term	Windsor, Weld County

These results guide the potential for alternate routes in Windsor as follows:

- Main Street is congested today and is forecasted to remain that way. Hence, motorists preferring less congested routes are likely already avoiding downtown unless their destination is along Main Street.
- 7th Street (SH 257) from Main Street north to and past WCR 74 is operating reasonably today, supporting diversions away from downtown. With a widening to 4 lanes by 2045 shown in the travel demand model, operations will continue to be reasonable allowing diverted trips to continue using this route. However, if this widening is not realized, congestion may limit this route's effectiveness as an alternate route.

- 7th Street from south of Crossroads Boulevard to Main Street is operating reasonably today, supporting diversions away from downtown. Although the travel demand model includes a future widening to 4 lanes between Crossroads Boulevard and Eastman Park Drive, this widening is not expected to be required, as reasonable operations can be maintained with a 2-lane cross-section in this segment. Operations are expected to be at or slightly over capacity between Eastman Park Drive and Main Street in the future. Given the residential nature of this segment with some blocks only providing 60 to 70 feet of right-of-way, widening to 4 lanes is not feasible. The congestion in this area will deter through trips between areas to the south and the Main Street / 7th Street intersection.
- Hollister Lake Road from Main Street north to WCR 74 is operating reasonably today, supporting diversions away from downtown. With a widening to 4 lanes by 2045 between Main Street and WCR 72 shown in the travel demand model, operations will continue to be reasonable allowing diverted trips to continue using this route. However, if this widening is not realized, congestion may limit this route's effectiveness as an alternate route.
- Hollister Lake Road (SH 257) from south of Crossroads Boulevard north to Main Street is one of the busiest arterials studied, but it is operating reasonably today and supporting diversions away from downtown. Even with a widening to 4 lanes by 2045 between Crossroads Boulevard and Garden Drive as shown in the travel demand model, operations will be over capacity from south of Crossroads Boulevard to Eastman Park Drive. The planned extension of Crossroads Boulevard to the east may be one way to mitigate this congestion, although the easterly endpoint will dictate how much traffic could be diverted away from Hollister Lake Road. The widening to 4 lanes between Eastman Park Drive and Garden Drive would result in reasonable operations in this segment. Although the future conditions in the model do not include widening between Garden Drive and Main Street, this widening has been contemplated in other Windsor planning documents, and it would also result in reasonable operations. Hence, widening Hollister Lake Road (SH 257) from south of Crossroads Boulevard north to Main Street is recommended in the future to support alternate routes.
- WCR 74 from west of 7th Street to east of Hollister Lake Road is operating reasonably today, supporting diversions away from downtown. Future operations assuming the 4-lane section west of 7th Street shown in the travel demand model are forecasted to be at capacity. Future operations east of 7th Street as a 2-lane facility are forecasted to be congested in the travel demand model. Various Severance planning documents show a potential widening to 4 lanes. With these improvements, reasonable operations can be obtained, and they are recommended to support ongoing use of WCR 74 as an alternate route.
- WCR 72 between 7th Street and Hollister Lake Road is operating reasonably today and is forecasted to continue reasonable operations in the future year. Intersection improvements at 7th Street and Hollister Lake Road may be required as part of the widening for those corridors to retain the ability of WCR 72 to function as an alternate route.
- WCR 70 does not exist between 7th Street (SH 257) and Hollister Lake Road today, and it is not included in either the existing year or future year travel demand model. Windsor is

currently working with the development community to preserve this right-of-way, with an eventual goal of creating a new east-west roadway along this corridor. If completed, this would provide another east-west alternate route that connects 7th Street and Hollister Lake Road.

