

# **Federal Street Corridor Study**

Final Appendices
February 2023

Prepared for:



By:





Appendix A – Environmental Justice & Environmental Mitigation

Appendix B – PEL Questionnaire

Appendix C – Traffic Volumes

Appendix D – Level of Service Calculations

Appendix E – Cost Estimates

### Appendix A

Environmental Justice & Environmental Mitigation

#### **Environmental Justice**

#### Introduction

Per federal requirements, the Capital District Transportation Committee (CDTC) undertakes an analysis of Environmental Justice in all Community and Transportation Linkage Planning Program (Linkage Program) initiatives to evaluate if transportation concepts and recommendations impact Environmental Justice populations. Impacts may be defined as those that are positive, potentially negative and neutral as described in CDTC's Environmental Justice Analysis document, dated March 2020. The goal of this analysis is to ensure that both the positive and negative impacts of transportation planning conducted by CDTC and its member agencies are fairly distributed and that defined Environmental Justice populations do not bear disproportionately high and adverse effects.

This goal has been set to:

- Ensure CDTC's compliance with Title VI of the Civil Rights Act of 1964, which states that "no person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance,"
- Assist the United State Department of Transportation's agencies in complying with Executive Order 12898 stating, "Each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."
- Address FTA C 4702.1B TITLE VI REQUIREMENTS AND GUIDELINES FOR FEDERAL TRANSIT ADMINISTRATION RECIPIENTS, which includes requirements for MPOs that are some form of a recipient of FTA, which CDTC is not.

#### **Data and Analysis**

CDTC staff created demographic parameters using data from the 2013-2017 American Community Survey (ACS). Threshold values were assigned at the census tract level to identify geographic areas with significant populations of minority or low-income persons. Tracts with higher than the regional average percentage of low-income or minority residents are identified as Environmental Justice populations. Minority residents are defined as those who identify themselves as anything but white only, not Hispanic or Latino. Low-income residents are defined as those whose household income falls below the poverty line.

The transportation patterns by race/ethnicity, income, age, English ability, disability status, and sex in CDTC's planning area are depicted in table III-2 through III-7, using the commute to work as a proxy for all travel. The greatest difference between the defined minority and non-minority population is in the Drive Alone and Transit categories: The minority population is almost 20% less likely to drive alone, 11% more likely to take transit, and is also more likely to walk and carpool. The defined low-income

population and the non-low-income population follow the same trend, with the low-income population 20% less likely to drive alone, 10% more likely to commute via transit, and more likely to walk and carpool. Other categories showed a lesser difference.

**Table 1: Commute Mode by Race/Ethnicity** 

By Race/Ethnicity	Drive Alone	Carpool	Transit	Other	Walk	Work at Home
All Workers (16+)	80.0%	7.6%	3.7%	1.2%	3.4%	4.1%
White Alone Not Hispanic or Latino	83.3%	6.9%	1.8%	1.0%	2.7%	4.2%
Minority	63.8%	11.0%	12.9%	2.0%	7.0%	3.3%

**Table 2: Commute Mode by Income** 

By Income	Drive Alone	Carpool	Transit	Other	Walk	Work at Home
At/Above 100% Poverty Level	81.8%	7.4%	3.2%	1.1%	2.6%	3.9%
Below 100% Poverty Level	61.3%	11.3%	13.2%	2.4%	8.8%	3.0%

**Table 3: Commute Mode By Age** 

By Age	By Age Drive Alone Carpool Transit C						
16-19 Years	ears <b>59.9% 16.2%</b> 4.3%				13.0%	3.8%	
20-64 Years	80.8%	7.4%	3.7%	1.1%	3.1%	3.9%	
65+ years	80.7%	5.0%	2.9%	1.3%	2.5%	7.6%	

**Table 4: Commute Mode by English Ability** 

By English Ability	Drive Alone	Carpool	Transit	Other	Walk	Work at Home
Speak English Very Well	70.3%	11.7%	4.8%	1.8%	7.0%	4.4%
Speak English Less than Very Well	65.6%	14.3%	8.3%	1.2%	7.4%	3.2%

**Table 5: Commute Mode by Disability** 

By Disability Status*	Drive Alone	Carpool	Transit	Other	Walk	Work at Home
Without any Disability	80.7%	7.4%	3.5%	1.1%	3.4%	4.0%
With a Disability	71.1%	11.2%	6.7%	2.4%	4.3%	4.3%

**Table 6: Commute Mode by Sex** 

By Sex*	Drive Alone	Carpool	Transit	Other	Walk	Work at Home	
Male	80.1%	7.5%	3.4%	1.5%	3.7%	3.9%	
Female	80.2%	7.8%	3.9%	0.9%	3.1%	4.3%	

Data is from the American Community Survey 2017 5-year estimates, tables S0802, B08105H, B08101, B08122, S0801, B08113, and S1811. Other includes taxi, motorcycle, and bicycle. \*Data for sex and disability status include all people in Albany, Rensselaer, Saratoga, and Schenectady Counties.

Map 1 provides an overview of the Federal Street Corridor Study study area. The Federal Street Corridor Study study area is included in the Environmental Justice area based on the study area Census Tracts having a higher than regional average percentage of both minority and low income residents. Within CDTC's planning area in the Capital Region, 21.5% of residents are minority (race other than white only, and not Hispanic/Latino) and 12.5% are low income (below the poverty rate).

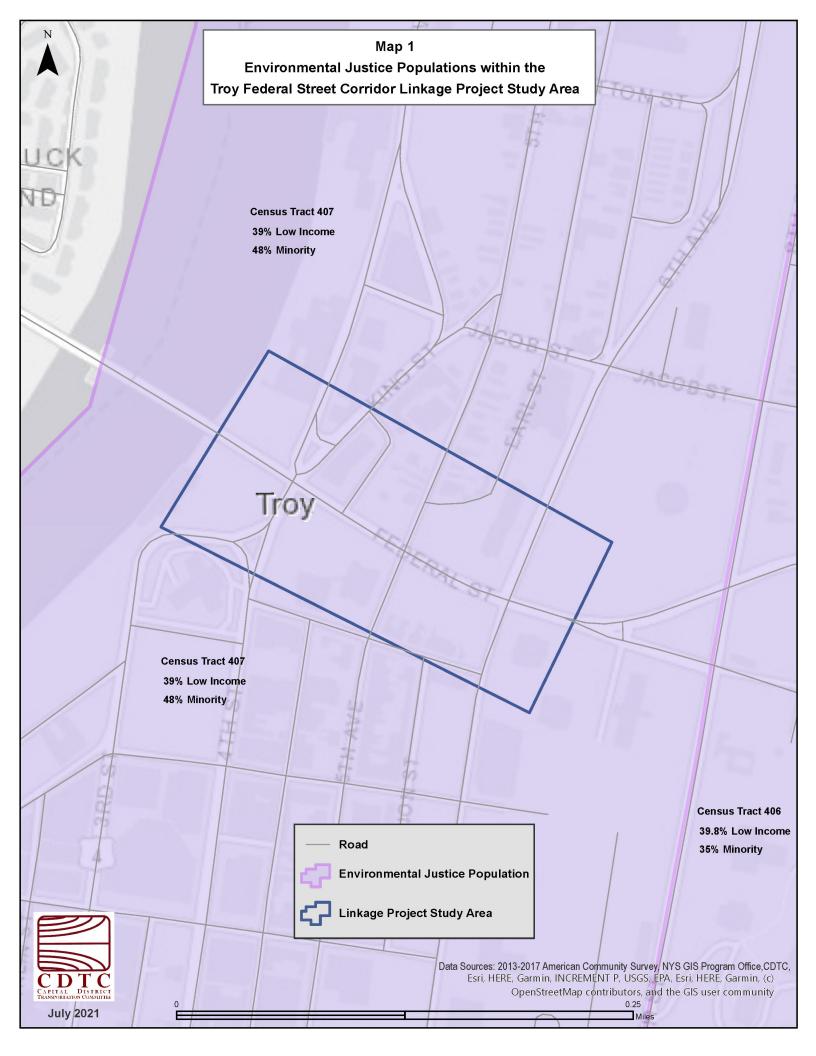
The Capital Region Indicators website, maintained by the Capital District Regional Planning Commission (CDRPC), provides information by race and ethnicity (White, Black or African American, Asian, and Hispanic or Latino) that may be useful to further understand the population within a study area. Since this document is a regional analysis performed at the census tract level, small scale populations may be overlooked. It therefore may still be useful to scan the project area, particularly if the project area is small, as minority or low-income populations may form a significant portion of the study area residents but not be reflected in the larger census tract areas. In addition, the project should look for worksites and other generators where minority and/or low-income people are over-represented, as the data only captures the residential population.

Consideration for including minority and low income populations in the planning process was given in the following ways:

- The Internet was used to display and advertise information about the study.
- Social media was used to provide information and input opportunities.
- At the request of a neighborhood association in the study area, project partners joined a virtual neighborhood meeting to explain the project and answer questions.
- Two formal public participation opportunities were held as online "Join at Your Own Pace"
  presentations. They were advertised with flyers distributed to businesses and residences near
  the study area, email blasts to over 2,000 emails addresses from Downtown Revitalization
  Initiative (DRI) and Troy Rehabilitation and Improvement Program (TRIP) databases, and a pressrelease.
- Public comment was accepted throughout the study process, and directly requested via online surveys
- Final products will be posted to CDTC's website, the City of Troy website and on social media.

#### Conclusion

CDTC defines plans and projects with a primary or significant focus on transit, bicycling, walking, or carpool as being "positive". The project evaluated a concept to reduce the number of vehicle lanes on Federal Street and provide space for a median, bicycle accommodations, on-street parking, and buffer space between the sidewalk and travel way. To accommodate these segment changes, the concept includes roundabouts at the Federal Street/River Street and Federal Street/6th Avenue intersections. The concept would result in a positive impact to environmental justice populations, through improved walking and bicycling accommodations, and reduced vehicle speeds.



#### **Environmental Mitigation**

#### Introduction

Per federal requirements, the Capital District Transportation Committee (CDTC) undertakes an Environmental Features Scan in all Community and Transportation Linkage Planning Program (Linkage Program) initiatives. The Environmental Features Scan identifies the location of environmentally sensitive features, both natural and cultural in relation to project study areas. Although the conceptual planning stage is too early in the transportation planning process to identify specific potential impacts to environmentally sensitive features, the early identification of environmentally sensitive features is an important part of the environmental mitigation process. It should also be noted here that as specific projects advance through the project development process, the applicable NEPA and SEQRA regulations requiring potential environmental impact identification, analysis and mitigation will be followed by the implementing agencies as required by federal and state law. CDTC is not an implementing agency.

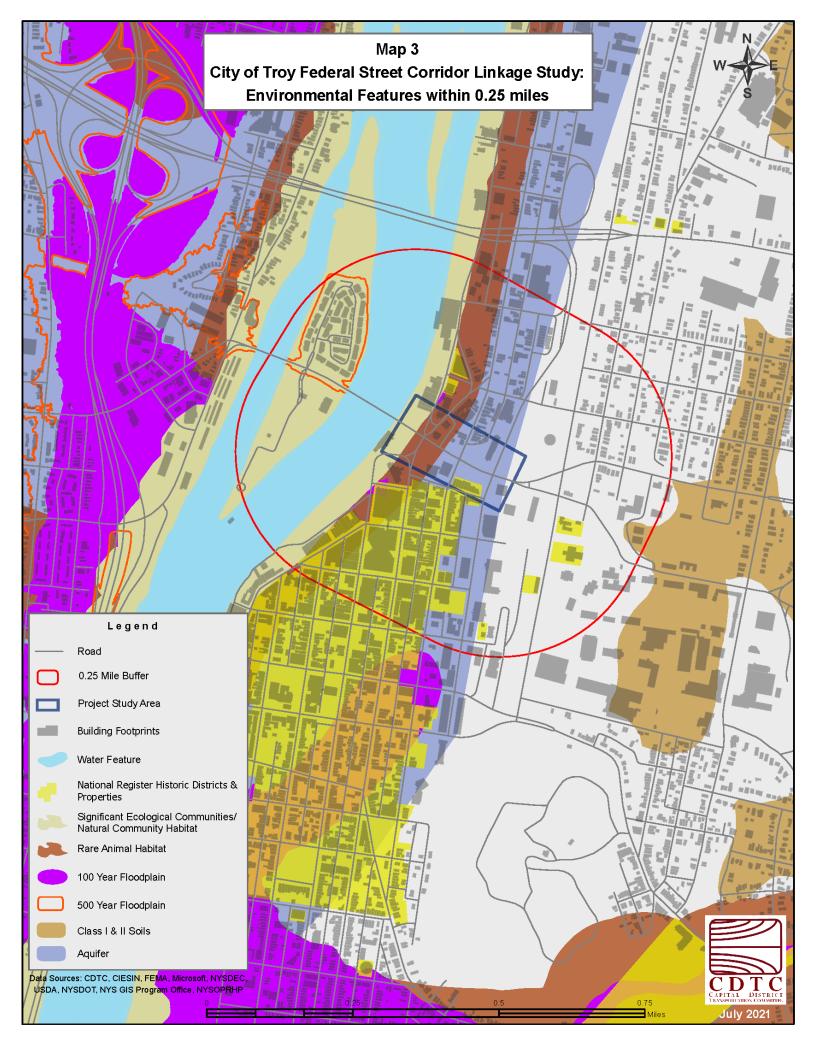
#### **Data and Analysis**

CDTC staff relies on data from several state and federal agencies to maintain an updated map-based inventory of both natural and cultural resources. The following features are mapped and reviewed for their presence within each study area as well as within a quarter mile buffer of the defined study area boundary.

- sole source aquifers
- aquifers
- reservoirs
- water features (streams, lakes, rivers and ponds)
- wetlands
- watersheds
- 100 year flood plains
- rare animal populations
- rare plant populations
- significant ecological sites
- significant ecological communities
- state historic sites
- national historic sites
- national historic register districts

- national historic register properties
- federal parks and lands
- state parks and forests
- state unique areas
- state wildlife management areas
- county forests and preserves
- municipal parks and lands
- land trust sites
- NYS DEC lands
- Adirondack Park
- agricultural districts
- NY Protected Lands
- natural community habitats
- rare plant habitats
- Class I & II soils

Map 3 provides an overview of the environmentally sensitive (cultural and natural) features located within the Federal Street Corridor Study study area as well as within a quarter mile buffer of the defined study area boundary.



#### Conclusion

Within one-quarter mile of the study area there is a water feature (the Hudson River), a 500 year floodplain on Starbuck Island, National Register historic districts and properties, significant ecological communities/natural community habitat, rare animal habitat, 100 year floodplain, class I and II soils, and an aquifer.

The project evaluated a concept to reduce the number of vehicle lanes on Federal Street and provide space for a median, bicycle accommodations, on-street parking, and buffer space between the sidewalk and travel way. To accommodate these segment changes, the concept includes roundabouts at the Federal Street/River Street and Federal Street/6th Avenue intersections. If implemented, the concept is expected to have minimal impact on the environmentally sensitive features in the study area.

Construction of the build concept is likely to impact storm water collection. The roundabouts will result in an increase of the footprints of the intersections, although there may be an opportunity to incorporate pervious surfaces within them, and initial implementation of 1-lane roundabouts could reduce the anticipated footprint. In the short term, a reduction of emissions can be expected, however the sub-alternative for 1-lane roundabouts could cause additional vehicle idling with increased emissions.

# Appendix B

PEL Questionnaire

	1. Backgrou	und:					
а	Who is the sponsor of the PEL study? (state DOT, Local Agency, Other)	City of Troy, CDTC					
b	What is the name of the PEL study document and other identifying project information (e.g. sub-account or STIP numbers, long-range plan, or transportation improvement program years)?	Federal Street Corridor Study					
c	Who was included on the study team (Name and title of agency representatives, consultants, etc.)?  Provide a description of the existing transportation facility within the corridor, including project limits, modes, functional classification, number of lanes, shoulder width, access control and type of surrounding environment (urban vs. rural, residential vs. commercial,	Carrie Ward - CDTC Stephen Maples - CDTC Steve Strichman - City of Troy Andrew Kreshik - City of Troy Mark Sargent - Creighton Manning Jesse Vogl - Creighton Manning Jeff Pangburn - Creighton Manning Kristie DiCocco - Alta					
e	etc.)  Provide a brief chronology of the planning activities (PEL study) including the year(s) the studies were completed.	See report section 1.1 See report section 1.1					
f	Are there recent, current, or near future planning studies or projects in the vicinity? What is the relationship of this project to those studies/projects?	See report section 1.1					
	2. Methodolog	ıy used:					
а	What was the scope of the PEL study and the reason for completing it?	The purpose of the Federal Street Corridor Study is to facilitate and accelerate a future multi-modal transportation improvement project informing scoping, through the development of a Purpose and Need Statement, alternatives analysis, and stakeholder involvement. This study is formatted similar to a NYSDOT project scoping report to guide subsequent phases of project development including a future design report. The primary report sections include:  1.1 Introduction 1.2 Purpose and Need 1.3 What Alternatives are Being Considered? 1.4 How will the Alternatives Affect the Environment? 1.5 What are the Costs & Schedules? 1.6 Which Alternative is Preferred? 1.7 What are the Opportunities for Public Involvement?					

b Did you use NEPA-like language? Why or why not?  Yes, NEPA-like language was used to support future. The Federal Street Corridor Study is modeled on the terms included in the report shell provided by NYSI.  How do you see these terms being used in NEPA documents?  What were the key steps and coordination points in the PEL decision-making process? Who were the decision-makers and who else participated in those key steps? For example, for the corridor vision, the decision was made by state DOT and the local agency, with buy-in from FHWA, the USACE, and USFWS and other resource/regulatory agencies.  The terms used in the Federal Street Corridor Study NEPA documents.  The decision-maker for the Federal Street Corridor in consultation with CDTC, NYSDOT, CDTA, CDRPC,  How should the PEL information be presented in NEPA?  How the information, data collection, analyses and Federal Street Corridor Study are presented in NEPA.	<del></del>							
What were the actual terms used and how did you define them? (Provide examples or list)  How do you see these terms being used in NEPA documents?  What were the key steps and coordination points in the PEL decision-making process? Who were the decision-makers and who else participated in those key steps? For example, for the corridor vision, the decision was made by state DOT and the local agency, with buy-in from FHWA, the USACE, and USFWS and other resource/regulatory agencies.  The decision-maker for the Federal Street Corridor in consultation with CDTC, NYSDOT, CDTA, CDRPC,  How should the PEL information be presented in NEPA?	re design report efforts.							
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It How should the PEL information be presented in NEPA?								
depend on the specific scope, design and potential	PA documentation will							
3. Agency coordination:								
Provide a synopsis of coordination with Federal, tribal, state and local environmental, regulatory and resource agencies. Describe their level of participation and how you coordinated with them.  consisting of representatives from the City of Troy, Team which met monthly throughout the study du Advisory Committee was engaged to meet at key stoverall).	The Federal Street Corridor Study initiated a Technical Advisory Committee consisting of representatives from the City of Troy, CDTC, and Consultant Team which met monthly throughout the study duration. A broader Study Advisory Committee was engaged to meet at key study milestones (3 overall).							
b What transportation agencies (e.g. for adjacent jurisdictions) did you coordinate with or were involved during the PEL study?  NYSDOT, CDTC, CDTA								
c What steps will need to be taken with each agency during NEPA scoping? NYSDOT - SEQRA								
4. Public coordination:								
a Provide a synopsis of your coordination efforts with the public and stakeholders.  See report section 1.7								
5. Purpose and Need for the PEL study:								
a What was the scope of the PEL study and the reason for completing it? See 2a.								
b Provide the purpose and need statement, or the corridor vision and transportation goals and objectives to realize that vision.  See report section 1.2								
What steps will need to be taken during the NEPA process to make this a project-level purpose and need statement?  Copy and paste, and reaffirm with involved agencies.	es							
vision, fatal flaw analysis, and possibly mode selection. This may help minimize problems during discussions with resource agencies. Alterna	6. Range of alternatives: Planning teams need to be cautious during the alternative screen process; alternative screening should focus on purpose and need/corridor vision, fatal flaw analysis, and possibly mode selection. This may help minimize problems during discussions with resource agencies. Alternatives that have fatal flaws or do not meet the purpose and need/corridor vision will not be considered reasonable alternatives, even if they reduce impacts to a particular resource. Detail the range of alternatives considered, screening criteria, and screening process, including:							
What types of alternatives were looked at? (Provide a one or two sentence summary and reference document.)  See report section 1.3	i							

b	How did you select the screening criteria and screening process?	Screening criteria were determined in coordination with the Technical Advisory Committee, and considering topics in the PSR shell
С	For alternative(s) that were screened out, briefly summarize the reasons for eliminating the alternative(s). (During the initial screenings, this generally will focus on fatal flaws.)	A painted median/road-diet alternative was screened out due to its inability to meet the project objectives to calm traffic and improve bicycle and pedestrian mobility. Sub-alternatives for the segment were screened out such as conventional bike lanes due to public feedback and Committee input.
d	Which alternatives should be brought forward into NEPA and why?	See report section 1.6
e	Did the public, stakeholders, and agencies have an opportunity to comment during this process?	Yes.
f	Were there unresolved issues with the public, stakeholders, and/or agencies?	While the majority of the public comments were generally supportive of the proposed alternative, there remains a segment that is opposed to roundabouts.
	7. Planning assumptions and	d analytical methods:
а	What is the forecast year used in the PEL study?	2045
b	What method was used for forecasting traffic volumes?	The design year is 20 years beyond the estimated year of completion (ETC+20) per the NYSDOT Highway Design Manual
С	Are the planning assumptions and the corridor vision/purpose and need statement consistent with each other and with the long-range transportation plan? Are the assumptions still valid?	Yes
d	What were the future year policy and/or data assumptions used in the transportation planning process related to land use, economic development, transportation costs, and network expansion?	Per NYSDOT guidance, a growth factor (19%) was calculated and applied to the 2022 traffic volumes to account for reduced traffic volumes resulting from changes to travel behavior due to the Covid-19 pandemic. A 0.6% per year growth rate (obtained from the CDTC STEP model) was applied to the Covid-factored volumes to develop the 2025 ETC and 2045 ETC+20 volumes. Traffic volumes were manually reassigned to account for turn restrictions under the median alternatives.
	8. Environmental resources (wetlands, cultural, etc.) reviewed. For each	resource or group of resources reviewed, provide the following:
а	In the PEL study, at what level of detail was the resource reviewed and what was the method of review?	Available online tools were used: CRIS (Cultural Resources/SHPO) Mapper and Environmental Resource Mapper (Wetlands, Rare Plants and Animals, Significant Natural Communities) Information for Planning and Consultation (USFWS) IPAC (Endagered Species). CDTC Environmental Screening

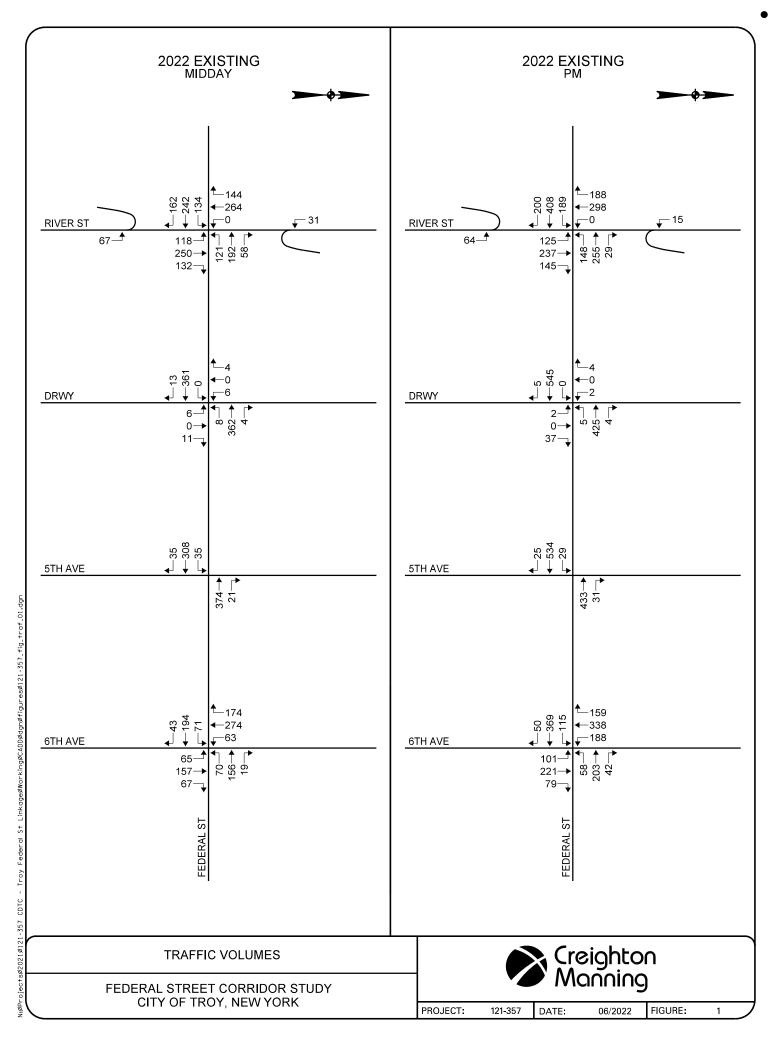
b	Is this resource present in the area and what is the existing environmental condition for this resource?	Natural Communities and Rare Animal habitiat near this location. Unidentified Aquafer. IPAC Endangered Species, Monarch Butterfly, Northern Long Eared Bat.
С	What are the issues that need to be considered during NEPA, including potential resource impacts and potential mitigation requirements (if known)?	Further documentation of endagered species, tree cutting restrictions,
d	How will the planning data provided need to be supplemented during NEPA?	Rescreen through IPAC
9	List environmental resources you are aware of that were not reviewed in the PEL study and why. Indicate whether or not they will need to be reviewed in NEPA and explain why.	None
10	Were cumulative impacts considered in the PEL study? If yes, provide the information or reference where the analysis can be found.	No
11	Describe any mitigation strategies discussed at the planning level that should be analyzed during NEPA.	Mitigation strategies were not discussed during planning, to be evaluated during design
12	What needs to be done during NEPA to make information from the PEL study available to the agencies and the public? Are there PEL study products which can be used or provided to agencies or the public during the NEPA scoping process?	
	13. Are there any other issues a future p	roject team should be aware of?
а	Examples: Controversy, utility problems, access or ROW issues, encroachments into ROW, problematic land owners and/or groups, contact information for stakeholders, special or unique resources in the area, etc	ROW needed for both roundabouts. Certain stakeholders oppose roundabouts, incorporate roundabout education during public involvement, potential conficts/relocations of underground utilities.

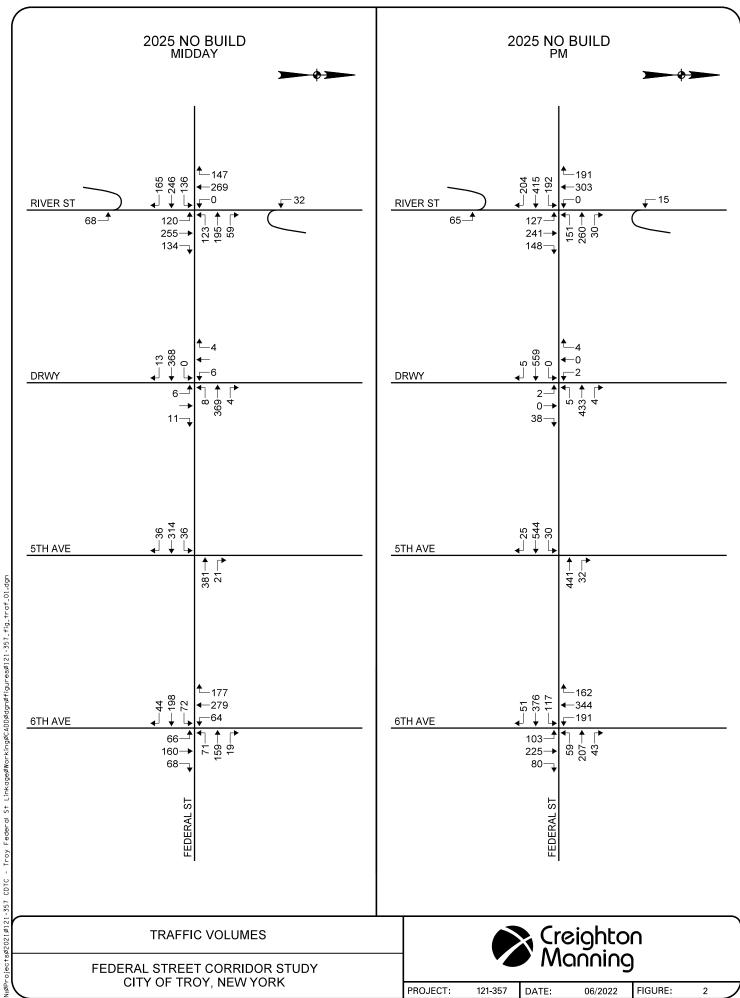
# Appendix C

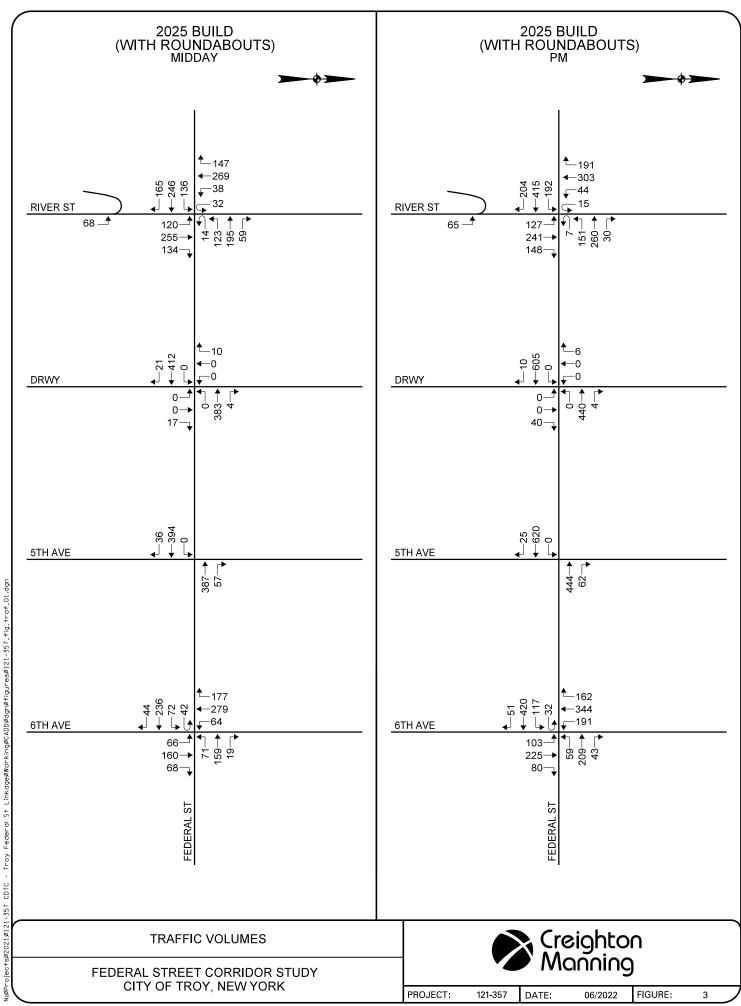
Traffic Volume Data

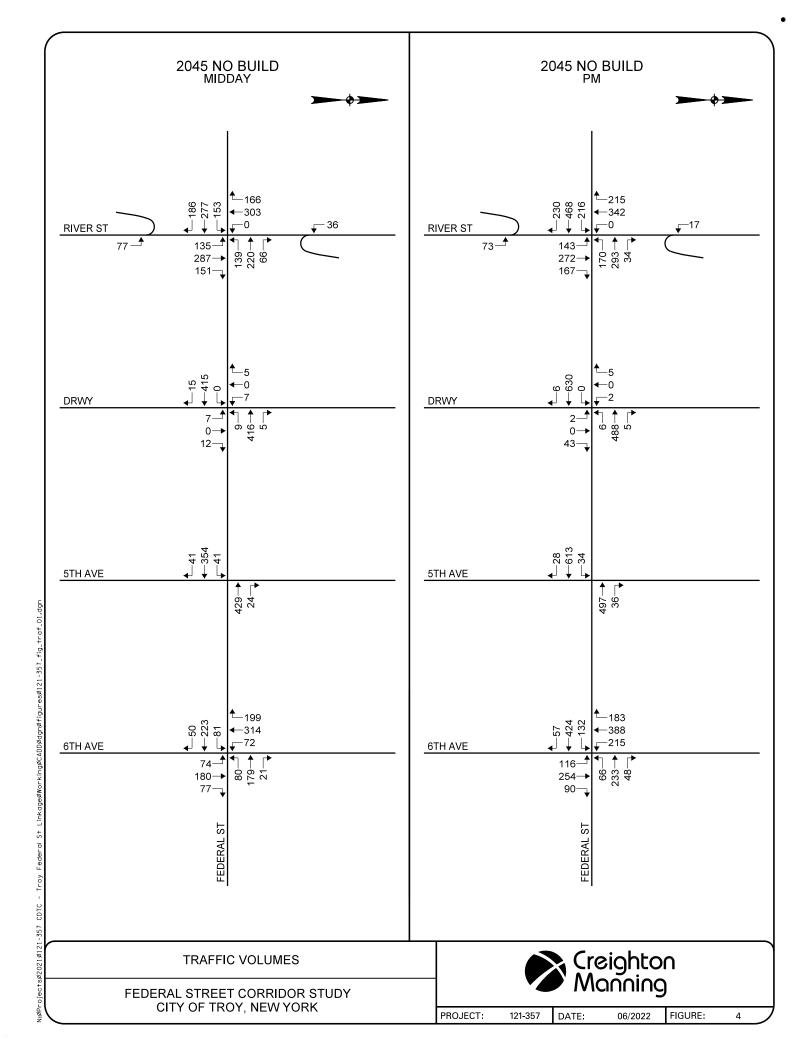
Federal Street is classified as an urban minor arterial and carries approximately 14,300 vehicles per day (vpd). The road is posted at 30 miles per hour and carries about 14,000 vehicles per day based on the traffic volume data collected by NYSDOT in October 2020. This traffic volume data was compared to additional counts conducted in March of 2022 and showed that the 2022 peak hour traffic volumes are approximately 20 percent lower than pre-pandemic conditions. Peak hour intersection turning movement counts from April and December 2021 at the Federal Street/River Street intersection were factored accordingly and balanced with new two-hour peak period counts that included bicycle and pedestrian observations at the two turnaround movements on River Street north and south of Federal Street, as well as the Federal Street/5th Avenue and Federal Street/6th Avenue. To note: new counts were conducted during the mid-day peak period based on an assessment of daily traffic volumes which show mid-day traffic conditions greater than the traditional morning peak period. The 2022 factored traffic volumes form the basis of the traffic forecasts and the resulting level of service analysis.

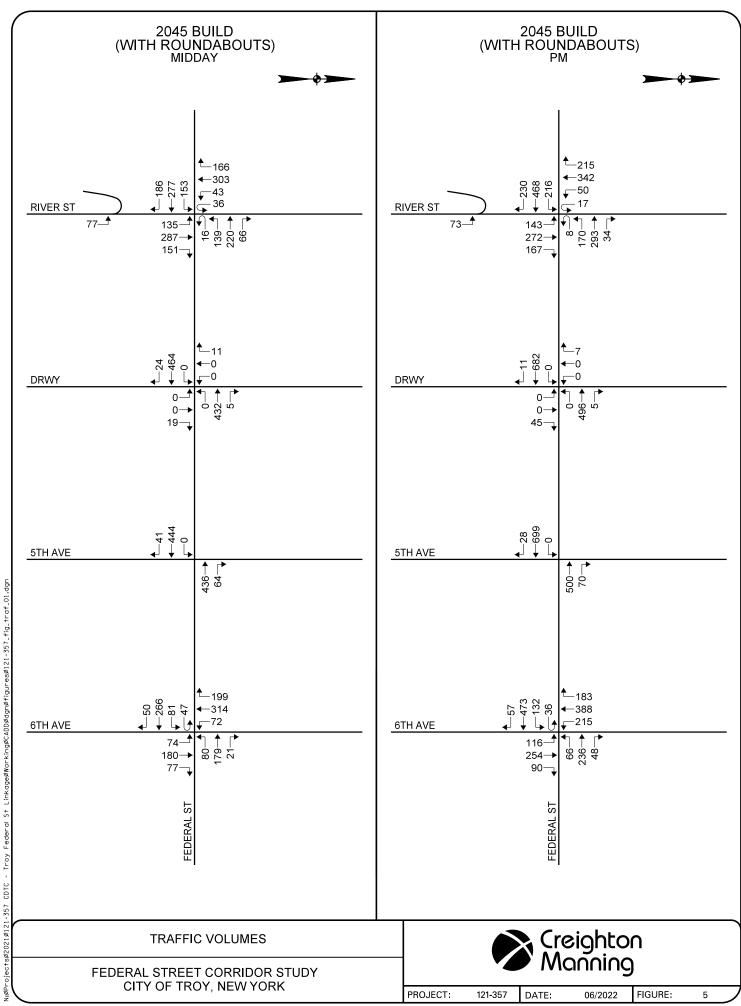
	Federal Stro	eet/River Street	
Intersection Leg	Count Date	Count Time	Pedestrian Crossings
West	Tuesday 12/7/2021	7:45 – 8:45 a.m.	6
East	Tuesday 12/7/2021	7:45 – 8:45 a.m.	9
South	Tuesday 12/7/2021	7:45 – 8:45 a.m.	3
North	Tuesday 12/7/2021	7:45 – 8:45 a.m.	1
West	Tuesday 12/7/2021	4:30 – 5:30 p.m.	9
East	Tuesday 12/7/2021	4:30 – 5:30 p.m.	9
South	Tuesday 12/7/2021	4:30 – 5:30 p.m.	1
North	Tuesday 12/7/2021	4:30 – 5:30 p.m.	0
West	Tuesday 4/20/2021	4:30 – 5:30 p.m.	9
East	Tuesday 4/20/2021	4:30 – 5:30 p.m.	4
South	Tuesday 4/20/2021	4:30 – 5:30 p.m.	9
North	Tuesday 4/20/2021	4:30 – 5:30 p.m.	4
West	Tuesday 3/1/2022	12:00 – 1:00 p.m.	5
East	Tuesday 3/1/2022	12:00 – 1:00 p.m.	10
South	Tuesday 3/1/2022	12:00 – 1:00 p.m.	0
North	Tuesday 3/1/2022	12:00 – 1:00 p.m.	2
West	Tuesday 3/1/2022	4:30 – 5:30 p.m.	5
East	Tuesday 3/1/2022	4:30 – 5:30 p.m.	0
South	Tuesday 3/1/2022	4:30 – 5:30 p.m.	4
North	Tuesday 3/1/2022	4:30 – 5:30 p.m.	0
	•	North Turnaround	
Intersection Leg	Count Date	Count Time	Pedestrian Crossings
King Street	Tuesday 3/1/2022	12:00 – 1:00 p.m.	5
River Street	Tuesday 3/1/2022	12:00 – 1:00 p.m.	0
U-Turn	Tuesday 3/1/2022	12:00 – 1:00 p.m.	2
King Street	Tuesday 3/1/2022	4:30 – 5:30 p.m.	8
River Street	Tuesday 3/1/2022	4:30 – 5:30 p.m.	6
U-Turn	Tuesday 3/1/2022	4:30 – 5:30 p.m.	9
	River Street –	South Turnaround	•
Intersection Leg	Count Date	Count Time	Pedestrian Crossings
West	Tuesday 3/1/2022	12:00 – 1:00 p.m.	8
East	Tuesday 3/1/2022	12:00 – 1:00 p.m.	5
North	Tuesday 3/1/2022	12:00 – 1:00 p.m.	10
West	Tuesday 3/1/2022	4:30 – 5:30 p.m.	19
East	Tuesday 3/1/2022	4:30 – 5:30 p.m.	11
North	Tuesday 3/1/2022	4:30 – 5:30 p.m.	16
	Federal Str	eet/6 <sup>th</sup> Avenue	
Intersection Leg	Count Date	Count Time	Pedestrian Crossings
West	Tuesday 12/7/2021	12:00 – 1:00 p.m.	5
East	Tuesday 12/7/2021	12:00 – 1:00 p.m.	10
South	Tuesday 12/7/2021	12:00 – 1:00 p.m.	0
North	Tuesday 12/7/2021	12:00 – 1:00 p.m.	2
West	Tuesday 12/7/2021	4:30 – 5:30 p.m.	4
East	Tuesday 12/7/2021	4:30 – 5:30 p.m.	0
South	Tuesday 12/7/2021	4:30 – 5:30 p.m.	4
North	Tuesday 12/7/2021	4:30 – 5:30 p.m.	0











Project No.: 121-357 File Name : 2022-3-1\_River-Federal\_12PM

Counted By: Site Code : 00121357
Location: River St - Federal St Start Date : 3/1/2022