- Garden Drive connects 7th Street and Hollister Lake Road (SH 257) through residential neighborhoods today. Operational concerns have been identified at both 7th Street and Hollister Lake Drive intersections. Hence, it is not a feasible alternate route.
- Eastman Park Drive also connects 7th Street and Hollister Lake Road (SH 257) through residential neighborhoods today. Although operations along this corridor were not explicitly evaluated in the Alternate Route study, the future year model shows it to be either approaching capacity or at capacity with the existing 2-lane cross-section. Given the residential nature of the surrounding development, widening to 4 lanes is not recommended. Hence, the utility of Eastman Park Drive as an alternate route is limited.
- Crossroads Boulevard from west of 7th Street to Hollister Lake Road (SH 257) is operating reasonably today, supporting diversions away from downtown. Future operations assuming the 4-lane section west of 7th Street shown in the travel demand model are forecasted to be reasonable. Future operations between 7th Street and Hollister Lake Road are forecasted to be congested in the travel demand model. A 2-lane extension to the east is anticipated to operate reasonably in the travel demand model. Although there are operational concerns between 7th Street and Hollister Lake Road, this corridor is recommended to support ongoing use as an alternate route. It may be feasible for another east-west route to the south or for enhanced connections to and from Crossroads Boulevard to address the identified shortfalls between 7th Street and Hollister Lake Road.

Appendix D. Diversion Potential Summary Technical Memorandum

MEMORANDUM

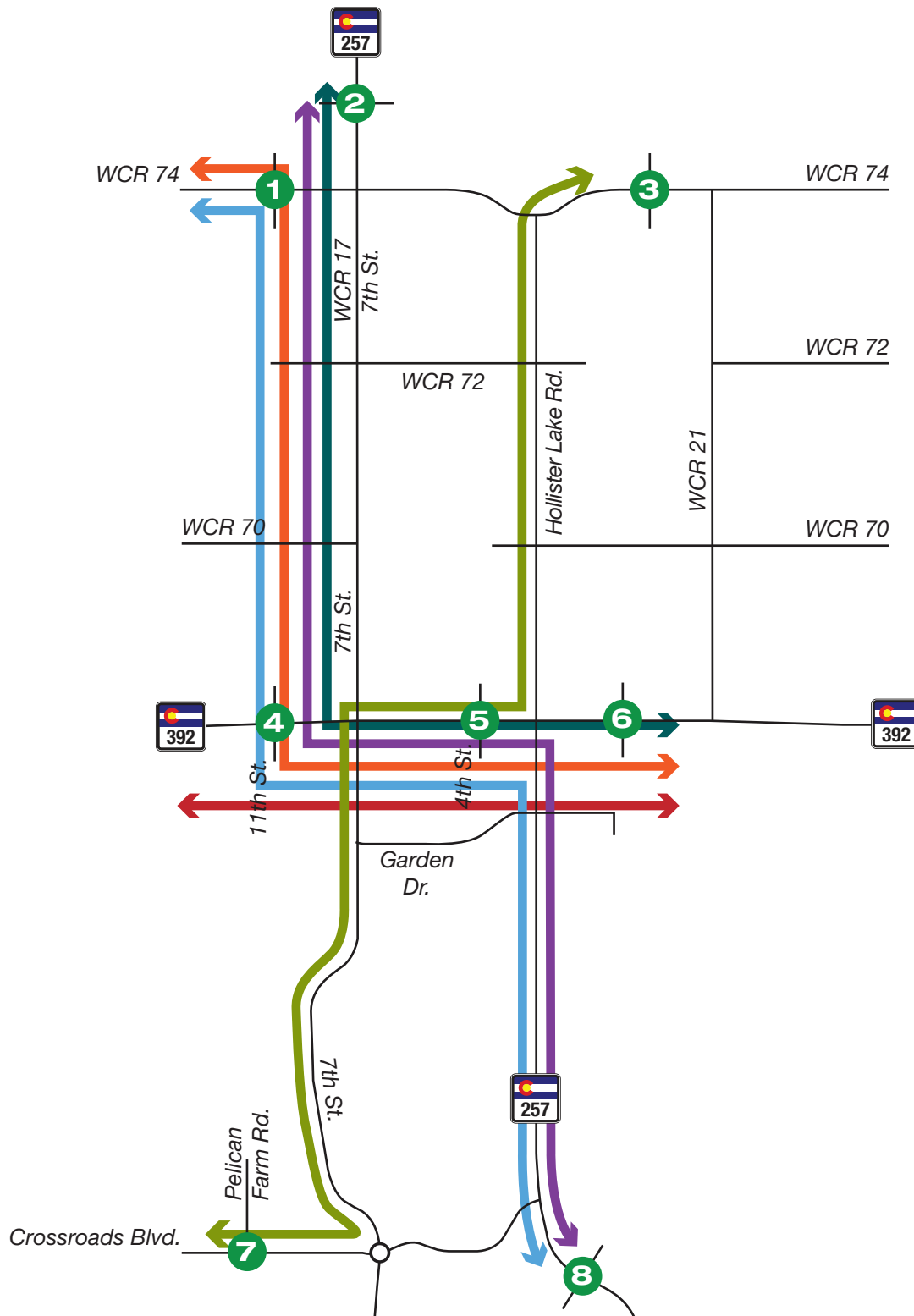
TO:	Study Advisory Team
FROM:	Paul Brown, PE, PTOE
DATE:	December 2, 2022
SUBJECT:	Windsor Downtown Alternate Route Study – Diversion Potential Summary Technical Memorandum (FHU Project Number 121464-04)

This memorandum summarizes the potential for alternate route diversions away from Main Street based on Bluetooth data collected for the project. These diversions would support upcoming analyses and future decision-making for the project team. As noted in previous memoranda, the project team collected daily and intersection traffic counts, vehicle classification, and Bluetooth data across the study area network.

As described in the study's *Existing Data Collection Summary Technical Memorandum*, daily Bluetooth-based origin / destination data were collected at eight study area locations. The dataset was summarized and filtered, resulting in approximately 3,600 vehicle trips that passed more than one data collection location in the study area network over the course of the study day.

I. Diversion Paths

The project team further evaluated key origin / destination pairs from this data set to determine the potential for diversion if an alternate route (yet to be determined) is provided. It is understood that each potential alternate route may have a different level of attraction, but that attraction is expected to act upon a baseline of trips that could be diverted. These paths are shown on **Figure I**.



The potential for diversion has been calculated for the following trip patterns:

- SH 257 southeast of downtown to SH 257 northwest of downtown (trips following SH 257 through Windsor and points north)
- SH 257 southeast of downtown to WCR 74 northwest of downtown (trips following SH 257 through Windsor and points west)
- SH 392 east of downtown to SH 257 northwest of downtown (trips following SH 392 and SH 257 through Windsor and points north)
- SH 392 east of downtown to WCR 74 northwest of downtown (trips following SH 392 and SH 257 through Windsor and points west)
- SH 392 east of downtown to SH 392 west of downtown (trips following SH 392 through Windsor)
- Crossroads Boulevard southwest of downtown to WCR 74 northeast of downtown (trips from Loveland to Severance)

For each path identified above, the number of trips traveling between the endpoint origin / destination stations was extracted from the dataset. Within this total number of trips, the number and percent of trips that passed through downtown were also calculated. These data are summarized in **Table I**. It is assumed that the trips between these pairs that traveled through downtown would be subject to diversion.

Table I. Diversion Path Volumes

Between		Origin / Destination Data		
		Total Trips	Trips through Downtown	Percent through Downtown
SH 257 (southeast)	SH 257 (northwest)	102	17	17%
SH 257 (southeast)	WCR 74 (northwest)	76	7	9%
SH 392 (east)	SH 257 (northwest)	177	50	28%
SH 392 (east)	WCR 74 (northwest)	175	44	25%
SH 392 (east)	SH 392 (west)	649	441	68%
Crossroads Blvd (southeast)	WCR 74 (northeast)	42	10	24%

As shown in **Table I**, the highest number of trips recorded between origin / destination pairs is along SH 392 between east of downtown and west of downtown. This pair also has the highest percentage of trips that pass through downtown (68 percent). The second busiest trip pairs are between SH 392 to the east and either SH 257 or WCR 74 to the northwest. These pairs also have the second highest percentage of trips that pass through downtown (between 25 percent and 28 percent). The pair with the fewest trips is between Crossroads Boulevard southwest of downtown and WCR 74 northeast of downtown. Again, about one-quarter of trips on this pair pass through downtown. The pairs between the southeast and the northwest see between 76 and 102 trips, but the percentage of trips through downtown is comparatively small (less than 20 percent).

2. Affinity for Diversion

It is recognized that there are outside forces that will affect the desire for a given motorist to divert from their current route between the origin / destination pairs to a new route. The affinity for diversions for each pair is discussed below and the results are summarized in **Table 2**.