Comments: 12:00 PM Page No : 1

Groups Printed- Passenger Veh - Heavy Veh - School Buses

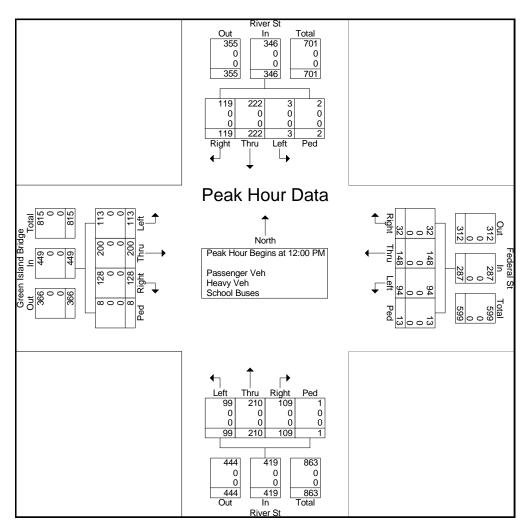
		River St Federal St									River St					Green Island Bridge					
		So	uthbo	und			W	Westbound No				Northbound			Eastbound						
Start Time	Left	Thru	Right	Ped	App. Total	Left	Thru	Right	Ped	App. Total	Left	Thru	Right	Ped	App. Total	Left	Thru	Right	Ped	App. Total	Int. Total
12:00 PM	2	51	38	0	91	20	43	10	2	75	30	51	36	0	117	18	47	27	4	96	379
12:15 PM	0	53	21	0	74	20	35	13	6	74	25	46	25	0	96	35	62	44	1	142	386
12:30 PM	1	59	37	1	98	27	36	2	2	67	25	47	26	0	98	32	51	29	3	115	378
12:45 PM	0	59	23	1	83	27	34	7	3	71	19	66	22	1	108	28	40	28	0	96	358
Total	3	222	119	2	346	94	148	32	13	287	99	210	109	1	419	113	200	128	8	449	1501
<b>Grand Total</b>	3	222	119	2	346	94	148	32	13	287	99	210	109	1	419	113	200	128	8	449	1501
Apprch %	0.9	64.2	34.4	0.6		32.8	51.6	11.1	4.5		23.6	50.1	26	0.2		25.2	44.5	28.5	1.8		
Total %	0.2	14.8	7.9	0.1	23.1	6.3	9.9	2.1	0.9	19.1	6.6	14	7.3	0.1	27.9	7.5	13.3	8.5	0.5	29.9	
Passenger Veh	3	222	119	2	346	94	148	32	13	287	99	210	109	1	419	113	200	128	8	449	1501
% Passenger Veh	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Veh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Veh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
School Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% School Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

File Name: 2022-3-1\_River-Federal\_12PM

Site Code : 00121357 Start Date : 3/1/2022

Page No : 2

		F	River	St			F	edera	St			F	River	St		G	reen	Island	Brid	ge	
		So	uthbo	und			W	estbo	und			No	rthbo	und			Ea	astbo	und		
Start Time	Left	Thru	Right	Ped	App. Total	Left	Thru	Right	Ped	App. Total	Left	Thru	Right	Ped	App. Total	Left	Thru	Right	Ped	App. Total	Int. Total
Peak Hour A								ak 1 of	1												
Peak Hour f	or En	tire Int	ersec	tion B	egins a	t 12:00	) PM														
12:00 PM	2	51	38	0	91	20	43	10	2	75	30	51	36	0	117	18	47	27	4	96	379
12:15 PM	0	53	21	0	74	20	35	13	6	74	25	46	25	0	96	35	62	44	1	142	386
12:30 PM	1	59	37	1	98	27	36	2	2	67	25	47	26	0	98	32	51	29	3	115	378
12:45 PM	0	59	23	1	83	27	34	7	3	71	19	66	22	1	108	28	40	28	0	96	358
Total Volume	3	222	119	2	346	94	148	32	13	287	99	210	109	1	419	113	200	128	8	449	1501
% App. Total	0.9	64.2	34.4	0.6		32.8	51.6	11.1	4.5		23.6	50.1	26	0.2		25.2	44.5	28.5	1.8		
PHF	.375	.941	.783	.500	.883	.870	.860	.615	.542	.957	.825	.795	.757	.250	.895	.807	.806	.727	.500	.790	.972
Passenger Veh	3	222	119	2	346	94	148	32	13	287	99	210	109	1	419	113	200	128	8	449	1501
% Passenger Veh	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Veh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Heavy Veh	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
School Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% School Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



### Federal Street/King Street/River Street

Count Date - Tuesday April 20, 2021

		Ea	stbou	nd		We	estbou	ınd		No	rthboı	und		Sc	outhb	ound	
		L	Т	R	С	L	Т	R	С	L	Т	R	С	L	Т	R	С
4:30	V	47	75	39	2	30	69	3	2	24	50	30	1		71	45	1
	HV					2	0	1		2	1	3					
	В							1									
		47	75	39	161	32	69	5	106	26	51	33	110		71	45	116
4:45	V	41	94	42	2	34	35	5	1	28	44	34			61	31	1
	HV	1	2			1	1	1			3	1				4	
	В							1									
		42	96	42	180	35	36	7	78	28	47	35	110		61	35	96
5:00	V	24	91	45	2	25	63	7	1	27	57	35	4		55	43	1
	HV			1				1			4	1			2	1	
	В		1	1													
		24	92	47	163	25	63	8	96	27	61	36	124		57	44	101
5:15	V	46	80	40	3	26	42	4		24	38	17	4		58	34	1
	HV					4					2	1			3		
	В																
		46	80	40	166	30	42	4	76	24	40	18	82		61	34	95
	Total V	159	343	168	670	122	210	24	356	105	199	122	426		250	158	408
	% HV	1%	1%	1%		6%	0%	13%		2%	5%	5%			2%	3%	
	PHF	0.85	0.89	0.89	0.93	0.87	0.76	0.75	0.84	0.94	0.82	0.85	0.86		0.88	0.88	0.88
	Pedestrians				9				4				9				4
	Balance	16	34	17													
	Covid Update	201	434	213	771	140	242	28	409	121	229	140	490	0	288	182	469
	eastbound	848															
	westbound	544															
	Total V % HV PHF Pedestrians Balance Covid Update eastbound	159 1% 0.85 16 201 848	343 1% 0.89	168 1% 0.89	670 0.93 9	122 6% 0.87	210 0% 0.76	24 13% 0.75	356 0.84 4	105 2% 0.94	199 5% 0.82	122 5% 0.85	426 0.86 9	0	250 2% 0.88	158 3% 0.88	408 0.88 4

Project No.: 121-357 File Name : 2022-3-1\_6th-Federal\_12PM

Counted By: BP Site Code : 12135701 Location: Federal St-6th Ave Start Date : 3/1/2022

Comments:12PM Page No : 1

Groups Printed- Passenger Veh - Heavy Veh - School Buses

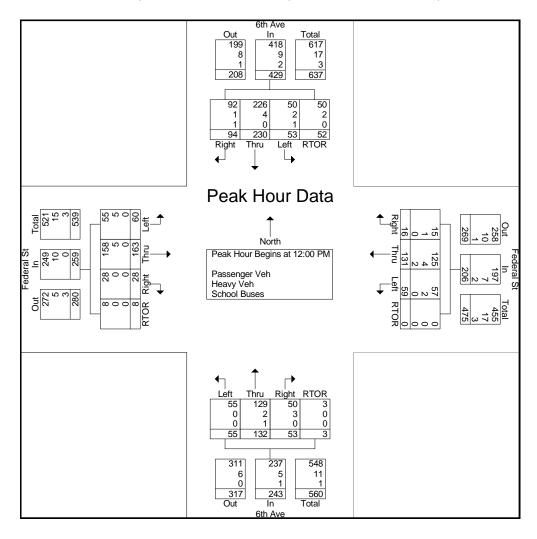
		(	6th A	/e		•	F	edera		,		(	6th A	/e			F	ederal	St		
		So	uthbo	und			W	estbo	und			No	rthbo	und			Ea	astbou	ınd		
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
12:00 PM	17	65	20	10	112	14	28	1	0	43	17	38	15	0	70	17	41	9	0	67	292
12:15 PM	8	52	18	9	87	18	42	5	0	65	15	27	12	0	54	19	41	5	1	66	272
12:30 PM	19	51	30	19	119	11	29	6	0	46	8	34	8	1	51	15	45	6	3	69	285
12:45 PM	9	62	26	14	111	16	32	4	0	52	15	33	18	2	68	9	36	8	4	57	288
Total	53	230	94	52	429	59	131	16	0	206	55	132	53	3	243	60	163	28	8	259	1137
<b>Grand Total</b>	53	230	94	52	429	59	131	16	0	206	55	132	53	3	243	60	163	28	8	259	1137
Apprch %	12.4	53.6	21.9	12.1		28.6	63.6	7.8	0		22.6	54.3	21.8	1.2		23.2	62.9	10.8	3.1		
Total %	4.7	20.2	8.3	4.6	37.7	5.2	11.5	1.4	0	18.1	4.8	11.6	4.7	0.3	21.4	5.3	14.3	2.5	0.7	22.8	
Passenger Veh	50	226	92	50	418	57	125	15	0	197	55	129	50	3	237	55	158	28	8	249	1101
% Passenger Veh	94.3	98.3	97.9	96.2	97.4	96.6	95.4	93.8	0	95.6	100	97.7	94.3	100	97.5	91.7	96.9	100	100	96.1	96.8
Heavy Veh	2	4	1	2	9	2	4	1	0	7	0	2	3	0	5	5	5	0	0	10	31
% Heavy Veh	3.8	1.7	1.1	3.8	2.1	3.4	3.1	6.2	0	3.4	0	1.5	5.7	0	2.1	8.3	3.1	0	0	3.9	2.7
School Buses	1	0	1	0	2	0	2	0	0	2	0	1	0	0	1	0	0	0	0	0	5
% School Buses	1.9	0	1.1	0	0.5	0	1.5	0	0	1	0	8.0	0	0	0.4	0	0	0	0	0	0.4

File Name: 2022-3-1\_6th-Federal\_12PM

Site Code : 12135701 Start Date : 3/1/2022

Page No : 2

		(	oth Av	⁄e			Fe	ederal	St			(	6th A۱	/e			F	edera	St		
		So	uthbo	und			We	estbo	und			No	rthbo	und			Ea	astbo	und		
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
Peak Hour /									ak 1 o	f 1											
Peak Hour f	or Ent	tire Int	ersec	tion Be	egins a	t 12:00	0:00 P	M													
12:00:00 PM	17	65	20	10	112	14	28	1	0	43	17	38	15	0	70	17	41	9	0	67	292
12:15:00 PM	8	52	18	9	87	18	42	5	0	65	15	27	12	0	54	19	41	5	1	66	272
12:30:00 PM	19	51	30	19	119	11	29	6	0	46	8	34	8	1	51	15	45	6	3	69	285
12:45:00 PM	9	62	26	14	111	16	32	4	0	52	15	33	18	2	68	9	36	8	4	57	288
Total Volume	53	230	94	52	429	59	131	16	0	206	55	132	53	3	243	60	163	28	8	259	1137
% App. Total	12.4	53.6	21.9	12.1		28.6	63.6	7.8	0		22.6	54.3	21.8	1.2		23.2	62.9	10.8	3.1		<u> </u>
PHF	.697	.885	.783	.684	.901	.819	.780	.667	.000	.792	.809	.868	.736	.375	.868	.789	.906	.778	.500	.938	.973
Passenger Veh	50	226	92	50	418	57	125	15	0	197	55	129	50	3	237	55	158	28	8	249	1101
% Passenger Veh	94.3	98.3	97.9	96.2	97.4	96.6	95.4	93.8	0	95.6	100	97.7	94.3	100	97.5	91.7	96.9	100	100	96.1	96.8
Heavy Veh	2	4	1	2	9	2	4	1	0	7	0	2	3	0	5	5	5	0	0	10	31
% Heavy Veh	3.8	1.7	1.1	3.8	2.1	3.4	3.1	6.3	0	3.4	0	1.5	5.7	0	2.1	8.3	3.1	0	0	3.9	2.7
School Buses	1	0	1	0	2	0	2	0	0	2	0	1	0	0	1	0	0	0	0	0	5
% School Buses	1.9	0	1.1	0	0.5	0	1.5	0	0	1.0	0	8.0	0	0	0.4	0	0	0	0	0	0.4



File Name: 2022-3-1\_6th-Federal\_430PM

Project No.: 121-357 Counted By: BP Site Code : 12135701 Location: 6th Ave-Federal St Start Date : 3/1/2022

Page No : 1 Comments: PM PK

Groups Printed- Passenger Veh - Heavy Veh - School Buses

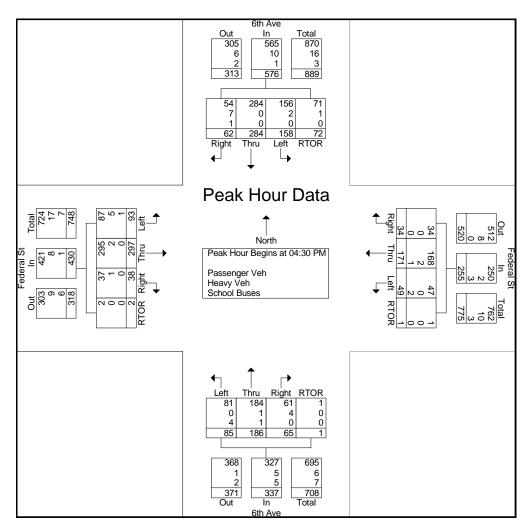
		(	6th A	ve				edera		<b>J</b> O. 10.		,	6th A	/e			F	ederal	St		
		So	uthbo	und			W	estbo	und			No	rthbo	und			Ea	astbou	ınd		
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
04:30 PM	50	78	13	20	161	21	52	12	0	85	15	47	12	1	75	25	78	6	0	109	430
04:45 PM	35	51	17	22	125	12	34	5	1	52	23	46	16	0	85	22	74	11	0	107	369
Total	85	129	30	42	286	33	86	17	1	137	38	93	28	1	160	47	152	17	0	216	799
05:00 PM	35	75	15	14	139	7	41	15	0	63	25	54	21	0	100	21	61	10	1	93	395
05:15 PM	38	80	17	16	151	9	44	2	0	55	22	39	16	0	77	25	84	11	1	121	404
Grand Total	158	284	62	72	576	49	171	34	1	255	85	186	65	1	337	93	297	38	2	430	1598
Apprch %	27.4	49.3	10.8	12.5		19.2	67.1	13.3	0.4		25.2	55.2	19.3	0.3		21.6	69.1	8.8	0.5		
Total %	9.9	17.8	3.9	4.5	36	3.1	10.7	2.1	0.1	16	5.3	11.6	4.1	0.1	21.1	5.8	18.6	2.4	0.1	26.9	
Passenger Veh	156	284	54	71	565	47	168	34	1	250	81	184	61	1	327	87	295	37	2	421	1563
% Passenger Veh	98.7	100	87.1	98.6	98.1	95.9	98.2	100	100	98	95.3	98.9	93.8	100	97	93.5	99.3	97.4	100	97.9	97.8
Heavy Veh	2	0	7	1	10	0	2	0	0	2	0	1	4	0	5	5	2	1	0	8	25
% Heavy Veh	1.3	0	11.3	1.4	1.7	0	1.2	0	0	8.0	0	0.5	6.2	0	1.5	5.4	0.7	2.6	0	1.9	1.6
School Buses	0	0	1	0	1	2	1	0	0	3	4	1	0	0	5	1	0	0	0	1	10
% School Buses	0	0	1.6	0	0.2	4.1	0.6	0	0	1.2	4.7	0.5	0	0	1.5	1.1	0	0	0	0.2	0.6

File Name: 2022-3-1\_6th-Federal\_430PM

Site Code : 12135701 Start Date : 3/1/2022

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		(	6th Av	/e			F	edera	St			(	6th A	/e			F	edera	St		
		So	uthbo	und			W	estbo	und			No	rthbo	und			Ea	astbo	und		
Start Time	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Left	Thru	Right	RTOR	App. Total	Int. Total
Peak Hour /									1 of 1												
Peak Hour f	or Ent	tire Int	tersec	tion B	egins a	t 4:30:	00 PN	Λ													
4:30:00 PM	50	78	13	20	161	21	52	12	0	85	15	47	12	1	75	25	78	6	0	109	430
4:45:00 PM	35	51	17	22	125	12	34	5	1	52	23	46	16	0	85	22	74	11	0	107	369
5:00:00 PM	35	75	15	14	139	7	41	15	0	63	25	54	21	0	100	21	61	10	1	93	395
5:15:00 PM	38	80	17	16	151	9	44	2	0	55	22	39	16	0	77	25	84	11	1	121	404
Total Volume	158	284	62	72	576	49	171	34	1	255	85	186	65	1	337	93	297	38	2	430	1598
% App. Total	27.4	49.3	10.8	12.5		19.2	67.1	13.3	0.4		25.2	55.2	19.3	0.3		21.6	69.1	8.8	0.5		
PHF	.790	.888	.912	.818	.894	.583	.822	.567	.250	.750	.850	.861	.774	.250	.843	.930	.884	.864	.500	.888	.929
Passenger Veh	156	284	54	71	565	47	168	34	1	250	81	184	61	1	327	87	295	37	2	421	1563
% Passenger Veh	98.7	100	87.1	98.6	98.1	95.9	98.2	100	100	98.0	95.3	98.9	93.8	100	97.0	93.5	99.3	97.4	100	97.9	97.8
Heavy Veh	2	0	7	1	10	0	2	0	0	2	0	1	4	0	5	5	2	1	0	8	25
% Heavy Veh	1.3	0	11.3	1.4	1.7	0	1.2	0	0	0.8	0	0.5	6.2	0	1.5	5.4	0.7	2.6	0	1.9	1.6
School Buses	0	0	1	0	1	2	1	0	0	3	4	1	0	0	5	1	0	0	0	1	10
% School Buses	0	0	1.6	0	0.2	4.1	0.6	0	0	1.2	4.7	0.5	0	0	1.5	1.1	0	0	0	0.2	0.6



# Appendix D

**Level of Service Calculations** 

A level of service analysis was conducted at the Federal Street/River Street and Federal Street/6th Avenue intersections for the No-Build and Build concepts based on a 2025 estimated year of completion (ETC) and 2045 ETC+20 for both single-lane and multi-lane roundabout sub-alternatives. Level of service is a measure of the quality of travel and is expressed in terms of delay ranging from LOS A (little delay), to LOS F (long delay). The development of the traffic forecasts were coordinated with the City of Troy and the Capital District Transportation Committee and are based on the 2022 factored traffic volumes that account for an approximate 20% increase to the raw 2022 traffic volumes to account for reduced travel resulting from the covid-19 pandemic, as well as a 0.6 percent per year growth rate

	_#	<b>→</b>	•	•	<b>←</b>	€.	4	7	<i>&gt;</i>	<b>↓</b>	4	
Movement	EBL	EBT	EBR	WBL	WBT	WBR2	NBL	NBR	NBR2	SBT	SBR	
Lane Configurations	ሻ	<b>∱</b> }		ሻ	<b>^</b>		ሻ	7	7	<b>↑</b> ↑		
Traffic Volume (vph)	113	203	136	102	161	49	99	210	111	222	121	
Future Volume (vph)	113	203	136	102	161	49	99	210	111	222	121	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	1.0	4.0		
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	0.99		
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00		
Frt	1.00	0.94		1.00	0.97		1.00	0.85	0.85	0.95		
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	1.00		
Satd. Flow (prot)	1787	3372		1687	3458		1787	1568	1568	3325		
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	1.00		
Satd. Flow (perm)	1787	3372		1687	3458		1787	1568	1568	3325		
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	
Growth Factor (vph)	119%	119%	119%	119%	119%	119%	119%	119%	119%	119%	119%	
Adj. Flow (vph)	139	249	167	125	198	60	121	258	136	272	148	
RTOR Reduction (vph)	0	102	0	0	102	0	0	0	60	63	0	
Lane Group Flow (vph)	139	314	0	125	156	0	121	258	76	357	0	
Confl. Peds. (#/hr)							4				4	
Heavy Vehicles (%)	1%	1%	0%	7%	1%	0%	1%	3%	3%	3%	1%	
Turn Type	Prot	NA		Prot	NA		Prot		custom	NA		
Protected Phases	5	2		1	6		3	8	7	4		
Permitted Phases		_		•			•		148	•		
Actuated Green, G (s)	10.1	16.2		8.2	14.3		7.8	21.7	40.0	14.0		
Effective Green, g (s)	11.1	17.2		9.2	15.3		8.8	22.7	37.0	15.0		
Actuated g/C Ratio	0.17	0.26		0.14	0.23		0.13	0.34	0.56	0.23		
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	2.0	5.0		
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.0	4.0	2.0	2.0		
Lane Grp Cap (vph)	299	876		234	799		237	537	876	753		
v/s Ratio Prot	c0.08	c0.09		0.07	0.05		0.07	c0.16	0.01	c0.11		
v/s Ratio Perm	60.00	60.03		0.01	0.00		0.07	60.10	0.04	60.11		
v/c Ratio	0.46	0.36		0.53	0.19		0.51	0.48	0.09	0.47		
Uniform Delay, d1	24.9	20.0		26.5	20.5		26.7	17.1	6.8	22.2		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.4	0.3		1.00	0.2		0.8	0.9	0.0	0.2		
Delay (s)	25.3	20.3		27.7	20.7		27.5	18.0	6.8	22.4		
Level of Service	23.3 C	20.3 C		27.7 C	20.7 C		27.5 C	10.0 B	0.0 A	22.4 C		
Approach Delay (s)	U	21.6		U	22.9		U	U	^	22.4		
Approach LOS		Z1.0			C					22. <del>4</del>		
Intersection Summary												
HCM 2000 Control Delay			20.9	Н	CM 2000	Level of	Service		С			
HCM 2000 Volume to Capa	city ratio		0.47		J.11 2000	. 20101011	20. 1100		J			
Actuated Cycle Length (s)	only ratio		66.2	S	um of los	t time (s)			16.0			
Intersection Capacity Utiliza	tion		52.2%			of Service			10.0			
Analysis Period (min)	UOII		15	- IC	O LEVE	or our vice						
c Critical Lane Group			10									