- **SH 257 southeast of downtown to SH 257 northwest of downtown:** Trips traveling between this origin / destination pair will pass a range of potential alternate routes and using an alternate route will not significantly lengthen or shorten these trips. This route also connects two state highway endpoints. State highway guide signing would enhance the use of this route (particularly for trucks). Hence, the affinity is assumed to be above average, and about three-quarters of trips going through downtown are forecasted to shift to an alternate route.
- **SH 257 southeast of downtown to WCR 74 northwest of downtown:** Trips traveling between this origin / destination pair will pass a range of potential alternate routes and using an alternate route will not significantly lengthen or shorten these trips. Hence, the affinity is assumed to be average, and about one-half of trips going through downtown are forecasted to shift to an alternate route.
- **SH 392 east of downtown to SH 257 northwest of downtown:** Trips traveling between this origin / destination pair will pass a range of potential alternate routes and using an alternate route will not significantly lengthen or shorten these trips. This route also connects two state highway endpoints. State highway guide signing would enhance the use of this route (particularly for trucks). Hence, the affinity is assumed to be above average, and about three-quarters of trips going through downtown are forecasted to shift to an alternate route.
- **SH 392 east of downtown to WCR 74 northwest of downtown:** Trips traveling between this origin / destination pair will pass a range of potential alternate routes and using an alternate route will not significantly lengthen or shorten these trips. Hence, the affinity is assumed to be average, and about one-half of trips going through downtown are forecasted to shift to an alternate route.
- **SH 392 east of downtown to SH 392 west of downtown:** Trips traveling between this origin / destination pair will not pass potential alternate routes and using an alternate route will be out of direction. Hence, the affinity is assumed to be below average, and about one-quarter of trips going through downtown are forecasted to shift to an alternate route.
- **Crossroads Boulevard southwest of downtown to WCR 74 northeast of downtown:** Trips traveling between this origin / destination pair will pass a range of potential alternate routes and using an alternate route will not significantly lengthen or shorten these trips. Hence, the affinity is assumed to be average, and about one-half of trips going through downtown are forecasted to shift to an alternate route.

Table 2. Affinity for Diversion

Between		Affinity for Diversion	
		Qualitative Assessment	Percent
SH 257 (southeast)	SH 257 (northwest)	Higher than average	75%
SH 257 (southeast)	WCR 74 (northwest)	Average	50%
SH 392 (east)	SH 257 (northwest)	Higher than average	75%
SH 392 (east)	WCR 74 (northwest)	Average	50%
SH 392 (east)	SH 392 (west)	Below average	25%
Crossroads Blvd (southeast)	WCR 74 (northeast)	Average	50%

3. Potential for Diverted Trips

The project team prepared a forecast of potential diverted trips combining the number of trips through downtown on each origin / destination pair with the affinity for diversion for each pair. To match this forecast with real-world conditions, the following several supplemental inputs were developed:

- The origin / destination data represent only a sample of all trips that occur on the roadway network. Both volume data and origin-destination data were collected in downtown Windsor along Main Street. The origin / destination data represent between 28 percent and 29 percent of the daily volume at this location. Hence, multiplying the origin / destination data by a factor of 3.51 is anticipated to expand the origin / destination forecasts to daily volumes.
- The classification counts conducted along Main Street (described in the *Existing Data Collection Summary Technical Memorandum*) indicate that large trucks make up 3.6 percent of the overall traffic stream.

The project team combined these data with the information presented in earlier sections of this memorandum to calculate the potential for diversion away from Main Street if a feasible alternate route is developed. These results are summarized in **Table 3**. As shown, 672 daily trips have the potential to be diverted away from Main Street, or about 4.2 percent of daily traffic on Main Street. This includes 27 large trucks per day. These values are subject to change based on the alternate route(s) under consideration. However, they represent only a small portion of total traffic on Main Street.

Table 3. Diversion Potentials

Between		O / D Trips on Main St.	Expanded Trips on Main St.	Affinity for Diversion	Diversion Potential*
SH 257 (southeast)	SH 257 (northwest)	17	60	75%	45 (2)
SH 257 (southeast)	WCR 74 (northwest)	7	25	50%	13 (2)
SH 392 (east)	SH 257 (northwest)	50	176	75%	132 (5)
SH 392 (east)	WCR 74 (northwest)	44	154	50%	77 (3)
SH 392 (east)	SH 392 (west)	441	1,548	25%	387 (14)
Crossroads Blvd (southeast)	WCR 74 (northeast)	10	35	50%	18 (1)

* Total trips (Truck Trips)

Appendix E. Public Involvement



Alternative Route Study - Update

Windsor Town Board Work Session
January 9, 2023



1



Project Scope

- Data Collection
- Downtown / Main Street Evaluation
- Alternate Route Evaluation
- Public and Stakeholder Involvement
- Documentation and Approvals

2



Available Data

- Historical data from CDOT for SH 257 and SH 392
 - 5 years of data (2017 through 2022)
- Volume observations
 - Morning peaks are typically lower than evening peaks
 - 2021 volumes have recovered from 2020 pandemic lows
 - August is the highest month; January is the lowest month
- Other observations
 - Trucks represent between 3 percent and 7 percent of downtown traffic
 - Downtown traffic growth ranges from 2 percent to 2½ percent per year
- Various previous studies

3



Project Data

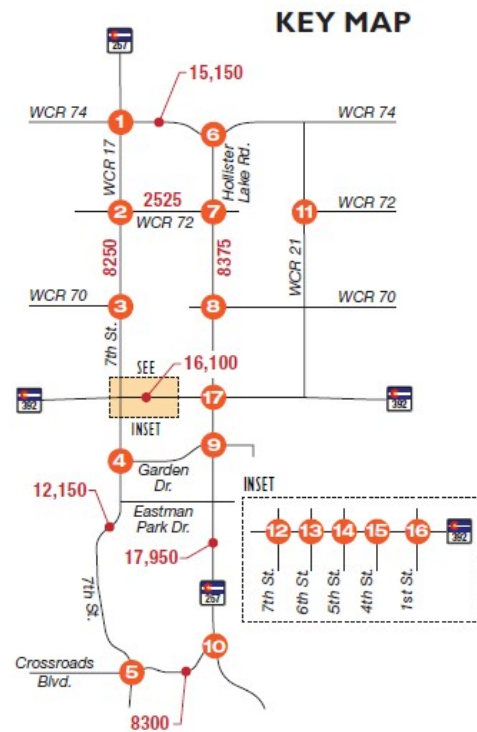
- Traffic counts
 - Intersection turning movements
 - Daily traffic flows
- Classification counts
 - 13 groups, including trucks based on number of axles
- Speed data
 - 5 mph groupings, 85th percentile
- Bluetooth data
 - Travel patterns

4



Project Daily Volume Data

- Main Street and WCR 74 are the busiest east-west corridors
- 7th Street and SH 257 carry more traffic south of Main Street

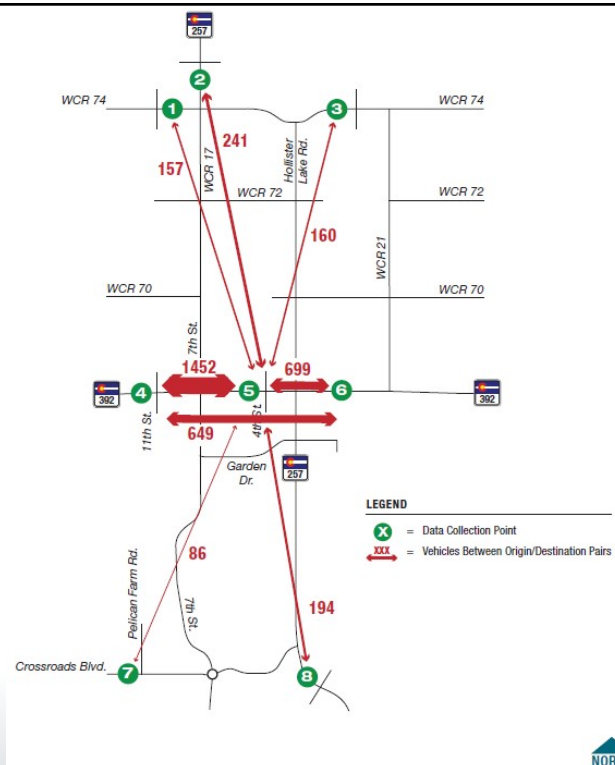


5



Project Bluetooth Data

- Data collected at 8 sites
- Over 450,000 total data points
- Filtered to account for duplicates
- About 3,700 unique vehicles passed two or more sites