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	<b>∱</b> β		ሻ	1•			र्सी के			4₽	7
Traffic Volume (vph)	60	163	36	59	131	16	55	132	56	53	230	146
Future Volume (vph)	60	163	36	59	131	16	55	132	56	53	230	146
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	13	13	13	11	11	11	11	11	14
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	1.00			0.95			0.95	1.00
Frt	1.00	0.97		1.00	0.98			0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99	1.00
Satd. Flow (prot)	1671	3428		1811	1837			3251			3365	1672
Flt Permitted	0.48	1.00		0.60	1.00			0.99			0.99	1.00
Satd. Flow (perm)	840	3428		1144	1837			3251			3365	1672
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Growth Factor (vph)	119%	119%	119%	119%	119%	119%	119%	119%	119%	119%	119%	119%
Adj. Flow (vph)	74	200	44	72	161	20	67	162	69	65	282	179
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	74	244	0	72	181	0	0	298	0	0	347	179
Heavy Vehicles (%)	8%	3%	0%	3%	5%	6%	0%	2%	6%	6%	2%	3%
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA		Split	NA	pm+ov
Protected Phases	7	4		3	8		2	2		6	6	7
Permitted Phases	4			8								6
Actuated Green, G (s)	28.7	18.7		24.7	16.7			20.0			20.0	30.0
Effective Green, g (s)	28.7	18.7		24.7	16.7			20.0			20.0	30.0
Actuated g/C Ratio	0.33	0.22		0.28	0.19			0.23			0.23	0.35
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	373	739		387	353			749			776	674
v/s Ratio Prot	0.02	0.07		0.02	c0.10			c0.09			c0.10	c0.03
v/s Ratio Perm	0.04			0.04								0.08
v/c Ratio	0.20	0.33		0.19	0.51			0.40			0.45	0.27
Uniform Delay, d1	20.4	28.7		23.1	31.4			28.2			28.6	20.4
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.3	0.3		0.2	1.3			0.3			0.4	0.2
Delay (s)	20.7	29.0		23.3	32.6			28.6			29.0	20.6
Level of Service	С	С		С	С			С			С	С
Approach Delay (s)		27.1			30.0			28.6			26.2	
Approach LOS		С			С			С			С	
Intersection Summary												
HCM 2000 Control Delay			27.6	Н	CM 2000	Level of	Service		С			
HCM 2000 Volume to Capa	city ratio		0.43									
Actuated Cycle Length (s)			86.7		um of lost				20.0			
Intersection Capacity Utiliza	tion		70.8%	IC	CU Level of	of Service	!		С			
Analysis Period (min)			15									
c Critical Lane Group												

	_#	<b>→</b>	•	•	<b>←</b>	٧.	4	7	<i>&gt;</i>	<b>↓</b>	4	
Movement	EBL	EBT	EBR	WBL	WBT	WBR2	NBL	NBR	NBR2	SBT	SBR	
Lane Configurations	ሻ	<b>↑</b> ↑		ች	<b>^</b>		ሻ	7	7	<b>↑</b> ⊅		
Traffic Volume (vph)	159	343	168	124	214	24	105	199	122	250	158	
Future Volume (vph)	159	343	168	124	214	24	105	199	122	250	158	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	1.0	4.0		
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	0.99		
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00		
Frt	1.00	0.95		1.00	0.98		1.00	0.85	0.85	0.94		
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	1.00		
Satd. Flow (prot)	1787	3409		1687	3523		1787	1568	1568	3307		
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	1.00		
Satd. Flow (perm)	1787	3409		1687	3523		1787	1568	1568	3307		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Growth Factor (vph)	119%	119%	119%	119%	119%	119%	119%	119%	119%	119%	119%	
Adj. Flow (vph)	197	425	208	154	265	30	130	247	151	310	196	
RTOR Reduction (vph)	0	51	0	0	98	0	0	0	59	90	0	
Lane Group Flow (vph)	197	582	0	154	197	0	130	247	92	416	0	
Confl. Peds. (#/hr)							4				4	
Heavy Vehicles (%)	1%	1%	0%	7%	1%	0%	1%	3%	3%	3%	1%	
Turn Type	Prot	NA		Prot	NA		Prot	Prot	custom	NA		
Protected Phases	5	2		1	6		3	8	7	4		
Permitted Phases									148			
Actuated Green, G (s)	14.0	21.2		12.4	19.6		10.7	25.5	48.1	15.0		
Effective Green, g (s)	15.0	22.2		13.4	20.6		11.7	26.5	45.1	16.0		
Actuated g/C Ratio	0.19	0.28		0.17	0.26		0.15	0.33	0.57	0.20		
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	2.0	5.0		
Vehicle Extension (s)	2.0	4.0		2.0	4.0		2.0	4.0	2.0	2.0		
Lane Grp Cap (vph)	338	954		285	915		263	523	891	667		
v/s Ratio Prot	c0.11	c0.17		0.09	0.06		0.07	c0.16	0.01	c0.13		
v/s Ratio Perm	•	••••		0.00	0.00		0.0.		0.05	001.10		
v/c Ratio	0.58	0.61		0.54	0.21		0.49	0.47	0.10	0.62		
Uniform Delay, d1	29.3	24.8		30.1	23.0		31.1	20.9	7.8	28.9		
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00		
Incremental Delay, d2	1.7	1.3		1.1	0.2		0.5	0.9	0.0	1.3		
Delay (s)	31.0	26.1		31.3	23.2		31.6	21.8	7.9	30.2		
Level of Service	С	С		С	С		С	С	Α	С		
Approach Delay (s)		27.2			25.9					30.2		
Approach LOS		С			С					С		
Intersection Summary												
HCM 2000 Control Delay			26.0	H	CM 2000	Level of	Service		С			
HCM 2000 Volume to Capac	city ratio		0.61									
Actuated Cycle Length (s)			79.3			t time (s)			16.0			
Intersection Capacity Utiliza	tion		62.0%	IC	CU Level	of Service			В			
Analysis Period (min)			15									
c Critical Lane Group												

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	7	<b>∱</b> î≽		Ť	f)			र्सी			4₽	7
Traffic Volume (vph)	97	310	42	49	171	35	85	186	66	158	284	134
Future Volume (vph)	97	310	42	49	171	35	85	186	66	158	284	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	13	13	13	11	11	11	11	11	14
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	1.00			0.95			0.95	1.00
Frt	1.00	0.98		1.00	0.97			0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.98	1.00
Satd. Flow (prot)	1687	3502		1793	1882			3248			3416	1524
Flt Permitted	0.33	1.00		0.40	1.00			0.99			0.98	1.00
Satd. Flow (perm)	590	3502		758	1882			3248			3416	1524
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Growth Factor (vph)	119%	119%	119%	119%	119%	119%	119%	119%	119%	119%	119%	119%
Adj. Flow (vph)	124	397	54	63	219	45	109	238	84	202	363	171
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	124	451	0	63	264	0	0	431	0	0	565	171
Heavy Vehicles (%)	7%	1%	3%	4%	2%	0%	5%	1%	6%	1%	0%	13%
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA		Split	NA	pm+ov
Protected Phases	7	4		3	8		2	2		6	6	7
Permitted Phases	4	00.0		8	00.0			04.0			00.5	6
Actuated Green, G (s)	33.4	23.2		28.8	20.9			21.8			23.5	33.7
Effective Green, g (s)	33.4	23.2		28.8	20.9			21.8			23.5	33.7
Actuated g/C Ratio	0.35 5.0	0.24 5.0		0.30 5.0	0.22 5.0			0.23 5.0			0.24 5.0	0.35 5.0
Clearance Time (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Vehicle Extension (s)		842			408							611
Lane Grp Cap (vph)	320			311 0.02				734			832	
v/s Ratio Prot v/s Ratio Perm	c0.04 0.09	0.13		0.02	c0.14			c0.13			c0.17	0.03
v/c Ratio	0.09	0.54		0.04	0.65			0.59			0.68	0.08
Uniform Delay, d1	22.8	31.9		24.6	34.4			33.3			33.0	22.6
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.8	0.7		0.3	3.5			1.00			2.2	0.3
Delay (s)	23.6	32.6		25.0	37.9			34.5			35.3	22.9
Level of Service	23.0 C	02.0 C		23.0 C	D			04.0 C			00.0 D	22.5 C
Approach Delay (s)		30.6			35.4			34.5			32.4	J
Approach LOS		C			D			C			C	
Intersection Summary												
HCM 2000 Control Delay			32.8	Н	CM 2000	Level of	Service		С			
HCM 2000 Volume to Capa	city ratio		0.60									
Actuated Cycle Length (s)			96.4		um of lost				20.0			
Intersection Capacity Utiliza	ition		71.6%	IC	CU Level of	of Service	•		С			
Analysis Period (min)			15									
c Critical Lane Group												

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Movement	EBL	EBT	EBR	WBL	WBT	WBR2	NBL	NBR	NBR2	SBT	SBR	
Lane Configurations	ሻ	<b>∱</b> }		ሻ	<b>1</b>	7	ă	7	7	<b>∱</b> }		
Traffic Volume (vph)	136	246	165	123	195	59	120	255	134	269	147	
Future Volume (vph)	136	246	165	123	195	59	120	255	134	269	147	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0		4.0	4.0	5.0	4.0	4.0	1.0	4.0		
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.99		
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Frt	1.00	0.94		1.00	1.00	0.85	1.00	0.85	0.85	0.95		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	1.00		
Satd. Flow (prot)	1787	3373		1687	1881	1615	1787	1568	1568	3313		
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	1.00		
Satd. Flow (perm)	1787	3373		1687	1881	1615	1787	1568	1568	3313		
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	
Adj. Flow (vph)	140	254	170	127	201	61	124	263	138	277	152	
RTOR Reduction (vph)	0	85	0	0	0	48	0	0	56	56	0	
Lane Group Flow (vph)	140	339	0	127	201	13	124	263	82	373	0	
Confl. Peds. (#/hr)							4				4	
Heavy Vehicles (%)	1%	1%	0%	7%	1%	0%	1%	3%	3%	3%	1%	
Turn Type	Prot	NA		Prot	NA	Perm	Prot	Prot	custom	NA		
Protected Phases	5	2		1	6	. •	3	8	7	4		
Permitted Phases		_		•		6			148	•		
Actuated Green, G (s)	10.8	15.2		10.6	15.0	15.0	10.3	23.4	44.1	13.2		
Effective Green, g (s)	11.8	16.2		11.6	16.0	15.0	11.3	24.4	41.1	14.2		
Actuated g/C Ratio	0.17	0.23		0.17	0.23	0.22	0.16	0.35	0.59	0.20		
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	2.0	5.0		
Vehicle Extension (s)	2.0	4.0		2.0	4.0	4.0	2.0	4.0	2.0	2.0		
Lane Grp Cap (vph)	304	788		282	434	349	291	552	929	678		
v/s Ratio Prot	c0.08	0.10		0.08	c0.11	040	0.07	c0.17	0.01	c0.11		
v/s Ratio Perm	00.00	0.10		0.00	00.11	0.01	0.01	00.17	0.05	00.11		
v/c Ratio	0.46	0.43		0.45	0.46	0.04	0.43	0.48	0.09	0.55		
Uniform Delay, d1	25.9	22.6		26.0	23.0	21.4	26.1	17.5	6.1	24.7		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.4	0.5		0.4	1.1	0.1	0.4	0.9	0.0	0.6		
Delay (s)	26.3	23.1		26.4	24.0	21.5	26.5	18.4	6.1	25.2		
Level of Service	20.0 C	C		C	C	C C	C	В	Α	C		
Approach Delay (s)	U	23.9		U	24.4	J	U		Α.	25.2		
Approach LOS		C			C					C		
		U			U					U		
Intersection Summary				, .	014 0000	1	<u> </u>					
	M 2000 Control Delay			Н	CM 2000	Level of S	service		С			
•	2000 Volume to Capacity ratio					(1) (2)			40.0			
Actuated Cycle Length (s)			69.3			t time (s)			16.0			
Intersection Capacity Utiliza	ation		52.9%	IC	U Level	of Service			Α			
Analysis Period (min)			15									

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	<b>∱</b> }		ሻ	1>			<b>€</b> 1₽			4₽	7
Traffic Volume (vph)	72	198	44	71	159	19	66	160	68	64	279	177
Future Volume (vph)	72	198	44	71	159	19	66	160	68	64	279	177
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	13	13	13	11	11	11	11	11	14
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	1.00			0.95			0.95	1.00
Frt	1.00	0.97		1.00	0.98			0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99	1.00
Satd. Flow (prot)	1671	3428		1811	1837			3251			3365	1672
Flt Permitted	0.47	1.00		0.60	1.00			0.99			0.99	1.00
Satd. Flow (perm)	832	3428		1139	1837			3251			3365	1672
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	74	204	45	73	164	20	68	165	70	66	288	182
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	74	249	0	73	184	0	0	303	0	0	354	182
Heavy Vehicles (%)	8%	3%	0%	3%	5%	6%	0%	2%	6%	6%	2%	3%
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA		Split	NA	pm+ov
Protected Phases	7	4		3	8		2	2		6	6	7
Permitted Phases	4	40.0		8	400							6
Actuated Green, G (s)	28.9	18.9		24.9	16.9			20.0			20.0	30.0
Effective Green, g (s)	28.9	18.9		24.9	16.9			20.0			20.0	30.0
Actuated g/C Ratio	0.33	0.22		0.29	0.19			0.23			0.23	0.35
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	373	745		388	357			748			774	673
v/s Ratio Prot	0.02	0.07		0.02	c0.10			c0.09			c0.11	c0.03
v/s Ratio Perm	0.04	0.00		0.04	0.50			0.44			0.40	0.08
v/c Ratio	0.20	0.33		0.19	0.52			0.41			0.46	0.27
Uniform Delay, d1	20.4	28.7 1.00		23.0	31.3 1.00			28.4 1.00			28.8	20.5
Progression Factor	1.00	0.3		1.00 0.2	1.00			0.4			1.00	1.00 0.2
Incremental Delay, d2 Delay (s)	20.7	29.0		23.3	32.6			28.8			29.2	20.8
Level of Service	20.7 C	29.0 C		23.3 C	32.0 C			20.0 C			29.2 C	20.0 C
Approach Delay (s)	U	27.1		C	29.9			28.8			26.3	U
Approach LOS		C C			23.3 C			20.0 C			20.5 C	
		U			U			U			U	
	ersection Summary											
	CM 2000 Control Delay			Н	CM 2000	Level of S	Service		С			
	CM 2000 Volume to Capacity ratio					(			00.0			
, ,	tuated Cycle Length (s)				um of lost				20.0			
Intersection Capacity Utiliza	ation		70.8%	IC	CU Level o	of Service			С			
Analysis Period (min)			15									

	<b>≭</b>	-	•	•	<b>←</b>	€_	4	7	/	<b>↓</b>	✓	
Movement	EBL	EBT	EBR	WBL	WBT	WBR2	NBL	NBR	NBR2	SBT	SBR	
Lane Configurations	ኻ	<b>∱</b> ∱		*	<b>↑</b>	7	ă	1	7	<b>∱</b> %		
Traffic Volume (vph)	192	415	204	151	260	30	127	241	148	303	191	
Future Volume (vph)	192	415	204	151	260	30	127	241	148	303	191	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0		4.0	4.0	5.0	4.0	4.0	1.0	4.0		
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.99		
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Frt	1.00	0.95		1.00	1.00	0.85	1.00	0.85	0.85	0.94		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	1.00		
Satd. Flow (prot)	1787	3408		1687	1881	1615	1787	1568	1568	3294		
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	1.00		
Satd. Flow (perm)	1787	3408		1687	1881	1615	1787	1568	1568	3294		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	200	432	212	157	271	31	132	251	154	316	199	
RTOR Reduction (vph)	0	42	0	0	0	23	0	0	31	74	0	
Lane Group Flow (vph)	200	603	0	157	271	8	132	251	123	441	0	
Confl. Peds. (#/hr)	200	000	- U	107	211		4	201	120	771	4	
Heavy Vehicles (%)	1%	1%	0%	7%	1%	0%	1%	3%	3%	3%	1%	
Turn Type	Prot	NA	0 70	Prot	NA	Perm	Prot		custom	NA	170	
Protected Phases	5	2		1	6	1 Cilli	3	8	7	4		
Permitted Phases		_		'		6			148			
Actuated Green, G (s)	14.8	22.7		13.1	21.0	21.0	11.7	28.0	51.3	16.5		
Effective Green, g (s)	15.8	23.7		14.1	22.0	21.0	12.7	29.0	48.3	17.5		
Actuated g/C Ratio	0.19	0.28		0.17	0.26	0.25	0.15	0.35	0.57	0.21		
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	2.0	5.0		
Vehicle Extension (s)	2.0	4.0		2.0	4.0	4.0	2.0	4.0	2.0	2.0		
Lane Grp Cap (vph)	336	961		283	492	403	270	541	901	686		
v/s Ratio Prot	c0.11	c0.18		0.09	0.14	100	0.07	c0.16	0.01	c0.13		
v/s Ratio Perm	00.11	00.10		0.00	0.11	0.00	0.01	00.10	0.07	00.10		
v/c Ratio	0.60	0.63		0.55	0.55	0.02	0.49	0.46	0.14	0.64		
Uniform Delay, d1	31.2	26.3		32.1	26.7	23.7	32.7	21.4	8.2	30.4		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	1.9	1.5		1.3	1.6	0.0	0.5	0.9	0.0	1.5		
Delay (s)	33.1	27.8		33.4	28.4	23.8	33.2	22.3	8.3	31.9		
Level of Service	С	C		С	С	C	C	C	A	С		
Approach Delay (s)		29.0		_	29.8					31.9		
Approach LOS		С			С					С		
Intersection Summary												
HCM 2000 Control Delay			28.0	Н	CM 2000	Level of S	Service		С			
HCM 2000 Volume to Capa	acity ratio		0.62		2111 2000		3, 1,00					
Actuated Cycle Length (s)	and radio		84.0	Si	um of los	st time (s)			16.0			
Intersection Capacity Utiliza	ation		62.8%			of Service			В			
Analysis Period (min)			15	٠,٠	3 20101	27 231 1100						
Citizal Lagran Con			10									

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	<b>∱</b> }		ሻ	1>			4T>			41₽	7
Traffic Volume (vph)	117	376	51	59	207	43	103	225	80	191	344	162
Future Volume (vph)	117	376	51	59	207	43	103	225	80	191	344	162
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	13	13	13	11	11	11	11	11	14
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	1.00			0.95			0.95	1.00
Frt	1.00	0.98		1.00	0.97			0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.98	1.00
Satd. Flow (prot)	1687	3502		1793	1882			3248			3416	1524
Flt Permitted	0.32	1.00		0.39	1.00			0.99			0.98	1.00
Satd. Flow (perm)	575	3502		740	1882			3248			3416	1524
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	126	404	55	63	223	46	111	242	86	205	370	174
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	126	459	0	63	269	0	0	439	0	0	575	174
Heavy Vehicles (%)	7%	1%	3%	4%	2%	0%	5%	1%	6%	1%	0%	13%
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA		Split	NA	pm+ov
Protected Phases	7	4		3	8		2	2		6	6	7
Permitted Phases	4			8								6
Actuated Green, G (s)	33.8	23.6		29.2	21.3			22.1			24.1	34.3
Effective Green, g (s)	33.8	23.6		29.2	21.3			22.1			24.1	34.3
Actuated g/C Ratio	0.35	0.24		0.30	0.22			0.23			0.25	0.35
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	315	845		306	410			734			842	613
v/s Ratio Prot	c0.04	0.13		0.02	c0.14			c0.14			c0.17	0.03
v/s Ratio Perm	0.10			0.04								0.08
v/c Ratio	0.40	0.54		0.21	0.66			0.60			0.68	0.28
Uniform Delay, d1	23.3	32.3		25.0	34.9			33.8			33.3	22.8
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.8	0.7		0.3	3.8			1.3			2.3	0.3
Delay (s)	24.1	33.1		25.3	38.6			35.1			35.6	23.1
Level of Service	С	C		С	D			D			D	С
Approach Delay (s)		31.1			36.1			35.1			32.7	
Approach LOS		С			D			D			С	
Intersection Summary	·											
	CM 2000 Control Delay			Н	CM 2000	Level of S	Service		С			
	CM 2000 Volume to Capacity ratio											
Actuated Cycle Length (s)	ctuated Cycle Length (s)				um of lost				20.0			
Intersection Capacity Utiliza	ation		71.8%	IC	CU Level of	of Service			С			
Analysis Period (min)			15									