6



Main Street Evaluation

- Traffic Operations
 - Evaluated 17 intersections
 - Highway Capacity Manual Methodologies
 - Future forecasts - 2% annual growth
- Bike / Pedestrian Connectivity
- Truck Accessibility Evaluation

7



Existing Traffic Operations

- Most signalized intersections operate at LOS D or better
- Various stop-controlled intersections operate with poor side street LOS

8



Future (2027) Traffic Operations

- Poor LOS at Main Street / Hollister Lake Road
 - Improvements under design
- Poor LOS at Main Street / 7th Street
- Remaining signalized intersections operate at LOS D or better
- Various stop-controlled intersections operate with poor side street LOS

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Future (2045) Traffic Operations

- Poor LOS at most signalized intersections
 - Improvements anticipated at Main Street / Hollister Lake Road
- Various stop-controlled intersections operate with poor side street LOS

10



Main Street Pedestrian Connectivity

- Main Street
 - Reasonable infrastructure between 7th Street and 3rd Street
 - Improvements needed between 3rd Street and Hollister Lake Road (identified in Transportation Master Plan)
- North of Main Street
 - Limited connectivity between Boardwalk Park and downtown
- South of Main Street
 - Reasonable infrastructure
 - Railroad creates a barrier between 1st Street and Hollister Lake Road

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Main Street Bicycle Connectivity

- Several key corridors in downtown:
 - Walnut Street, one block south of Main Street
 - Boardwalk Park, 1-2 blocks north of Main Street
 - 7th Street
- Other corridors planned:
 - Main Street / SH 392 east of 1st Street

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Main Street Truck Operations

- Main Street is surrounded by commercial development
 - Key truck users include the post office, gas stations, and the auto parts / tool rental facilities
 - Restaurants and stores also count on truck deliveries
- Precluding trucks from downtown is not feasible

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Main Street Summary

- Traffic operations will degrade along Main Street
 - Some improvements are planned
- More pedestrian and bicycle connectivity is needed
- Trucks cannot be entirely precluded from downtown based on state law and business needs

14



Alternate Route Evaluation

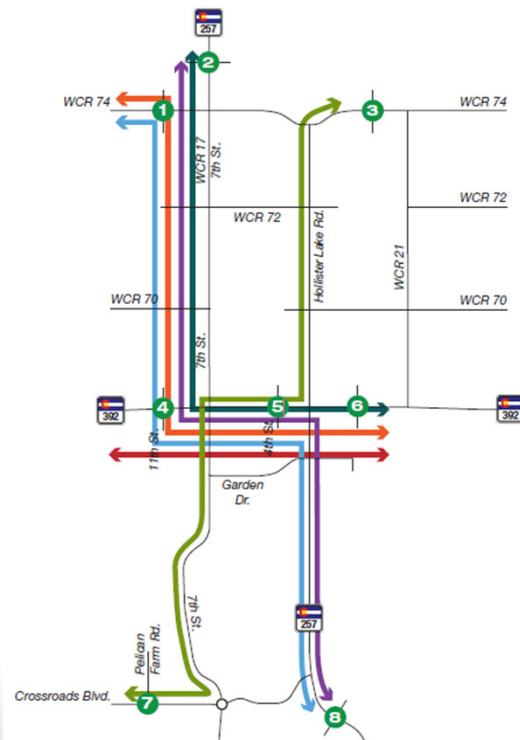
- Diversion paths
- Affinity for diversion
- Potential for diverted trips

15



Diversion Paths

- East to / from west
- Southeast to/ from northwest
- East to / from northwest
- Southwest to / from northeast



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Affinity for Diversion

- East to / from west
 - Low (out of direction)
- Southeast to/ from northwest
 - High (low percentage through downtown today)
- East to / from northwest
 - Average
- Southwest to / from northeast
 - Average

17



Estimated Potential for Diverted Trips

- East to / from west
 - 375 to 400 vpd
- Southeast to/ from northwest
 - 50 to 75 vpd
- East to / from northwest
 - 200 to 225 vpd
- Southwest to / from northeast
 - Less than 25 vpd
- Total potential diversion between 625 and 725 vpd

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Alternate Route Summary

- Traffic operations will degrade along alternate routes
 - Some improvements are planned
- Diversion potential away from downtown is limited
 - May not warrant designated alternate route
- Diversion will not substantially improve downtown traffic operations

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Public Outreach

- Public Pop-up event at Farmers Market (August)
- Online Public Survey (September)
- What we heard:
 - Most respondents (almost 90 percent) were Windsor residents
 - Respondents typically use Main Street to access downtown and to access regional connections
 - Almost ¾ of respondents drive through the corridor multiple times per week
 - Key concerns along Main Street included congestion, pedestrian safety, and truck noise / emissions
 - Potential changes included restricted access for large trucks and intersection changes to improve traffic flow

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Survey Responses

- 245 survey responses
 - 89% of participants are Windsor residents
 - 5% each from Severance and unincorporated Weld County
- Access to downtown businesses and regional transportation are the most common reasons participants use Main Street
 - 55% use Main Street frequently to access businesses
 - 48% use Main Street frequently to access regional connections
 - 37% use Main Street frequently to access employment
- Driving through is the primary way that participants use Main Street
 - 73% drive through multiple times per week
 - 80% park on Main Street at least a few times per month
 - 63% drive to destinations at least once a week
 - 57% walk along Main Street at least a few times per month

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Survey Responses (continued)

- Congestion is the biggest concern along Main Street for participants
 - 94% identified congestion as a concern
 - 76% identified pedestrian safety as a concern
 - 66% identified truck noise/emissions as a concern
- Respondents were most interested in restricted truck access and intersection capacity improvements as potential changes to Main Street
 - 77% are very interested in restricted truck access
 - 54% are very interested in intersection capacity improvements
 - 37% are very interested in more pedestrian crossings and bulbouts
- Respondents indicated the most support for additional truck traffic on Crossroads Boulevard, County Road 74, and County Road 70
 - 60% are somewhat to very supportive of truck routing on Crossroads Boulevard
 - 67% are somewhat to very supportive of truck routing on CR 74
 - 57% are somewhat to very supportive of truck routing on CR 70

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Recommendations

- Proceed with design and ROW of WCR 70 to complete the east-west roadway network
- Extension of Crossroads Blvd east of SH257 will divert some traffic
- Continue to create friction on Main Street
 - Implement components of Windsor TMP
- Work with CDOT and surrounding communities to address operational shortfalls on alternate routes

23



Eric Bracke, PE, PTOE
Transportation Engineer

24

Windsor's historic downtown is bisected by two state highways: State Highway 392 and State Highway 257. They provide important access in and out of town, but they also carry commuter traffic and regional truck traffic through downtown. This has long been a source of community concerns related to traffic operations and pedestrian safety; a safe and inviting Main Street which allows for the needed movement of freight through Windsor is vital to the Town's continued vibrancy.

The Downtown Alternate Route Study was conducted to better understand Main Street traffic patterns and to identify future solutions for improving safety, managing traffic, and maintaining downtown vitality. Traffic data and input from the community were used to inform the study. Findings and recommendations were presented to the Town Board for consideration in early 2023.

Key Observations & Conclusions

Traffic data was collected in the fall of 2022, including intersection turning counts, daily traffic counts, and travel patterns. Key observations included:

- Main Street is the busiest east-west street with over 16,000 vehicles per day
- The busiest travel pattern is along Main Street between 11th Street and 4th Street
- Most signalized intersections operate at acceptable levels of service

The observed traffic volumes were also used estimate future traffic volumes. Analysis of this data, as well as a review of current conditions for all users of Main Street, resulted in the following key conclusions:

- Main Street congestion will increase in the future as vehicle volumes grow
- Pedestrian and bicycle connectivity to and through downtown is limited
- Trucks cannot be entirely eliminated from downtown due to state law and access needs for local businesses

Community outreach was conducted to understand how people use Main Street and what issues or opportunities they see related to downtown mobility. In August 2022, project team members gathered input at the Windsor Farmer's Market. A survey taken by 245 people resulted in the following findings:

- Driving through downtown is the primary way that survey participants use Main Street
- Downtown congestion and pedestrian safety are major concerns
- Survey participants favor restricted truck access and intersection improvements

Alternatives & Recommendations

Following the downtown traffic analysis, a series of six travel patterns involving Main Street were identified for more detailed study. The figure at right shows these paths.