	<b>_</b> #	<b>→</b>	•	•	•	€_	4	7	<i>&gt;</i>	<b>↓</b>	4	
Movement	EBL	EBT	EBR	WBL	WBT	WBR2	NBL	NBR	NBR2	SBT	SBR	
Lane Configurations	¥	<b>∱</b> }		, N	<b>†</b>	7	ă	7	7	ħβ		
Traffic Volume (vph)	153	277	186	139	220	66	135	287	151	303	166	
Future Volume (vph)	153	277	186	139	220	66	135	287	151	303	166	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0		4.0	4.0	5.0	4.0	4.0	1.0	4.0		
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.99		
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Frt	1.00	0.94		1.00	1.00	0.85	1.00	0.85	0.85	0.95		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	1.00		
Satd. Flow (prot)	1787	3372		1687	1881	1615	1787	1568	1568	3312		
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	1.00		
Satd. Flow (perm)	1787	3372		1687	1881	1615	1787	1568	1568	3312		
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	
Adj. Flow (vph)	158	286	192	143	227	68	139	296	156	312	171	
RTOR Reduction (vph)	0	85	0	0	0	53	0	0	62	55	0	
Lane Group Flow (vph)	158	393	0	143	227	15	139	296	94	428	0	
Confl. Peds. (#/hr)							4				4	
Heavy Vehicles (%)	1%	1%	0%	7%	1%	0%	1%	3%	3%	3%	1%	
Turn Type	Prot	NA		Prot	NA	Perm	Prot	Prot	custom	NA		
Protected Phases	5	2		1	6		3	8	7	4		
Permitted Phases						6			148			
Actuated Green, G (s)	12.1	16.9		11.9	16.7	16.7	11.6	26.6	48.7	15.2		
Effective Green, g (s)	13.1	17.9		12.9	17.7	16.7	12.6	27.6	45.7	16.2		
Actuated g/C Ratio	0.17	0.24		0.17	0.23	0.22	0.17	0.37	0.60	0.21		
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	2.0	5.0		
Vehicle Extension (s)	2.0	4.0		2.0	4.0	4.0	2.0	4.0	2.0	2.0		
Lane Grp Cap (vph)	309	798		287	440	356	297	572	947	709		
v/s Ratio Prot	c0.09	0.12		0.08	c0.12		0.08	c0.19	0.01	c0.13		
v/s Ratio Perm						0.01			0.05			
v/c Ratio	0.51	0.49		0.50	0.52	0.04	0.47	0.52	0.10	0.60		
Uniform Delay, d1	28.3	24.9		28.4	25.2	23.2	28.5	18.8	6.3	26.8		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	0.6	0.7		0.5	1.4	0.1	0.4	1.1	0.0	1.0		
Delay (s)	28.9	25.6		28.9	26.6	23.2	28.9	19.8	6.3	27.8		
Level of Service	С	С		С	С	С	С	В	Α	С		
Approach Delay (s)		26.4			26.8					27.8		
Approach LOS		С			С					С		
Intersection Summary												
HCM 2000 Control Delay			24.6	H	CM 2000	Level of S	Service		С			
HCM 2000 Volume to Capac	city ratio		0.56									
Actuated Cycle Length (s)			75.6			t time (s)			16.0			
Intersection Capacity Utilizat	tion		57.5%	IC	U Level	of Service			В			
Analysis Period (min)			15									

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	<b>∱</b> ∱		ሻ	₽			र्सी			-4↑	7
Traffic Volume (vph)	81	223	50	80	179	21	74	180	77	72	314	199
Future Volume (vph)	81	223	50	80	179	21	74	180	77	72	314	199
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	13	13	13	11	11	11	11	11	14
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	1.00			0.95			0.95	1.00
Frt	1.00	0.97		1.00	0.98			0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99	1.00
Satd. Flow (prot)	1671	3426		1811	1838			3251			3365	1672
Flt Permitted	0.43	1.00		0.58	1.00			0.99			0.99	1.00
Satd. Flow (perm)	759	3426		1103	1838			3251			3365	1672
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	84	230	52	82	185	22	76	186	79	74	324	205
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	84	282	0	82	207	0	0	341	0	0	398	205
Heavy Vehicles (%)	8%	3%	0%	3%	5%	6%	0%	2%	6%	6%	2%	3%
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA		Split	NA	pm+ov
Protected Phases	7	4		3	8		2	2		6	6	7
Permitted Phases	4			8								6
Actuated Green, G (s)	29.6	19.6		25.6	17.6			20.0			20.3	30.3
Effective Green, g (s)	29.6	19.6		25.6	17.6			20.0			20.3	30.3
Actuated g/C Ratio	0.34	0.22		0.29	0.20			0.23			0.23	0.34
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	359	763		385	368			739			777	671
v/s Ratio Prot	0.03	0.08		0.02	c0.11			c0.10			c0.12	c0.03
v/s Ratio Perm	0.05	0.07		0.04	0.50			0.40			0.54	0.09
v/c Ratio	0.23	0.37		0.21	0.56			0.46			0.51	0.31
Uniform Delay, d1	20.6	28.9		23.1	31.7			29.3			29.5	21.1
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	0.3	0.3		0.3	2.0 33.6			0.5			0.6	0.3 21.4
Delay (s) Level of Service	20.9	29.2		23.4 C				29.8			30.1 C	21.4 C
	С	C 27.3		C	C 30.7			C 29.8			27.1	C
Approach Delay (s) Approach LOS		21.3 C			30.7 C			29.0 C			27.1 C	
		C			C			C			U	
Intersection Summary									_			
HCM 2000 Control Delay	M 2000 Control Delay		28.4	Н	CM 2000	Level of S	Service		С			
HCM 2000 Volume to Capa	acity ratio		0.49									
Actuated Cycle Length (s)			87.9		um of lost				20.0			
Intersection Capacity Utiliz	ation		70.8%	IC	CU Level	of Service			С			
Analysis Period (min)			15									

c Critical Lane Group

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Movement	EBL	EBT	EBR	WBL	WBT	WBR2	NBL	NBR	NBR2	SBT	SBR	
Lane Configurations	¥	<b>∱</b> 1≽		Į,	<b>†</b>	7	ă	7	7	<b>∱</b> ∱		
Traffic Volume (vph)	216	468	230	170	293	34	143	272	167	342	215	
Future Volume (vph)	216	468	230	170	293	34	143	272	167	342	215	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0		4.0	4.0	5.0	4.0	4.0	1.0	4.0		
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00	1.00	0.95		
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	0.99		
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Frt	1.00	0.95		1.00	1.00	0.85	1.00	0.85	0.85	0.94		
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	1.00		
Satd. Flow (prot)	1787	3409		1687	1881	1615	1787	1568	1568	3293		
FIt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	1.00		
Satd. Flow (perm)	1787	3409		1687	1881	1615	1787	1568	1568	3293		
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	
Adj. Flow (vph)	225	488	240	177	305	35	149	283	174	356	224	
RTOR Reduction (vph)	0	41	0	0	0	26	0	0	21	74	0	
Lane Group Flow (vph)	225	687	0	177	305	9	149	283	153	506	0	
Confl. Peds. (#/hr)							4				4	
Heavy Vehicles (%)	1%	1%	0%	7%	1%	0%	1%	3%	3%	3%	1%	
Turn Type	Prot	NA		Prot	NA	Perm	Prot	Prot	custom	NA		
Protected Phases	5	2		1	6		3	8	7	4		
Permitted Phases						6			148			
Actuated Green, G (s)	16.7	26.7		14.7	24.7	24.7	13.0	31.9	56.7	19.0		
Effective Green, g (s)	17.7	27.7		15.7	25.7	24.7	14.0	32.9	53.7	20.0		
Actuated g/C Ratio	0.19	0.30		0.17	0.28	0.26	0.15	0.35	0.57	0.21		
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	2.0	5.0		
Vehicle Extension (s)	2.0	4.0		2.0	4.0	4.0	2.0	4.0	2.0	2.0		
Lane Grp Cap (vph)	338	1011		283	517	427	267	552	901	705		
v/s Ratio Prot	c0.13	c0.20		0.10	0.16		0.08	c0.18	0.01	c0.15		
v/s Ratio Perm						0.01			0.09			
v/c Ratio	0.67	0.68		0.63	0.59	0.02	0.56	0.51	0.17	0.72		
Uniform Delay, d1	35.1	28.9		36.1	29.3	25.4	36.8	23.9	9.3	34.1		
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	3.8	2.0		3.1	2.0	0.0	1.4	1.1	0.0	2.9		
Delay (s)	38.9	30.9		39.2	31.3	25.4	38.3	25.0	9.4	37.0		
Level of Service	D	С		D	С	С	D	С	Α	D		
Approach Delay (s)		32.8			33.6					37.0		
Approach LOS		С			С					D		
Intersection Summary												
HCM 2000 Control Delay			31.8	H	CM 2000	Level of S	Service		С			
HCM 2000 Volume to Capac	city ratio		0.69									
Actuated Cycle Length (s)			93.4			t time (s)			16.0			
Intersection Capacity Utilizat	ion		68.6%	IC	U Level	of Service			С			
Analysis Period (min)			15									

	۶	<b>→</b>	$\rightarrow$	•	<b>←</b>	•	•	<b>†</b>	<b>/</b>	<b>&gt;</b>	ļ	4
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	<b>∱</b> }		ሻ	ĵ.			<b>€</b> 1Ъ			4₽	7
Traffic Volume (vph)	132	424	57	66	233	48	116	254	90	215	388	183
Future Volume (vph)	132	424	57	66	233	48	116	254	90	215	388	183
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	13	13	13	11	11	11	11	11	14
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	5.0
Lane Util. Factor	1.00	0.95		1.00	1.00			0.95			0.95	1.00
Frt	1.00	0.98		1.00	0.97			0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.98	1.00
Satd. Flow (prot)	1687	3503		1793	1882			3248			3416	1524
Flt Permitted	0.27	1.00		0.34	1.00			0.99			0.98	1.00
Satd. Flow (perm)	487	3503		635	1882			3248			3416	1524
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	142	456	61	71	251	52	125	273	97	231	417	197
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	142	517	0	71	303	0	0	495	0	0	648	197
Heavy Vehicles (%)	7%	1%	3%	4%	2%	0%	5%	1%	6%	1%	0%	13%
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA		Split	NA	pm+ov
Protected Phases	7	4		3	8		2	2		6	6	7
Permitted Phases	4			8								6
Actuated Green, G (s)	36.9	26.6		31.9	24.1			24.2			26.7	37.0
Effective Green, g (s)	36.9	26.6		31.9	24.1			24.2			26.7	37.0
Actuated g/C Ratio	0.35	0.25		0.30	0.23			0.23			0.25	0.35
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	3.0
Lane Grp Cap (vph)	288	884		278	430			746			866	607
v/s Ratio Prot	c0.05	0.15		0.02	c0.16			c0.15			c0.19	0.03
v/s Ratio Perm	0.12			0.06								0.10
v/c Ratio	0.49	0.58		0.26	0.70			0.66			0.75	0.32
Uniform Delay, d1	25.3	34.5		26.9	37.3			36.9			36.2	25.0
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	1.00
Incremental Delay, d2	1.3	1.0		0.5	5.2			2.2			3.6	0.3
Delay (s)	26.7	35.5		27.3	42.5			39.1			39.8	25.3
Level of Service	С	D		С	D			D			D	С
Approach Delay (s)		33.6			39.6			39.1			36.4	
Approach LOS		С			D			D			D	
Intersection Summary	•											
	CM 2000 Control Delay			Н	CM 2000	Level of S	Service		D			
	CM 2000 Volume to Capacity ratio								05.5			
, ,	ctuated Cycle Length (s)				um of lost				20.0			
Intersection Capacity Utiliza	ation		73.8%	IC	CU Level of	of Service			D			
Analysis Period (min)			15									

♥ Site: 101 [Federal Street/River Street Noon Peak -EBL-WBL-

NBR-SBR - FINAL (Site Folder: Noon Peak -2025)]

Federal Street/River Street

Existing 2022 PM Peak

Site Category: (None)

Roundabout

Lane Use a	and Per	forman	се										
	DEM FLO [ Total	WS HV]	Сар.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	50% BA QUE [ Veh	UE Dist ]	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
South: River	veh/h	% NB	veh/h	v/c	%	sec	_	_	ft	_	ft	%	%
Lane 1 <sup>d</sup>	388	2.4	917	0.423	100	6.4	LOS A	0.8	21.0	Full	200	0.0	0.0
Lane 2	138	3.0	837	0.165	100	4.9	LOSA	0.3	6.5	Short	100	0.0	NA
Approach	526	2.5		0.423		6.0	LOS A	0.8	21.0				
East: Federa	al Street.	WB											
Lane 1	141	6.4	792	0.178	100	9.7	LOSA	0.3	7.1	Short	100	0.0	NA
Lane 2 <sup>d</sup>	262	8.0	836	0.313	100	5.5	LOSA	0.6	13.9	Full	300	0.0	0.0
Approach	403	2.7		0.313		7.0	LOS A	0.6	13.9				
North: River	Street S	SB											
Lane 1 <sup>d</sup>	349	2.6	920	0.380	100	5.9	LOS A	0.7	17.4	Full	300	0.0	0.0
Lane 2	152	1.0	859	0.177	100	5.1	LOSA	0.3	7.0	Short	100	0.0	NA
Approach	501	2.1		0.380		5.6	LOSA	0.7	17.4				
West: Feder	al Street	EB											
Lane 1	141	1.0	882	0.160	100	9.2	LOSA	0.3	6.5	Short	100	0.0	NA
Lane 2 <sup>d</sup>	424	0.6	885	0.479	100	6.1	LOSA	1.1	27.7	Full	350	0.0	0.0
Approach	565	0.7		0.479		6.9	LOSA	1.1	27.7				
Intersection	1995	1.9		0.479		6.4	LOSA	1.1	27.7				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach L	ane Flo	ws (ve	h/h)								
South: River	Street N	В									
Mov. From S To Exit:	U S	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c		Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	124	263	-	388	2.4	917	0.423	100	NA	NA
Lane 2	-	-	-	138	138	3.0	837	0.165	100	0.0	1

Approach	1	124	263	138	526	2.5		0.423				
East: Federal	Street.	WB										
Mov. From E	U	L2	T1	R2	Total	%HV	Сар.	Deg. Satn		Prob. SL Ov.	Ov. Lane	
To Exit:	E	S	W	N			veh/h	v/c	%	%	No.	
Lane 1	14	127	-	-	141	6.4	792	0.178	100	0.0	2	
Lane 2	-	-	201	61	262	0.8	836	0.313	100	NA	NA	
Approach	14	127	201	61	403	2.7		0.313				
North: River S	Street S	В										
Mov. From N	U	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn		Prob. SL Ov.	Ov. Lane	
To Exit:	N	Е	S	W			ven/n	v/c	%	%	No.	
Lane 1	33	39	277	-	349	2.6	920	0.380	100	NA	NA	
Lane 2	-	-	-	152	152	1.0	859	0.177	100	0.0	1	
Approach	33	39	277	152	501	2.1		0.380				
West: Federa	I Street	EB										
Mov. From W	U	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
To Exit:	W	N	Е	S								
Lane 1	1	140	-	-	141	1.0	882	0.160	100	0.0	2	
Lane 2	-	-	254	170	424	0.6	885	0.479	100	NA	NA	
Approach	1	140	254	170	565	0.7		0.479				
	Total	%HV	Deg.Sat	n (v/c)								
Intersection	1995	1.9		0.479								

Merge Analysis									
Ex Lan Numbe	ie	Short Lane Length ft	Opng in Lane	Opposing Flow Rate veh/h pcu/	e Gap	Follow-up Headway sec	Capacity veh/h	Min. Delay sec	Merge Delay sec
South Exit: River Street N Merge Type: <b>Not Applied</b>	В								
Full Length Lane	1	Merge A	Analysis	not applied	•				
East Exit: Federal Street. \ Merge Type: <b>Not Applied</b>	ΝB								
Full Length Lane	1	Merge A	Analysis	not applied	•				
North Exit: River Street St Merge Type: <b>Not Applied</b>	В								
Full Length Lane	1	Merge A	Analysis	not applied	•				
West Exit: Federal Street Merge Type: <b>Not Applied</b>	EB								
Full Length Lane	1	Merge A	Analysis	not applied					

**♥** Site: 101 [Federal Street/River Street PM Peak -EBL-WBL-NBR-

SBR FINAL (Site Folder: PM Peak - 2025)]

Federal Street/River Street

Existing 2022 PM Peak

Site Category: (None)

Roundabout

Lane Use a	and Per	forman	ce										
	[ Total	DWS HV]	Cap.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	50% BA QUE [ Veh	UE Dist]	Lane Config	Lane Length	Cap. Adj.	Prob. Block.
South: River	veh/h	% NB	veh/h	v/c	%	sec			ft		ft	%	%
			70-	0.504	400				00 =		200		
Lane 1 <sup>d</sup>	393	4.0	735	0.534	100	9.0	LOSA	1.1	29.5	Full	200	0.0	0.0
Lane 2	157	5.0	658	0.239	100	6.4	LOSA	0.4	9.2	Short	100	0.0	NA
Approach	550	4.3		0.534		8.2	LOS A	1.1	29.5				
East: Federa	al Street.	WB											
Lane 1	168	5.8	754	0.223	100	10.0	LOS B	0.3	9.0	Short	100	0.0	NA
Lane 2 <sup>d</sup>	309	1.3	787	0.392	100	6.2	LOSA	0.8	19.0	Full	300	0.0	0.0
Approach	477	2.9		0.392		7.6	LOS A	8.0	19.0				
North: River	Street S	SB											
Lane 1 <sup>d</sup>	385	2.0	838	0.459	100	6.8	LOSA	0.9	23.9	Full	300	0.0	0.0
Lane 2	203	3.0	757	0.268	100	5.9	LOSA	0.4	11.0	Short	100	0.0	NA
Approach	588	2.3		0.459		6.5	LOS A	0.9	23.9				
West: Feder	al Street	EB											
Lane 1	205	1.0	831	0.247	100	9.7	LOSA	0.4	10.4	Short	100	0.0	NA
Lane 2 <sup>d</sup>	659	1.0	831	0.792	100	11.5	LOS B	3.3	83.5	Full	350	0.0	0.0
Approach	864	1.0		0.792		11.0	LOS B	3.3	83.5				
Intersection	2479	2.4		0.792		8.7	LOSA	3.3	83.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach L	ane Flo	ws (ve	h/h)								
South: River	Street N	В									
Mov. From S To Exit:	U S	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c		Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	135	256	-	393	4.0	735	0.534	100	NA	NA
Lane 2	-	-	-	157	157	5.0	658	0.239	100	0.0	1

Approach	1	135	256	157	550	4.3		0.534				
East: Federal	Street. \	WB										
Mov. From E	U	L2	T1	R2	Total	%HV	Сар.	Deg. Satn		Prob. SL Ov.	Ov. Lane	
To Exit:	Е	S	W	Ν			veh/h	v/c	%	%	No.	
Lane 1	7	161	-	-	168	5.8	754	0.223	100	0.0	2	
Lane 2	-	-	277	32	309	1.3	787	0.392	100	NA	NA	
Approach	7	161	277	32	477	2.9		0.392				
North: River S	Street S	В										
Mov. From N	U	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
To Exit:	N	Е	S	W			ven/m	V/C	%	%	INO.	
Lane 1	16	47	322	-	385	2.0	838	0.459	100	NA	NA	
Lane 2	-	-	-	203	203	3.0	757	0.268	100	0.0	1	
Approach	16	47	322	203	588	2.3		0.459				
West: Federa	I Street	EB										
Mov. From W	U	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
To Exit:	W	N	E	S	005	4.0						
Lane 1	1	204	-	-	205	1.0	831	0.247	100	0.0	2	
Lane 2	-	-	441	217	659	1.0	831	0.792	100	NA	NA	
Approach	1	204	441	217	864	1.0		0.792				
	Total	%HV	Deg.Sat	n (v/c)								
Intersection	2479	2.4		0.792								

Merge Analysis											
Ex Lan Numbe	е	Short Lane Length ft	Opng in Lane	Opposin Flow Rat veh/h pcu	e Ga	ıp Headv	-up Lar vay Flo Ra sec veh	w ite	apacity veh/h	Min. Delay sec	Merge Delay sec
South Exit: River Street N Merge Type: <b>Not Applied</b>	В										
Full Length Lane	1	Merge A	Analysis ı	not applied	d.						
East Exit: Federal Street. \ Merge Type: Not Applied	ΝB										
Full Length Lane	1	Merge A	Analysis ı	not applied	d.						
North Exit: River Street SI Merge Type: <b>Not Applied</b>	В										
Full Length Lane	1	Merge A	Analysis ı	not applied	d.						
West Exit: Federal Street Merge Type: <b>Not Applied</b>	EB										
Full Length Lane	1	Merge A	Analysis ı	not applied	d.						

♥ Site: 101 [Federal Street/River Street Noon Peak -EBL-WBL-

NBR-SBR-FINAL (Site Folder: Noon Peak - 2045)]

Federal Street/River Street

Existing 2022 PM Peak

Site Category: (None)

Roundabout

Lane Use a	and Per	forman	ce										
	DEM FLC [ Total		Сар.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	50% BA0 QUE [ Veh		Lane Config	Lane Length		Prob. Block.
	veh/h	% -	veh/h	v/c	%	sec			ft		ft	%	%
South: River	Street I	NB											
Lane 1 <sup>d</sup>	436	2.4	870	0.501	100	7.4	LOSA	1.1	28.3	Full	200	0.0	0.0
Lane 2	156	3.0	791	0.197	100	5.3	LOSA	0.3	7.8	Short	100	0.0	NA
Approach	592	2.5		0.501		6.8	LOSA	1.1	28.3				
East: Federa	al Street.	WB											
Lane 1	160	6.4	742	0.215	100	10.2	LOS B	0.3	8.6	Short	100	0.0	NA
Lane 2 <sup>d</sup>	295	8.0	784	0.376	100	6.3	LOSA	0.7	17.9	Full	300	0.0	0.0
Approach	455	2.7		0.376		7.6	LOSA	0.7	17.9				
North: River	Street S	SB											
Lane 1 <sup>d</sup>	394	2.6	873	0.451	100	6.7	LOS A	0.9	23.4	Full	300	0.0	0.0
Lane 2	171	1.0	812	0.211	100	5.4	LOSA	0.3	8.5	Short	100	0.0	NA
Approach	565	2.1		0.451		6.3	LOSA	0.9	23.4				
West: Feder	al Street	EB											
Lane 1	159	1.0	831	0.191	100	9.6	LOSA	0.3	7.8	Short	100	0.0	NA
Lane 2 <sup>d</sup>	477	0.6	834	0.572	100	7.5	LOSA	1.5	38.0	Full	350	0.0	0.0
Approach	636	0.7		0.572		8.0	LOSA	1.5	38.0				
Intersection	2247	1.9		0.572		7.2	LOSA	1.5	38.0				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach L	ane Flo	ws (ve	h/h)								
South: River	Street N	В									
Mov. From S To Exit:	U	L2 W	T1 N	R2 F	Total	%HV	Cap. veh/h	Deg. Satn v/c		Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	139	296	-	436	2.4	870	0.501	100	NA	NA
Lane 2	-	-	-	156	156	3.0	791	0.197	100	0.0	1

Approach	1	139	296	156	592	2.5		0.501				
East: Federal	Street.	WB										
Mov. From E	U	L2	T1	R2	Total	%HV	Cap.	Deg. Satn		Prob. SL Ov.	Ov. Lane	
To Exit:	Е	S	W	Ν			veh/h	v/c	%	%	No.	
Lane 1	16	143	-	-	160	6.4	742	0.215	100	0.0	2	
Lane 2	-	-	227	68	295	8.0	784	0.376	100	NA	NA	
Approach	16	143	227	68	455	2.7		0.376				
North: River S	Street S	В										
Mov. From N	U	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn		Prob. SL Ov.	Ov. Lane	
To Exit:	N	Е	S	W			ven/m	v/c	%	%	No.	
Lane 1	37	44	312	-	394	2.6	873	0.451	100	NA	NA	
Lane 2	-	-	-	171	171	1.0	812	0.211	100	0.0	1	
Approach	37	44	312	171	565	2.1		0.451				
West: Federa	l Street	EB										
Mov. From W To Exit:	U W	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
Lane 1	1	158	-	-	159	1.0	831	0.191	100	0.0	2	
Lane 2	-	-	286	- 192	477	0.6	834	0.191	100	NA	NA	
Approach	1	158	286	192	636	0.7	304	0.572	100	1471	1471	
	Total	%HV	Deg.Sat	n (v/c)								
Intersection	2247	1.9		0.572								

Merge Analysis											
Ex Lan Numbe	е	Short Lane Length ft	Opng in Lane	Opposin Flow Rat veh/h pcu	e Ga	ıp Headv	-up Lar vay Flo Ra sec veh	w ite	apacity veh/h	Min. Delay sec	Merge Delay sec
South Exit: River Street N Merge Type: <b>Not Applied</b>	В										
Full Length Lane	1	Merge A	Analysis ı	not applied	d.						
East Exit: Federal Street. \ Merge Type: Not Applied	ΝB										
Full Length Lane	1	Merge A	Analysis ı	not applied	d.						
North Exit: River Street SI Merge Type: <b>Not Applied</b>	В										
Full Length Lane	1	Merge A	Analysis ı	not applied	d.						
West Exit: Federal Street Merge Type: <b>Not Applied</b>	EB										
Full Length Lane	1	Merge A	Analysis ı	not applied	d.						

**♥** Site: 101 [Federal Street/River Street PM Peak -EBL-WBL-NBR-

SBR-FINAL (Site Folder: PM Peak - 2045)]

Federal Street/River Street

ETC+20 2045 PM Peak

Site Category: (None)

Roundabout

Lane Use a	and Per	forman	ce										
		IAND DWS HV]	Сар.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	50% BA0 QUE [ Veh		Lane Config	Lane Length		Prob. Block.
	veh/h	% -	veh/h	v/c	%	sec			ft		ft	%	%
South: River	Street	NB											
Lane 1 <sup>d</sup>	443	4.0	681	0.650	100	11.1	LOS B	1.6	41.5	Full	200	0.0	0.0
Lane 2	178	5.0	605	0.294	100	7.1	LOSA	0.4	11.5	Short	100	0.0	NA
Approach	620	4.3		0.650		10.0	LOSA	1.6	41.5				
East: Federa	al Street.	WB											
Lane 1	189	5.8	702	0.270	100	10.6	LOS B	0.4	11.0	Short	100	0.0	NA
Lane 2 <sup>d</sup>	348	1.4	732	0.475	100	7.5	LOSA	1.0	25.6	Full	300	0.0	0.0
Approach	537	2.9		0.475		8.6	LOSA	1.0	25.6				
North: River	Street S	SB											
Lane 1 <sup>d</sup>	435	2.0	787	0.553	100	8.2	LOSA	1.3	32.6	Full	300	0.0	0.0
Lane 2	229	3.0	707	0.324	100	6.5	LOSA	0.5	13.5	Short	100	0.0	NA
Approach	664	2.3		0.553		7.6	LOSA	1.3	32.6				
West: Feder	al Street	EB											
Lane 1	231	1.0	778	0.297	100	10.2	LOS B	0.5	12.7	Short	100	0.0	NA
Lane 2 <sup>d</sup>	743	1.0	778	0.954	100	24.4	LOS C	7.0	176.2	Full	350	0.0	12.1
Approach	973	1.0		0.954		21.1	LOS C	7.0	176.2				
Intersection	2795	2.4		0.954		13.0	LOS B	7.0	176.2				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: HCM Queue Formula.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach L	ane Flo	ws (ve	h/h)								
South: River	Street N	В									
Mov. From S To Exit:	U S	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c		Prob. SL Ov. %	Ov. Lane No.
Lane 1	1	152	289	-	443	4.0	681	0.650	100	NA	NA
Lane 2	-	-	-	178	178	5.0	605	0.294	100	0.0	1

Approach	1	152	289	178	620	4.3		0.650				
East: Federal	Street. \	WB										
Mov. From E	U	L2	T1	R2	Total	%HV	Сар.	Deg. Satn		Prob. SL Ov.	Ov. Lane	
To Exit:	E	S	W	Ν			veh/h	v/c	%	%	No.	
Lane 1	9	181	-	-	189	5.8	702	0.270	100	0.0	2	
Lane 2	-	-	312	36	348	1.4	732	0.475	100	NA	NA	
Approach	9	181	312	36	537	2.9		0.475				
North: River S	Street S	В										
Mov. From N	U	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
To Exit:	N	Е	S	W			vei//ii	V/C	70	70	INO.	
Lane 1	18	53	364	-	435	2.0	787	0.553	100	NA	NA	
Lane 2	-	-	-	229	229	3.0	707	0.324	100	0.0	1	
Approach	18	53	364	229	664	2.3		0.553				
West: Federa	I Street	EB										
Mov. From W	U	L2	T1	R2	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Prob. SL Ov. %	Ov. Lane No.	
To Exit:	W	N	Е	S								
Lane 1	1	230	-	-	231	1.0	778	0.297	100	0.0	2	
Lane 2	-	-	498	245	743	1.0	778	0.954	100	NA	NA	
Approach	1	230	498	245	973	1.0		0.954				
	Total	%HV	Deg.Sat	n (v/c)								
Intersection	2795	2.4		0.954								

Merge Analysis										
E> Lar Numbe	ie	Short Lane Length ft	Opng in Lane	Opposin Flow Ra veh/h pcu	te Gap	) Headwa <sup>'</sup> y		Deg. Satn v/c	Min. Delay sec	Merge Delay sec
South Exit: River Street N Merge Type: <b>Not Applied</b>	В									
Full Length Lane	1	Merge A	Analysis ı	not applie	d.					
East Exit: Federal Street. \ Merge Type: Not Applied	WB									
Full Length Lane	1	Merge A	Analysis ı	not applie	d.					
North Exit: River Street Sl Merge Type: <b>Not Applied</b>	В									
Full Length Lane	1	Merge A	Analysis ı	not applie	d.					
West Exit: Federal Street Merge Type: <b>Not Applied</b>	EB									
Full Length Lane	1	Merge A	Analysis ı	not applie	d.					

▼ Site: 101 [Federal Street/6th Avenue Noon Peak - NBL-SBL -

FINAL - Single Lane (Site Folder: Noon Peak - 2025)]
Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Federal Street/River Street Existing 2022 PM Peak

Site Category: (None)

Roundabout

Lane Use	and P	erfor	mance												
	Dem Flov	WS	Arrival		Сар.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	50% B Que	eue	Lane Config	Lane Length	Cap. F Adj. B	
	[ Total veh/h	HV] %	[ Total veh/h	HV] %	veh/h	v/c	%	sec		[ Veh	Dist ] ft		ft	%	%
South: 6th	Avenue	NB													
Lane 1 <sup>d</sup>	304	2.5	304	2.5	845	0.360	100	6.3	LOSA	0.7	18.1	Full	200	0.0	0.0
Approach	304	2.5	304	2.5		0.360		6.3	LOSA	0.7	18.1				
East: Fede	ral Stre	et. WE	3												
Lane 1 <sup>d</sup>	258	4.5	258	4.5	901	0.286	100	6.0	LOSA	0.5	13.9	Full	300	0.0	0.0
Approach	258	4.5	258	4.5		0.286		6.0	LOSA	0.5	13.9				
North: 6th	Avenue	SB													
Lane 1 <sup>d</sup>	537	2.8	537	2.8	920	0.584	100	7.0	LOSA	1.8	45.7	Full	300	0.0	0.0
Approach	537	2.8	537	2.8		0.584		7.0	LOSA	1.8	45.7				
West: Fed	eral Stre	et EE	3												
Lane 1 <sup>d</sup>	406	3.4	406	3.4	839	0.484	100	7.8	LOS A	1.2	30.1	Full	350	0.0	0.0
Approach	406	3.4	406	3.4		0.484		7.8	LOSA	1.2	30.1				
All Vehicles	1505	3.2	1505	3.2		0.584		6.9	LOSA	1.8	45.7				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Approach L	ane Flo	ws (v	eh/h)								
South: 6th Ave	enue Ni	3									
Mov. From S To Exit:	U S	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Prob. Util. SL Ov. % %	Ov. Lane No.	
Lane 1	1	68	165	70	304	2.5	845	0.360	100 NA	NA	
Approach	1	68	165	70	304	2.5		0.360			
East: Federal	Street. \	ΝB									
Mov. From E To Exit:	U E	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Prob. Util. SL Ov. % %	Ov. Lane No.	

Lane 1	1	73	164	20	258	4.5	901	0.286	100	NA	NA	
Approach	1	73	164	20	258	4.5		0.286				
North: 6th Av	enue S	В										
Mov.	U	L2	T1	R2	Total	%HV		Deg.		Prob.	Ov.	
From N To Exit:	N	Е	S	W			Cap. veh/h	Satn v/c	Util. S %	SL Ov. %	Lane No.	
Lane 1	1	66	288	182	537	2.8	920	0.584	100	NA	NA	
Approach	1	66	288	182	537	2.8		0.584				
West: Federa	al Street	EB										
Mov.	U	L2	T1	R2	Total	%HV	C a ia	Deg.		Prob.	Ov.	
From W To Exit:	W	N	Е	S			Cap. veh/h	Satn v/c	Util. 8 %	SL Ov. %	Lane No.	
Lane 1	43	74	243	45	406	3.4	839	0.484	100	NA	NA	
Approach	43	74	243	45	406	3.4		0.484				
	Total	%HV [	eg.Sat	n (v/c)								
All Vehicles	1505	3.2		0.584								

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis								
Exit	Short P	Percent Opposing	Critical	Follow-up Lane Ca	apacity	Deg.	Min.	Merge
Lane	Lane O	png in Flow Rate	Gap	Headway Flow		Satn [	Delay	Delay
Number	Length	Lane		Rate				
	ft	% veh/h pcu/h	sec	sec veh/h	veh/h	v/c	sec	sec
There are no Exit Short Land	es for Merg	ge Analysis at this Si	te.					

Variable Demai	nd Analysis			
	Initial Queued Demand	Residual Queued Demand	Time for Residual Demand to Clear	Duration of Oversatn
	veh	veh	sec	sec
South: 6th Avenu	e NB			
Lane 1	0.0	0.0	0.0	0.0
East: Federal Str	eet. WB			
Lane 1	0.0	0.0	0.0	0.0
North: 6th Avenue	e SB			
Lane 1	0.0	0.0	0.0	0.0
West: Federal Str	eet EB			
Lane 1	0.0	0.0	0.0	0.0

FINAL - Single Lane (Site Folder: PM Peak - 2025)]
Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Federal Street/River Street Existing 2022 PM Peak

Site Category: (None)

Roundabout

Lane Use	and P	erfor	mance												
	Dem Flo	NS	Arrival		Сар.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	Que		Lane Config	Lane Length	Cap. F Adj. E	Prob. Block.
	[ Total veh/h	HV ] %	[ Total veh/h	HV ] %	veh/h	v/c	%	sec		[ Veh	Dist ] ft		ft	%	%
South: 6th	Avenue	NB													
Lane 1 <sup>d</sup>	440	3.0	440	3.0	557	0.790	100	18.3	LOS B	2.7	68.0	Full	200	0.0	0.3
Approach	440	3.0	440	3.0		0.790		18.3	LOS B	2.7	68.0				
East: Fede	ral Stre	et. WE	3												
Lane 1 <sup>d</sup>	335	2.1	335	2.1	778	0.431	100	7.5	LOSA	0.9	23.9	Full	300	0.0	0.0
Approach	335	2.1	335	2.1		0.431		7.5	LOSA	0.9	23.9				
North: 6th	Avenue	SB													
Lane 1 <sup>d</sup>	751	1.9	751	1.9	850	0.883	100	17.1	LOS B	5.7	144.0	Full	300	0.0	<mark>10.5</mark>
Approach	751	1.9	751	1.9		0.883		17.1	LOS B	5.7	144.0				
West: Fed	eral Stre	et EE	3												
Lane 1 <sup>d</sup>	667	2.2	667	2.2	688	0.968	100	31.0	LOS C	7.3	185.2	Full	350	0.0	<mark>13.8</mark>
Approach	667	2.2	667	2.2		0.968		31.0	LOS C	7.3	185.2				
All Vehicles	2192	2.2	2192	2.2		0.968		20.1	LOSC	7.3	185.2				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Approach L	ane Flo	ows (v	eh/h)								
South: 6th Ave	enue N	В									
Mov. From S To Exit:	U S	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Prob. Util. SL Ov. % %	Lane	
Lane 1	1	111	242	86	440	3.0	557	0.790	100 NA	NA	
Approach	1	111	242	86	440	3.0		0.790			
East: Federal	Street.	WB									
Mov. From E	U	L2	T1	R2	Total	%HV	Сар.	Deg. Satn	Lane Prob. Util. SL Ov.		
To Exit:	Е	S	W	Ν			veh/h	v/c	% %	No.	

Lane 1	1	63	225	46	335	2.1	778	0.431	100	NA	NA	
Approach	1	63	225	46	335	2.1		0.431				
North: 6th Av	enue S	В										
Mov.	U	L2	T1	R2	Total	%HV		Deg.		Prob.	Ov.	
From N							Cap. veh/h	Satn v/c	Util. %	SL Ov. %	Lane No.	
To Exit:	N	E	S	W			vei//ii	V/C	70	70	INU.	
Lane 1	11	205	370	174	751	1.9	850	0.883	100	NA	NA	
Approach	1	205	370	174	751	1.9		0.883				
West: Federa	al Street	EB										
Mov.	U	L2	T1	R2	Total	%HV		Deg.	Lane	Prob.	Ov.	
From W							Cap.	Satn		SL Ov.	Lane	
To Exit:	W	Ν	Е	S			veh/h	v/c	%	%	No.	
Lane 1	34	126	452	55	667	2.2	688	0.968	100	NA	NA	
Approach	34	126	452	55	667	2.2		0.968				
	Total	%HV [	eg.Satr	n (v/c)								
All Vehicles	2192	2.2		0.968								

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis							
Exit	Short	Percent Opposing	Critical	Follow-up Lane Capa	city Deg	. Min.	Merge
Lane	Lane	Opng in Flow Rate	Gap	Headway Flow	Satr	Delay	Delay
Number	Length	Lane		Rate			
	ft	% veh/h pcu/h	sec	sec veh/h ve	eh/h v/d	sec	sec
There are no Exit Short Lan	es for Me	erge Analysis at this Si	te.				

Variable Demand	Analysis			
	Initial Queued Jemand	Residual Queued Demand	Time for Residual Demand to Clear	Duration of Oversatn
	veh	veh	sec	sec
South: 6th Avenue N	1B			
Lane 1	0.0	0.0	0.0	0.0
East: Federal Street.	WB			
Lane 1	0.0	0.0	0.0	0.0
North: 6th Avenue S	В			
Lane 1	0.0	0.0	0.0	0.0
West: Federal Street	EB			
Lane 1	0.0	0.0	0.0	0.0
North: 6th Avenue S Lane 1 West: Federal Street	0.0 EB	0.0	0.0	0.0

▼ Site: 101 [Federal Street/6th Avenue PM Peak - NBL-SBL -

FINAL - Single Lane (Site Folder: PM Peak - 2045)]
Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Federal Street/River Street ETC+20 2045 PM Peak

Site Category: (None)

Roundabout

Lane Use	and P	erfor	mance												
	Dem Flo		Arrival		Сар.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service		ack Of eue	Lane Config	Lane Length	Cap. F Adj. E	Prob. Block.
	[ Total veh/h	HV] %	[ Total veh/h	HV] %	veh/h	v/c	%	sec		[ Veh	Dist ] ft		ft	%	%
South: 6th	Avenue	NB													
Lane 1 <sup>d</sup>	496	3.0	496	3.0	558	0.889	100	24.7	LOS C	4.0	101.9	Full	200	0.0	<mark>12.5</mark>
Approach	496	3.0	496	3.0		0.889		24.7	LOS C	4.0	101.9				
East: Fede	ral Stre	et. WE	3												
Lane 1 <sup>d</sup>	377	2.1	377	2.1	744	0.507	100	8.6	LOSA	1.2	31.4	Full	300	0.0	0.0
Approach	377	2.1	377	2.1		0.507		8.6	LOSA	1.2	31.4				
North: 6th	Avenue	SB													
Lane 1 <sup>d</sup>	846	1.9	846	1.9	806	1.050	100	48.6	LOS F	13.6	344.2	Full	300	0.0	<mark>78.9</mark>
Approach	846	1.9	846	1.9		1.050		48.6	LOS D	13.6	344.2				
West: Fed	eral Stre	et EE	3												
Lane 1 <sup>d</sup>	751	2.2	751	2.2	654	1.148	100	87.9	LOS F	17.3	440.1	Full	350	0.0	<mark>100.0</mark>
Approach	751	2.2	751	2.2		1.148		87.9	LOS F	17.3	440.1				
All Vehicles	2470	2.2	2470	2.2		1.148		49.6	LOS D	17.3	440.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Approach L		<u> </u>									
South: 6th Ave	enue N	IB .									
Mov. From S To Exit:	U S	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Pi Util. SL %		Ov. Lane No.
Lane 1	1	125	273	97	496	3.0	558	0.889	100	NA	NA
Approach	1	125	273	97	496	3.0		0.889			
East: Federal	Street.	WB									
Mov. From E	U	L2	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Pi Util. SL	Ov.	Ov. Lane
To Exit:	Е	S	W	Ν			veh/h	v/c	%	%	No.

Lane 1	1	71	254	52	377	2.1	744	0.507	100	NA	NA	
Approach	1	71	254	52	377	2.1		0.507				
North: 6th Av	enue S	В										
Mov. From N	U	L2	T1	R2	Total	%HV	Cap.	Deg. Satn		Prob. SL Ov.	Ov. Lane	
To Exit:	N	Е	S	W			veh/h	v/c	%	%	No.	
Lane 1	1	231	417	197	846	1.9	806	1.050	100	NA	NA	
Approach	1	231	417	197	846	1.9		1.050				
West: Federa	l Street	EB										
Mov. From W	U	L2	T1	R2	Total	%HV	Cap.	Deg. Satn	Util.	Prob. SL Ov.	Ov. Lane	
To Exit:	W	N	Е	S			veh/h	v/c	%	%	No.	
Lane 1	39	142	509	61	751	2.2	654	1.148	100	NA	NA	
Approach	39	142	509	61	751	2.2		1.148				
	Total	%HV [	Deg.Sat	n (v/c)								
All Vehicles	2470	2.2		1.148								

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis							
Exit	Short	Percent Opposing	Critical	Follow-up Lane Capa	city Deg	. Min.	Merge
Lane	Lane	Opng in Flow Rate	Gap	Headway Flow	Satr	Delay	Delay
Number	Length	Lane		Rate			
	ft	% veh/h pcu/h	sec	sec veh/h ve	eh/h v/d	sec	sec
There are no Exit Short Lan	es for Me	erge Analysis at this Si	te.				

Variable Deman	d Analysis			
	Initial Queued Demand	Residual Queued Demand	Time for Residual Demand to Clear	Duration of Oversatn
	veh	veh	sec	sec
South: 6th Avenue	NB			
Lane 1	0.0	0.0	0.0	0.0
East: Federal Stre	et. WB			
Lane 1	0.0	0.0	0.0	0.0
North: 6th Avenue	SB			
Lane 1	0.0	10.1	45.1	NA
West: Federal Stre	eet EB			
Lane 1	0.0	24.2	133.3	NA

▼ Site: 101 [Federal Street/6th Avenue Noon Peak - NBL-SBL -

FINAL - Single Lane (Site Folder: Noon Peak - 2045)]
Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Federal Street/River Street Existing 2022 PM Peak

Site Category: (None)

Roundabout

Lane Use	and F	erfor	mance												
	Dem Flo		Arrival	Flows	Сар.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	50% Ba Que		Lane Config	Lane Length	Cap. F Adj. B	
	[ Total veh/h	HV]	[ Total veh/h	HV]	veh/h	v/c	%	sec		[ Veh	Dist ] ft		ft	%	%
South: 6th	Avenue	NB													
Lane 1 <sup>d</sup>	342	2.5	342	2.5	797	0.429	100	7.3	LOSA	0.9	23.9	Full	200	0.0	0.0
Approach	342	2.5	342	2.5		0.429		7.3	LOSA	0.9	23.9				
East: Fede	eral Stre	et. WE	3												
Lane 1 <sup>d</sup>	290	4.5	290	4.5	859	0.337	100	6.4	LOSA	0.6	16.8	Full	300	0.0	0.0
Approach	290	4.5	290	4.5		0.337		6.4	LOSA	0.6	16.8				
North: 6th	Avenue	SB													
Lane 1 <sup>d</sup>	604	2.8	604	2.8	878	0.688	100	9.1	LOSA	2.6	66.1	Full	300	0.0	0.0
Approach	604	2.8	604	2.8		0.688		9.1	LOSA	2.6	66.1				
West: Fed	eral Str	eet EE	3												
Lane 1 <sup>d</sup>	458	3.4	458	3.4	792	0.578	100	9.4	LOSA	1.6	41.7	Full	350	0.0	0.0
Approach	458	3.4	458	3.4		0.578		9.4	LOS A	1.6	41.7				
All Vehicles	1694	3.2	1694	3.2		0.688		8.3	LOSA	2.6	66.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Approach L		· ·	011111)							
South: 6th Ave	enue N	В								
Mov. From S To Exit:	U S	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Prob Util. SL Ov % %	. Lane
Lane 1	1	76	186	79	342	2.5	797	0.429	100 NA	NA NA
Approach	1	76	186	79	342	2.5		0.429		
East: Federal	Street.	WB								
Mov. From E	U	L2	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Prob Util. SL Ov	. Lane
To Exit:	Е	S	W	Ν			veh/h	v/c	% %	No.

Lane 1	1	82	185	22	290	4.5	859	0.337	100	NA	NA	
Approach	1	82	185	22	290	4.5		0.337				
North: 6th Av	enue S	В										
Mov.	U	L2	T1	R2	Total	%HV		Deg.		Prob.	Ov.	
From N	N	Е	S	W			Cap. veh/h	Satn v/c	Util. %	SL Ov. %	Lane No.	
To Exit:	IN											
Lane 1	1	74	324	205	604	2.8	878	0.688	100	NA	NA	
Approach	1	74	324	205	604	2.8		0.688				
West: Federa	al Street	EB										
Mov.	U	L2	T1	R2	Total	%HV		Deg.	Lane	Prob.	Ov.	
From W							Сар.	Satn		SL Ov.	Lane	
To Exit:	W	Ν	Ε	S			veh/h	v/c	%	%	No.	
Lane 1	48	84	274	52	458	3.4	792	0.578	100	NA	NA	
Approach	48	84	274	52	458	3.4		0.578				
	Total	%HV E	eg.Satı	n (v/c)								
All Vehicles	1694	3.2		0.688								

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis								
Exit	Short P	Percent Opposing	Critical	Follow-up Lane Ca	apacity	Deg.	Min.	Merge
Lane	Lane O	png in Flow Rate	Gap	Headway Flow		Satn [	Delay	Delay
Number	Length	Lane		Rate				
	ft	% veh/h pcu/h	sec	sec veh/h	veh/h	v/c	sec	sec
There are no Exit Short Land	es for Merg	ge Analysis at this Si	te.					

	Time a fam	
Initial Residual Queued Queued Demand Demand	Time for Residual Demand to Clear	Duration of Oversatn
veh veh	sec	sec
South: 6th Avenue NB		
Lane 1 0.0 0.0	0.0	0.0
East: Federal Street. WB		
Lane 1 0.0 0.0	0.0	0.0
North: 6th Avenue SB		
Lane 1 0.0 0.0	0.0	0.0
West: Federal Street EB		
Lane 1 0.0 0.0	0.0	0.0

♥ Site: 101 [Federal Street/6th Avenue PM Peak - NBL-SBL -

FINAL (Site Folder: PM Peak - 2045)]

Federal Street/River Street

ETC+20 2045 PM Peak

Site Category: (None)

Roundabout

Lane Use and Performance													
	DEM. FLO [ Total veh/h		Cap.	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	50% BA QUE [ Veh		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block.
South: 6th A			ven/m	V/C	70	Sec			IL		IL	70	70
Lane 1 Lane 2 <sup>d</sup> Approach	126 370 496	5.0 2.3 3.0	543 625	0.232 0.592 0.592	100 100	11.8 9.9 10.4	LOS B LOS A LOS B	0.3 1.3 1.3	8.5 33.1 33.1	Short Full	100 200	0.0	NA 0.0
East: Federa	al Street.	WB											
Lane 1 <sup>d</sup>	377	2.1	836	0.452	100	6.9	LOS A	0.9	23.2	Full	300	0.0	0.0
Approach	377	2.1		0.452		6.9	LOS A	0.9	23.2				
North: 6th Av	venue Sl	В											
Lane 1 Lane 2 <sup>d</sup>	232 614	1.0 2.2	838 902	0.277 0.681	100 100	9.5 7.7	LOS A LOS A	0.5 2.2	11.8 54.8	Short Full	100 300	0.0	NA 0.0
Approach	846	1.9	- 002	0.681	100	8.2	LOSA	2.2	54.8	T dii		0.0	0.0
West: Feder	al Street	EB											
Lane 1 <sup>d</sup>	751	2.2	748	1.003	100	34.8	LOS F	8.8	223.4	Full	350	0.0	<mark>20.9</mark>
Approach	751	2.2		1.003		34.8	LOS C	8.8	223.4				
Intersection	2470	2.2		1.003		16.5	LOS B	8.8	223.4				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach La	ane Flo	ws (ve	h/h)								
South: 6th Ave	nue NE	3									
Mov. From S To Exit:	U S	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c		Prob. SL Ov. %	Ov. Lane No.
Lane 1 Lane 2	1 -	125 -	- 273	- 97	126 370	5.0 2.3		0.232 0.592	100 100	0.0 NA	2 NA
Approach	1	125	273	97	496	3.0		0.592			
East: Federal S	Street. V	VB									

Mov. From E	U	L2	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util	Prob. SL Ov.	Ov. Lane	
To Exit:	Е	S	W	Ν			veh/h	v/c	%	%	No.	
Lane 1	1	71	254	52	377	2.1	836	0.452	100	NA	NA	
Approach	1	71	254	52	377	2.1		0.452				
North: 6th Ave	enue SE	3										
Mov.	U	L2	T1	R2	Total	%HV	0-11	Deg.	Lane	Prob.	Ov.	
From N							Cap. veh/h	Satn v/c	Util. %	SL Ov.	Lane No.	
To Exit:	N	Е	S	W			VC11/11	V/C	/0	70		
Lane 1	1	231	-	-	232	1.0	838	0.277	100	0.0	2	
Lane 2	-	-	417	197	614	2.2	902	0.681	100	NA	NA	
Approach	1	231	417	197	846	1.9		0.681				
West: Federa	l Street	EB										
Mov.	U	L2	T1	R2	Total	%HV		Deg.	Lane	Prob.	Ov.	
From W							Cap.	Satn		SL Ov.	Lane	
To Exit:	W	N	Е	S			veh/h	v/c	%	%	No.	
Lane 1	39	142	509	61	751	2.2	748	1.003	100	NA	NA	
Approach	39	142	509	61	751	2.2		1.003				
	Total	%HV I	Deg.Sati	n (v/c)								
Intersection	2470	2.2		1.003								

Merge Analysis			
Exit Lane Number	Short Percent Opposing Critical Follow-up Lane Capacity Lane Opng in Flow Rate Gap Headway Flow Length Lane Rate ft % veh/h pcu/h sec sec veh/h veh/h	Deg. Min. Satn Delay	Merge Delay sec
South Exit: 6th Avenue NB Merge Type: <b>Not Applied</b>			
Full Length Lane 1	Merge Analysis not applied.		
East Exit: Federal Street. Will Merge Type: Not Applied			
Full Length Lane 1	Merge Analysis not applied.		
North Exit: 6th Avenue SB Merge Type: <b>Not Applied</b>			
Full Length Lane 1	Merge Analysis not applied.		
West Exit: Federal Street El Merge Type: <b>Not Applied</b>			
Full Length Lane 1	Merge Analysis not applied.		

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♥ Site: 101 [Federal Street/6th Avenue Noon Peak - NBL-SBL -

FINAL (Site Folder: Noon Peak - 2025)]

Federal Street/River Street

Existing 2022 PM Peak

Site Category: (None)

Roundabout

Lane Use a	and Per	forman	се										
	DEM FLO [ Total veh/h		Cap.	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	50% BA0 QUE [ Veh		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block.
South: 6th A			7011/11	• • • • • • • • • • • • • • • • • • • •	,,							70	70
Lane 1 Lane 2 <sup>d</sup> Approach	69 235 304	0.0 3.2 2.5	892 939	0.077 0.250 0.250	100 100	8.7 4.4 5.3	LOS A LOS A	0.1 0.4 0.4	2.9 10.4 10.4	Short Full	100 200	0.0	NA 0.0
East: Federa	al Street.	WB											
Lane 1 <sup>d</sup>	258	4.5	998	0.258	100	5.3	LOS A	0.4	11.0	Full	300	0.0	0.0
Approach	258	4.5		0.258		5.3	LOS A	0.4	11.0				
North: 6th Av	venue S	В											
Lane 1	67	5.9	912	0.074	100	8.5	LOSA	0.1	2.7	Short	100	0.0	NA
Lane 2 <sup>d</sup> Approach	470 537	2.4	1017	0.462	100	4.6 5.1	LOS A	1.0	24.7 24.7	Full	300	0.0	0.0
West: Feder	al Street	EB											
Lane 1 <sup>d</sup>	406	3.4	943	0.431	100	6.3	LOS A	0.8	21.7	Full	350	0.0	0.0
Approach	406	3.4		0.431		6.3	LOSA	0.8	21.7				
Intersection	1505	3.2		0.462		5.5	LOSA	1.0	24.7				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach Lane Flows (veh/h)			eh/h)	ws (ve	ne Flo	Approach La
South: 6th Avenue NB				3	ue NE	South: 6th Ave
Mov. U L2 T1 R2 Total %HV Deg. Lane Prob. From S To Exit: S W N E veh/h v/c % %	Cap. Satn Util SL Ov. I					rom S
Lane 1 1 68 69 0.0 892 0.077 100 0.0					1	
Lane 2         -         -         165         70         235         3.2         939         0.250         100         NA         N           Approach         1         68         165         70         304         2.5         0.250					1	

Mov.	U	L2	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util	Prob. SL Ov.	Ov. Lane	
From E To Exit:	Е	S	W	N			veh/h	v/c	%	%	No.	
Lane 1	1	73	164	20	258	4.5	998	0.258	100	NA	NA	
Approach	1	73	164	20	258	4.5		0.258				
North: 6th Ave	enue SE	3										
Mov.	U	L2	T1	R2	Total	%HV		Deg.	Lane	Prob.	Ov.	
From N							Cap. veh/h	Satn v/c	Util. %	SL Ov.	Lane No.	
To Exit:	N	Е	S	W				V/C	/0			
Lane 1	1	66	-	-	67	5.9	912	0.074	100	0.0	2	
Lane 2	-	-	288	182	470	2.4	1017	0.462	100	NA	NA	
Approach	1	66	288	182	537	2.8		0.462				
West: Federa	l Street	EB										
Mov.	U	L2	T1	R2	Total	%HV		Deg.	Lane	Prob.	Ov.	
From W							Cap.	Satn		SL Ov.	Lane	
To Exit:	W	N	E	S			veh/h	v/c	%	%	No.	
Lane 1	43	74	243	45	406	3.4	943	0.431	100	NA	NA	
Approach	43	74	243	45	406	3.4		0.431				
	Total	%HV I	Deg.Sati	n (v/c)								
Intersection	1505	3.2		0.462								

Merge Analysis									
Ex Lan Numbe	е	Short Lane Length ft	Opng in Lane	Opposing Flow Rate veh/h pcu/h	Critical Gap sec	Follow-up Headway sec	Capacity veh/h	Deg. Satn v/c	Merge Delay sec
South Exit: 6th Avenue NE Merge Type: Not Applied	3								
Full Length Lane	1	Merge A	Analysis r	not applied.					
East Exit: Federal Street. V Merge Type: <b>Not Applied</b>	VB								
Full Length Lane	1	Merge A	Analysis r	not applied.					
North Exit: 6th Avenue SB Merge Type: <b>Not Applied</b>									
Full Length Lane	1	Merge A	Analysis r	not applied.					
West Exit: Federal Street I Merge Type: <b>Not Applied</b>	EB								
Full Length Lane	1	Merge A	Analysis r	not applied.					

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♥ Site: 101 [Federal Street/6th Avenue PM Peak - NBL-SBL -

FINAL (Site Folder: PM Peak - 2025)]

Federal Street/River Street

Existing 2022 PM Peak

Site Category: (None)

Roundabout

Lane Use a	and Perf	forman	се										
	DEM/ FLO [ Total veh/h		Cap.	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	50% BA QUE [ Veh		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block.
South: 6th A				.,,	- / -							70	
Lane 1 Lane 2 <sup>d</sup> Approach	112 328 440	5.0 2.3 3.0	597 683	0.187 0.480 0.480	100 100	11.1 7.8 8.6	LOS B LOS A LOS A	0.3 0.9 0.9	6.9 24.1 24.1	Short Full	100 200	0.0	NA 0.0
East: Federa	al Street.	WB											
Lane 1 <sup>d</sup> Approach	335 335	2.1	885	0.379	100	6.0	LOS A	0.7	17.4 17.4	Full	300	0.0	0.0
North: 6th Av	venue SI	В											
Lane 1 Lane 2 <sup>d</sup> Approach	206 544 751	1.0 2.2 1.9	883 946	0.234 0.575 0.575	100 100	9.1 6.1 6.9	LOS A LOS A	0.4 1.5 1.5	9.8 38.3 38.3	Short Full	100 300	0.0	NA 0.0
West: Feder	al Street	EB											
Lane 1 <sup>d</sup> Approach	667 667	2.2	802	0.831 0.831	100	13.7 13.7	LOS B	3.5 3.5	89.4 89.4	Full	350	0.0	0.0
Intersection	2192	2.2		0.831		9.2	LOSA	3.5	89.4				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Approach La	ane Flo	ws (ve	h/h)								
South: 6th Ave	nue NE	3									
Mov. From S To Exit:	U S	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c		Prob. SL Ov. %	Ov. Lane No.
Lane 1 Lane 2	1 -	111 -	- 242	- 86	112 328	5.0 2.3	597 683	0.187 0.480	100 100	0.0 NA	2 NA
Approach	1	111	242	86	440	3.0		0.480			
East: Federal	Street. V	VB									

Mov. From E	U	L2	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane	
To Exit:	Е	S	W	N			veh/h	v/c	%	%	No.	
Lane 1	1	63	225	46	335	2.1	885	0.379	100	NA	NA	
Approach	1	63	225	46	335	2.1		0.379				
North: 6th Ave	enue SE	3										
Mov.	U	L2	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Util	Prob. SL Ov.	Ov. Lane	
From N To Exit:	N	Е	S	W			veh/h	v/c	%	%	No.	
Lane 1	1	205	-	-	206	1.0	883	0.234	100	0.0	2	
Lane 2	-	-	370	174	544	2.2	946	0.575	100	NA	NA	
Approach	1	205	370	174	751	1.9		0.575				
West: Federa	l Street	EB										
Mov.	U	L2	T1	R2	Total	%HV		Deg.	Lane	Prob.	Ov.	
From W To Exit:	W	N	Е	S			Cap. veh/h	Satn v/c	Util. %	SL Ov. %	Lane No.	
Lane 1	34	126	452	55	667	2.2	802	0.831	100	NA	NA	
Approach	34	126	452	55	667	2.2		0.831				
	Total	%HV I	Deg.Sati	n (v/c)								
Intersection	2192	2.2		0.831								

Merge Analysis			
Exit Lane Number	Short Percent Opposing Critical Follow-up Lane Capacity Lane Opng in Flow Rate Gap Headway Flow Length Lane Rate ft % veh/h pcu/h sec sec veh/h veh/h	Deg. Min. Satn Delay	Merge Delay sec
South Exit: 6th Avenue NB Merge Type: <b>Not Applied</b>			
Full Length Lane 1	Merge Analysis not applied.		
East Exit: Federal Street. Will Merge Type: Not Applied			
Full Length Lane 1	Merge Analysis not applied.		
North Exit: 6th Avenue SB Merge Type: <b>Not Applied</b>			
Full Length Lane 1	Merge Analysis not applied.		
West Exit: Federal Street El Merge Type: <b>Not Applied</b>			
Full Length Lane 1	Merge Analysis not applied.		

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♥ Site: 101 [Federal Street/6th Avenue Noon Peak - NBL-SBL -

FINAL (Site Folder: Noon Peak - 2045)]

Federal Street/River Street

Existing 2022 PM Peak

Site Category: (None)

Roundabout

Lane Use a	and Perf	forman	се										
	DEM/ FLO [ Total veh/h		Cap.	Deg. Satn v/c	Lane Util. %	Aver. Delay sec	Level of Service	50% BA QUE [ Veh		Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: 6th A		В											
Lane 1 Lane 2 <sup>d</sup> Approach	77 265 342	0.0 3.2 2.5	896 869	0.086 0.305 0.305	100 100	8.9 5.0 5.9	LOS A LOS A	0.1 0.5 0.5	3.3 13.6 13.6	Short Full	100 200	0.0	NA 0.0
East: Federa	al Street.	WB											
Lane 1 <sup>d</sup>	290	4.5	961	0.301	100	5.6	LOS A	0.5	13.1	Full	300	0.0	0.0
Approach	290	4.5		0.301		5.6	LOS A	0.5	13.1				
North: 6th Av	venue SI	В											
Lane 1 Lane 2 <sup>d</sup>	75 529	5.9 2.4	924 956	0.081 0.553	100 100	8.6 5.9	LOS A LOS A	0.1 1.5	3.1 37.4	Short Full	100 300	0.0	NA 0.0
Approach	604	2.8		0.553		6.2	LOSA	1.5	37.4				
West: Feder	al Street	EB											
Lane 1 <sup>d</sup>	458	3.4	900	0.509	100	7.2	LOSA	1.1	29.3	Full	350	0.0	0.0
Approach	458	3.4		0.509		7.2	LOSA	1.1	29.3				
Intersection	1694	3.2		0.553		6.3	LOSA	1.5	37.4				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: SIDRA Standard (Geometric Delay is included).

Queue Model: HCM Queue Formula. Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

	nue NB	;									
Mov. From S To Exit:	U S	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c		Prob. SL Ov. %	Ov. Lane No.
Lane 1 Lane 2	1 -	76 -	- 186	- 79	77 265	0.0 3.2	896 869	0.086 0.305	100 100	0.0 NA	2 NA
Approach	1	76	186	79	342	2.5		0.305			

Mov. From E	U	L2	T1	R2	Total	%HV	Сар.	Deg. Satn	Lane Util.	Prob. SL Ov.	Ov. Lane	
To Exit:	Ε	S	W	Ν			veh/h	v/c	%	%	No.	
Lane 1	1	82	185	22	290	4.5	961	0.301	100	NA	NA	
Approach	1	82	185	22	290	4.5		0.301				
North: 6th Ave	enue SE	}										
Mov.	U	L2	T1	R2	Total	%HV	0	Deg.	Lane	Prob.	Ov.	
From N							Cap. veh/h	Satn v/c	Util. %	SL Ov.	Lane No.	
To Exit:	N	Е	S	W			Ven/m	V/C	70	70	INU.	
Lane 1	1	74	-	-	75	5.9	924	0.081	100	0.0	2	
Lane 2	-	-	324	205	529	2.4	956	0.553	100	NA	NA	
Approach	1	74	324	205	604	2.8		0.553				
West: Federal	l Street	EB										
Mov.	U	L2	T1	R2	Total	%HV		Deg.	Lane	Prob.	Ov.	
From W							Cap.	Satn		SL Ov.	Lane	
To Exit:	W	N	Е	S			veh/h	v/c	%	%	No.	
Lane 1	48	84	274	52	458	3.4	900	0.509	100	NA	NA	
Approach	48	84	274	52	458	3.4		0.509				
	Total	%HV	Deg.Sat	n (v/c)								
Intersection	1694	3.2		0.553								

Merge Analysis									
Ex Lan Numbe	е		Opng in Lane	Opposing Flow Rate veh/h pcu/h	Critical Gap sec	Follow-up Headway sec	Capacity veh/h	Min. Delay sec	Merge Delay sec
South Exit: 6th Avenue NE Merge Type: <b>Not Applied</b>	3								
Full Length Lane	1	Merge /	Analysis r	not applied.					
East Exit: Federal Street. V Merge Type: <b>Not Applied</b>	VΒ								
Full Length Lane	1	Merge /	Analysis r	not applied.					
North Exit: 6th Avenue SB Merge Type: <b>Not Applied</b>	1								
Full Length Lane	1	Merge /	Analysis r	not applied.					
West Exit: Federal Street Merge Type: <b>Not Applied</b>	EB								
Full Length Lane	1	Merge /	Analysis r	not applied.					

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**♥** Site: 101 [Federal Street/River Street Noon Peak -EBL-WBL-NBR-SBR - FINAL - Single Lane (Site Folder: Noon Peak -2025)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Federal Street/River Street Existing 2022 PM Peak Site Category: (None)

Roundabout

Lane Use	and P	erfor	mance												
	Dem Flov [Total	ws	Arrival [ Total		Сар.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	50% Ba Que [ Veh		Lane Config	Lane Length	Cap. P Adj. B	
	veh/h	%	veh/h	%	veh/h	v/c	%	sec			ft		ft	%	%
South: Riv	er Stree	t NB													
Lane 1 <sup>d</sup>	526	2.5	526	2.5	810	0.649	100	9.7	LOSA	2.1	54.2	Full	200	0.0	0.0
Approach	526	2.5	526	2.5		0.649		9.7	LOSA	2.1	54.2				
East: Fede	ral Stre	et. WE	3												
Lane 1 <sup>d</sup>	403	2.7	403	2.7	738	0.546	100	9.9	LOSA	1.4	36.0	Full	300	0.0	0.0
Approach	403	2.7	403	2.7		0.546		9.9	LOS A	1.4	36.0				
North: Rive	er Stree	t SB													
Lane 1 <sup>d</sup>	501	2.1	501	2.1	820	0.611	100	8.9	LOSA	1.9	47.6	Full	300	0.0	0.0
Approach	501	2.1	501	2.1		0.611		8.9	LOS A	1.9	47.6				
West: Fed	eral Stre	et EE	3												
Lane 1 <sup>d</sup>	565	0.7	565	0.7	812	0.696	100	10.8	LOS B	2.5	63.6	Full	350	0.0	0.0
Approach	565	0.7	565	0.7		0.696		10.8	LOS B	2.5	63.6				
All Vehicles	1995	1.9	1995	1.9		0.696		9.9	LOSA	2.5	63.6				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Approach La	ane Fl	ows (v	eh/h)							
South: River S	treet 1	NΒ								
Mov. From S To Exit:	U S	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Prob. Util. SL Ov. % %	Lane
Lane 1	1	124	263	138	526	2.5	810	0.649	100 NA	NA
Approach	1	124	263	138	526	2.5		0.649		
East: Federal	Street.	WB								
Mov. From E To Exit:	U	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Prob. Util. SL Ov. % %	Lane

Lane 1	14	127	201	61	403	2.7	738	0.546	100	NA	NA	
Approach	14	127	201	61	403	2.7		0.546				
North: River	Street S	SB										
Mov. From N	U	L2	T1	R2	Total	%HV	Cap.	Deg. Satn		Prob. SL Ov.	Ov. Lane	
To Exit:	Ν	Е	S	W			veh/h	v/c	%	%	No.	
Lane 1	33	39	277	152	501	2.1	820	0.611	100	NA	NA	
Approach	33	39	277	152	501	2.1		0.611				
West: Federa	al Street	EB										
Mov. From W To Exit:	U W	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c		Prob. SL Ov. %	Ov. Lane No.	
Lane 1	1	140	254	170	565	0.7	812	0.696	100	NA	NA	
Approach	1	140	254	170	565	0.7		0.696				
	Total	%HV E	eg.Sat	n (v/c)								
All Vehicles	1995	1.9		0.696								

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis								
Exit	Short P	Percent Opposing	Critical	Follow-up Lane Ca	apacity	Deg.	Min.	Merge
Lane	Lane O	png in Flow Rate	Gap	Headway Flow		Satn [	Delay	Delay
Number	Length	Lane		Rate				
	ft	% veh/h pcu/h	sec	sec veh/h	veh/h	v/c	sec	sec
There are no Exit Short Land	es for Merg	ge Analysis at this Si	te.					

Variable Deman	nd Analysis			
	Initial Queued Demand	Residual Queued Demand	Time for Residual Demand to Clear	Duration of Oversatn
	veh	veh	sec	sec
South: River Street	et NB			
Lane 1	0.0	0.0	0.0	0.0
East: Federal Stre	et. WB			
Lane 1	0.0	0.0	0.0	0.0
North: River Stree	t SB			
Lane 1	0.0	0.0	0.0	0.0
West: Federal Stre	eet EB			
Lane 1	0.0	0.0	0.0	0.0

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**♥** Site: 101 [Federal Street/River Street PM Peak -EBL-WBL-NBR-SBR FINAL - Single Lane (Site Folder: PM Peak - 2025)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Federal Street/River Street Existing 2022 PM Peak Site Category: (None)

Roundabout

Lane Use	and P	erfor	mance												
	Dem Flo [ Total	ws	Arrival		Сар.	Deg. Satn	Lane Util.	Aver. Delay	Level of Service	50% B Que [ Veh		Lane Config	Lane Length	Cap. F Adj. B	
	veh/h	%	veh/h	%	veh/h	v/c	%	sec		,	ft		ft	%	%
South: Riv	er Stree	t NB													
Lane 1 <sup>d</sup>	550	4.3	550	4.3	667	0.824	100	17.0	LOS B	3.5	89.8	Full	200	0.0	<mark>8.3</mark>
Approach	550	4.3	550	4.3		0.824		17.0	LOS B	3.5	89.8				
East: Fede	eral Stre	et. WE	3												
Lane 1 <sup>d</sup>	477	2.9	477	2.9	710	0.671	100	12.2	LOS B	2.1	53.7	Full	300	0.0	0.0
Approach	477	2.9	477	2.9		0.671		12.2	LOS B	2.1	53.7				
North: Rive	er Stree	t SB													
Lane 1 <sup>d</sup>	588	2.3	588	2.3	726	0.811	100	14.9	LOS B	3.5	90.2	Full	300	0.0	0.0
Approach	588	2.3	588	2.3		0.811		14.9	LOS B	3.5	90.2				
West: Fed	eral Stre	et EE	3												
Lane 1 <sup>d</sup>	864	1.0	864	1.0	758	1.140	100	82.6	LOS F	19.5	490.3	Full	350	0.0 1	00.0
Approach	864	1.0	864	1.0		1.140		82.6	LOS F	19.5	490.3				
All Vehicles	2479	2.4	2479	2.4		1.140		38.4	LOS D	19.5	490.3				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Approach La	ane Fl	ows (v	eh/h)								
South: River S	treet 1	ΝB									
Mov. From S To Exit:	U S	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Pr Util. SL %	Ov. L	Ov. ane No.
Lane 1	1	135	256	157	550	4.3	667	0.824	100	NA N	NA
Approach	1	135	256	157	550	4.3		0.824			
East: Federal	Street.	WB									
Mov. From E To Exit:	U	L2 S	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Pr Util. SL %	Ov. L	Ov. ane No.

Lane 1	7	161	277	32	477	2.9	710	0.671	100	NA	NA	
Approach	7	161	277	32	477	2.9		0.671				
North: River	Street S	SB										
Mov.	U	L2	T1	R2	Total	%HV		Deg.		Prob.	Ov.	
From N							Cap. veh/h	Satn v/c	Util. S %	SL Ov. %	Lane No.	
To Exit:	N	Е	S	W			VEII/II	V/C	70	70	INU.	
Lane 1	16	47	322	203	588	2.3	726	0.811	100	NA	NA	
Approach	16	47	322	203	588	2.3		0.811				
West: Federa	al Street	EB										
Mov.	U	L2	T1	R2	Total	%HV		Deg.	Lane		Ov.	
From W							Cap.	Satn		SL Ov.	Lane	
To Exit:	W	N	Е	S			veh/h	v/c	%	%	No.	
Lane 1	1	204	441	217	864	1.0	758	1.140	100	NA	NA	
Approach	1	204	441	217	864	1.0		1.140				
	Total	%HV [	eg.Sat	n (v/c)								
All Vehicles	2479	2.4		1.140								

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis								
Exit	Short P	Percent Opposing	Critical	Follow-up Lane Ca	apacity	Deg.	Min.	Merge
Lane	Lane O	png in Flow Rate	Gap	Headway Flow		Satn [	Delay	Delay
Number	Length	Lane		Rate				
	ft	% veh/h pcu/h	sec	sec veh/h	veh/h	v/c	sec	sec
There are no Exit Short Land	es for Merg	ge Analysis at this Si	te.					

Variable Demand	l Analysis			
	Initial Queued Demand	Residual Queued Demand	Time for Residual Demand to Clear	Duration of Oversatn
	veh	veh	sec	sec
South: River Street	NB			
Lane 1	0.0	0.0	0.0	0.0
East: Federal Stree	t. WB			
Lane 1	0.0	0.0	0.0	0.0
North: River Street	SB			
Lane 1	0.0	0.0	0.0	0.0
West: Federal Stree	et EB			
Lane 1	0.0	26.6	126.3	NA

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W Site: 101 [Federal Street/River Street PM Peak -EBL-WBL-NBR-SBR-FINAL - Single Lane (Site Folder: PM Peak - 2045)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Federal Street/River Street ETC+20 2045 PM Peak

Site Category: (None)

Roundabout

Lane Use	and P	erfor	mance												
	Dem Flo		Arrival		Сар.	Deg. Satn	Lane Util.		Level of Service	Qu		Lane Config	Lane Length	Cap. F Adj. E	Prob. Block.
	[ Total veh/h	HV] %	[ Total veh/h	HV] %	veh/h	v/c	%	sec		[ Veh	Dist ] ft		ft	%	%
South: Riv	er Stree	t NB													
Lane 1 <sup>d</sup>	620	4.3	620	4.3	691	0.898	100	21.3	LOS C	5.0	128.8	Full	200	0.0	<mark>21.3</mark>
Approach	620	4.3	620	4.3		0.898		21.3	LOS C	5.0	128.8				
East: Fede	ral Stre	et. WE	3												
Lane 1 <sup>d</sup>	537	2.9	537	2.9	685	0.784	100	15.8	LOS B	3.1	78.3	Full	300	0.0	0.0
Approach	537	2.9	537	2.9		0.784		15.8	LOS B	3.1	78.3				
North: Rive	er Stree	t SB													
Lane 1 <sup>d</sup>	664	2.3	664	2.3	672	0.988	100	34.8	LOS C	8.0	203.1	Full	300	0.0	<mark>23.5</mark>
Approach	664	2.3	664	2.3		0.988		34.8	LOS C	8.0	203.1				
West: Fed	eral Stre	eet EE	3												
Lane 1 <sup>d</sup>	973	1.0	973	1.0	702	1.386	100	188.5	LOS F	38.2	962.8	Full	350	0.0	100.0
Approach	973	1.0	973	1.0		1.386		188.5	LOS F	38.2	962.8				
All Vehicles	2795	2.4	2795	2.4		1.386		81.7	LOS F	38.2	962.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Approach La	ane Fl	ows (v	eh/h)							
South: River S	treet 1	ΝB								
Mov. From S To Exit:	U S	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Prob. Util. SL Ov. %	Lane
Lane 1	1	152	289	178	620	4.3	691	0.898	100 NA	NA
Approach	1	152	289	178	620	4.3		0.898		
East: Federal S	Street.	WB								
Mov. From E To Exit:	U	L2	T1 W	R2 N	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Prob. Util. SL Ov. % %	Lane

Lane 1	9	181	312	36	537	2.9	685	0.784	100	NA	NA		
Approach	9	181	312	36	537	2.9		0.784					
North: River Street SB													
Mov.	U	L2	T1	R2	Total	%HV		Deg.		Prob.	Ov.		
From N To Exit:	N	Е	S	W			Cap. veh/h	Satn v/c	Util. 3	SL Ov. %	Lane No.		
Lane 1	18	53	364	229	664	2.3	672	0.988	100	NA	NA		
Approach	18	53	364	229	664	2.3		0.988					
West: Federa	West: Federal Street EB												
Mov. From W	U	L2	T1	R2	Total	%HV	Сар.	Deg. Satn	Util.	Prob. SL Ov.	Ov. Lane		
To Exit:	W	Ν	Е	S			veh/h	v/c	%	%	No.		
Lane 1	1	230	498	245	973	1.0	702	1.386	100	NA	NA		
Approach	1	230	498	245	973	1.0		1.386					
	Total	%HV [	eg.Satı	n (v/c)									
All Vehicles	2795	2.4		1.386									

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis								
Exit	Short	Percent Opposing	Critical	Follow-up Lane Ca	apacity	Deg.	Min.	Merge
Lane	Lane	Opng in Flow Rate	Gap	Headway Flow		Satn I	Delay	Delay
Number	Length	Lane		Rate				·
	ft	% veh/h pcu/h	sec	sec veh/h	veh/h	v/c	sec	sec
There are no Exit Short Land	es for Me	erge Analysis at this Si	te.					

Variable Dema	nd Analysis									
	Initial Queued Demand	Residual Queued Demand	Time for Residual Demand to Clear	Duration of Oversatn						
	veh	veh	sec	sec						
South: River Stre	eet NB									
Lane 1	0.0	0.0	0.0	0.0						
East: Federal Str	reet. WB									
Lane 1	0.0	0.0	0.0	0.0						
North: River Stre	et SB									
Lane 1	0.0	0.0	0.0	0.0						
West: Federal Street EB										
Lane 1	0.0	67.8	347.7	NA						

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**♥** Site: 101 [Federal Street/River Street Noon Peak -EBL-WBL-NBR-SBR-FINAL - Single Lane (Site Folder: Noon Peak - 2045)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

Federal Street/River Street Existing 2022 PM Peak Site Category: (None) Roundabout

Lane Use	and P	erfor	mance												
	Dem Flo [ Total	and ws	Arrival [ Total	Flows HV]	Cap.	Deg. Satn	Lane Util.	Delay	Level of Service	50% Ba Que [ Veh	eue Dist ]	Lane Config	Lane Length ft	Cap. F Adj. B	
South: Riv	veh/h er Stree		veh/h	%	veh/h	v/c	%	sec	_		ft	_	11	%	. %
Lane 1 <sup>d</sup>	592	2.5	592	2.5	760	0.779	100	13.5	LOS B	3.2	82.9	Full	200	0.0	<mark>5.9</mark>
Approach	592	2.5	592	2.5		0.779		13.5	LOS B	3.2	82.9				
East: Fede	eral Stre	et. WE	3												
Lane 1 <sup>d</sup>	455	2.7	455	2.7	684	0.665	100	12.6	LOS B	2.0	51.3	Full	300	0.0	0.0
Approach	455	2.7	455	2.7		0.665		12.6	LOS B	2.0	51.3				
North: Riv	er Stree	t SB													
Lane 1 <sup>d</sup>	565	2.1	565	2.1	769	0.734	100	11.9	LOS B	2.8	70.7	Full	300	0.0	0.0
Approach	565	2.1	565	2.1		0.734		11.9	LOS B	2.8	70.7				
West: Fed	eral Stre	eet EE	3												
Lane 1 <sup>d</sup>	636	0.7	636	0.7	759	0.838	100	16.3	LOS B	4.1	103.9	Full	350	0.0	0.0
Approach	636	0.7	636	0.7		0.838		16.3	LOS B	4.1	103.9				
All Vehicles	2247	1.9	2247	1.9		0.838		13.7	LOS B	4.1	103.9				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: Siegloch M1 implied by US HCM 6 Roundabout Capacity Model.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Approach La	Approach Lane Flows (veh/h)											
South: River S	South: River Street NB											
Mov. From S To Exit:	U S	L2 W	T1 N	R2 E	Total	%HV	Cap. veh/h	Deg. Satn v/c	Lane Prob. Util. SL Ov. % %	Lane		
Lane 1	1	139	296	156	592	2.5	760	0.779	100 NA	NA		
Approach	1	139	296	156	592	2.5		0.779				
East: Federal	Street.	WB										
Mov. From E	U	L2	T1	R2	Total	%HV	Cap.	Deg. Satn	Lane Prob. Util. SL Ov.	Lane		
To Exit:	Е	S	W	N			veh/h	v/c	% %	No.		

Lane 1	16	143	227	68	455	2.7	684	0.665	100	NA	NA	
Approach	16	143	227	68	455	2.7		0.665				
North: River	North: River Street SB											
Mov. From N	U	L2	T1	R2	Total	%HV	Сар.	Deg. Satn		Prob. SL Ov.	Ov. Lane	
To Exit:	Ν	Ε	S	W			veh/h	v/c	%	%	No.	
Lane 1	37	44	312	171	565	2.1	769	0.734	100	NA	NA	
Approach	37	44	312	171	565	2.1		0.734				
West: Federa	West: Federal Street EB											
Mov. From W To Exit:	U W	L2 N	T1 E	R2 S	Total	%HV	Cap. veh/h	Deg. Satn v/c		Prob. SL Ov. %	Ov. Lane No.	
Lane 1	1	158	286	192	636	0.7	759	0.838	100	NA	NA	
Approach	1	158	286	192	636	0.7		0.838				
	Total	%HV [	eg.Satr	n (v/c)								
All Vehicles	2247	1.9		0.838								

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

Merge Analysis								
Exit	Short	Percent Opposing	Critical	Follow-up Lane Capa	acity [	Deg.	Min.	Merge
Lane	Lane	Opng in Flow Rate	Gap	Headway Flow		Satn [	Delay	Delay
Number	Length	Lane		Rate				
	ft	% veh/h pcu/h	sec	sec veh/h ve	eh/h	v/c	sec	sec
There are no Exit Short Lan	es for Me	erge Analysis at this Si	te.					

Initial Residual Time for Duration   Queued Queued Residual of   Demand Demand Demand to Clear   Veh Veh Sec Sec   South: River Street NB   Lane 1   0.0									
veh veh sec sec South: River Street NB									
Lane 1 0.0 0.0 0.0 0.0									
Lane 1 0.0 0.0 0.0 0.0									
East: Federal Street. WB									
Lane 1 0.0 0.0 0.0 0.0									
North: River Street SB									
Lane 1 0.0 0.0 0.0 0.0									
West: Federal Street EB									
Lane 1 0.0 0.0 0.0 0.0									

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Project: N:\Projects\2021\121-357 CDTC - Troy Federal St Linkage\Working\Traffic\Analysis\SIDRA\20220830\_Federal-River Final\_121357.sip9

Appendix E

**Cost Estimates** 



Calculated By:
Calculated Date:
Checked By:
Checked Date:

Acres

### **Federal Street Improvements**

October 20, 2022

## **Description of Major Improvements:**

Construction of 2 roundabouts: One at Route 4/Federal St. and one at 6th Ave/Federal St.

Construction of roadway improvements including raised median between the 2 roundabouts

Construction of two-way separated bike lane

Approximate ROW required:	TE	0	0.0000	Acres
ITEM DESCRIPTION	UNITS	PRICE	QUANTITY	TOTAL
UNCLASSIFIED EXCAVATION AND DISPOSAL	CY	\$32.00	10100	\$323,200
EMBANKMENT IN PLACE	CY	\$40.00	1500	\$60,000
FULL DEPTH PAVEMENT AND SUBBASE	SF	\$8.75	97745	\$855,269
GRANITE CURB	LF	\$42.00	9200	\$386,400
RAISED MEDIANS	SF	\$12.50	25055	\$313,188
ROUNDABOUT TRUCK APRON	SF	\$17.50	6435	\$112,613
CONCRETE SIDEWALKS	SF	\$11.50	29465	\$338,848
MSES WALLS	SF	\$72.00	1200	\$86,400
DRAINAGE BASINS	EA	\$7,500.00	20	\$150,000
DRAINAGE PIPE	LF	\$90.00	1500	\$135,000
DECORATIVE LIGHTING	LS	\$200,000.00	1	\$200,000
LANDSCAPING (INCLUDING TOPSOIL AND SEED)	LS	\$65,000.00	1	\$65,000
SIGNING AND STRIPING	LS	\$30,000.00	1	\$30,000
STORMWATER MANAGEMENT (\$25,000 /acre)	AC	\$25,000.00	3.00	\$75,000
EROSION CONTROL	LS	\$15,000.00	1	\$15,000
WORK ZONE TRAFFIC CONTROL	LS	12%	1	\$377,600
SURVEY AND STAKEOUT	LS	3%	1	\$94,400
MOBILIZATION	LS	4%	1	\$125,900
CONTINGENCY	LS	20%	1	\$629,200
	<del>_</del> ,	CONSTRUCT	ION SUBTOTAL:	\$ 4,374,000

FEE

18620 SF

0.4275

DESIGN ENGINEERING (14%) \$ 612,400 CONSTRUCTION INSPECTION (15%) \$ 656,100

ANTICIPATED ROW COST \$ 149,610

PROJECT TOTAL: \$ 5,793,000

10/20/2022 Conceptual Estimate Page 1 of 1