The focus was to understand how many trips from each path could be redirected from Main Street to alternate routes if surrounding street improvements are made. The estimated potential for rerouting trips along each path is:

- East-west trips along Main Street/Highway 302 (red) – up to 400 vehicles per day
- Trips between the east and northwest (orange & dark green) – up to 225 vehicles per day
- Trips between the southwest and northeast (light green) – up to 25 vehicles per day
- Trips between southeast and northwest (light blue and purple) – up to 75 vehicles per day

Across all the paths, the total estimated potential for rerouting trips from Main Street is up to 725 vehicles per day – less than 5% of Main Street’s average daily total of 16,000 vehicles per day. This amount of diversion will not substantially improve downtown traffic operations, so a designated alternate route may not be warranted. There are still steps Windsor can take to strengthen the overall roadway network, provide and enhance alternate routes, and improve safety in downtown, including:

- Construct Weld County Road 70 between Highway 257 and Clydesdale Lane
- Construct the extension of Crossroads Boulevard east of Highway 257
- Implement recommendations from Windsor’s transportation plan to improve downtown walkability
- Work with CDOT and surrounding communities to improve operations on alternate routes



MEMORANDUM

Date: April 3, 2023
To: Mayor and Town Board
From: Shane Hale, Town Manager
Re: Future Meetings Agenda
Item #: B.3.

Background / Discussion:

Financial Impact:

Relationship to Strategic Plan:

Recommendation:

CC:

Attachments:

1. 2023 Future Meetings Agenda



FUTURE TOWN BOARD MEETINGS

April 10, 2023 5:30 p.m.	Town Board Work Session Board and Commission Appreciation Event
April 10, 2023 7:00 p.m.	Town Board Regular Meeting
April 17, 2023 5:30 p.m.	Town Board Work Session Tour of OEM Office
April 24, 2023 5:30 p.m.	Town Board Work Session Poster Contest Recognition Celebration Meet the Board – New Employees Windsor/Thornton CR 13 Pipeline IGA
April 24, 2023 7:00 p.m.	Town Board Regular Meeting
May 1, 2023 5:30 p.m.	Town Board Work Session Boardwalk Park Study Update
May 8, 2023 5:30 p.m.	Town Board Work Session Board/Manager/Attorney Monthly Meeting Sustainable Windsor Colorado Recycling Education
May 8, 2023 7:00 p.m.	Town Board Regular Meeting
May 15, 2023 5:30 p.m.	Town Board Work Session
May 22, 2023 5:30 p.m.	Town Board Work Session Meet the Board – New Employees
May 22, 2023 7:00 p.m.	Town Board Regular Meeting
May 29, 2023	Canceled – Memorial Day Holiday

Future Work Session Topics

- DDA Entertainment District
- Telecom Code (Pending FCC Rules)
- Weld RE-4 School Land Dedication/Cash in lieu of Land Update
- Smart Meter Project (Brian)
- Revenue Projections (August 7)
- Capital Improvement Plan (September 18 – Public Services Campus)
- Utility Rates and Fees (October 9th)
- Operating Budget (Saturday, October 14th)
- Follow-up Budget Questions (November 13th)



MEMORANDUM

Date: April 3, 2023
To: Mayor and Town Board
From:
Re: An Executive Session Pursuant to C.R.S. § 24-6-402 (e)(I) for the Purpose of Determining Positions Relative to Matters that may be Subject to Negotiations with Employees or Employee Organizations; Developing Strategy for and Receiving Reports on the Progress of Such Negotiations; and Instructing Negotiators - Selecting the New Town Attorney
Item #: C.1.

Background / Discussion:

Financial Impact:

Relationship to Strategic Plan:

Recommendation:

CC:

Attachments: