

# **Public Safety & Transportation Committee Agenda**

# City of Newton In City Council

Wednesday, April 6, 2022

7:00 PM

The Public Safety & Transportation Committee will hold this meeting as a virtual meeting on Wednesday, April 6, 2022 at 7:00 pm. To view this meeting using Zoom use this link https://us02web.zoom.us/j/89399311654 or call 1-646-558-8656 and use the following Meeting ID: 893 9931 1654

### **Items Scheduled for Discussion:**

**Chair's Note:** The Committee will join the Public Facilities Committee for discussion on the following 2 (two) items:

# Referred to Public Safety & Transportation and Public Facilities Committees

#239-22 Approval of a 25% design for the Commonwealth Avenue Carriageway Redesign

HER HONOR THE MAYOR requesting the approval of a 25% design for the Commonwealth Avenue Carriageway Redesign Project in Auburndale. The Council needs to select one of two alternatives for the Ash street intersection portion of this state-funded project.

# Referred to Public Safety & Transportation and Public Facilities Committees

#243-22 Discussion regarding MassDOT's intersection project

<u>HER HONOR THE MAYOR</u> requesting a discussion of MassDOT's proposed modification to the roundabout design located at the Grove Street intersection from the I-95 SB offramp and Quinobequin Road consistent with the requirements of Riverside Special Permit #27-20(2), Condition 14c.

Respectfully submitted,

**Andreae Downs, Chair** 

The location of this meeting is accessible and reasonable accommodations will be provided to persons with disabilities who require assistance. If you need a reasonable accommodation, please contact the city of Newton's ADA Coordinator, Jini Fairley, at least two business days in advance of the meeting: <a href="mailto:jfairley@newtonma.gov">jfairley@newtonma.gov</a> or (617) 796-1253. The city's TTY/TDD direct line is: 617-796-1089. For the Telecommunications Relay Service (TRS), please dial 711.



Ruthanne Fuller Mayor

# City of Newton, Massachusetts

Office of the Mayor

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239-22

March 28, 2022

Honorable City Council Newton City Hall 1000 Commonwealth Avenue Newton, MA 02459

# Honorable City Councilors:

I respectfully submit this docket item to this Honorable Council requesting the approval of a 25% design for the Commonwealth Avenue Carriageway Redesign Project in Auburndale. The Council needs to select one of two alternatives for the Ash Street intersection portion of this state-funded project.

The Commonwealth Avenue Carriageway Redesign Project will reconstruct a critical compromised segment of the Commonwealth Avenue Carriageway from Lyons Field to the Marriott Driveway. The timeline and design for this project is closely coordinated with MassDOT's larger \$23.8 million Project #110980 Newton-Weston-Bridge Rehabilitation South Avenue (Rt. 30) over the Charles River, which shares a project limit at the Marriott Driveway on Commonwealth Avenue. The Council has previously reviewed and approved that project design, including the new roundabout feature at Auburn/Commonwealth Ave.

The project will: a) improve bicycle and pedestrian safety and connectivity and ADA compliance, b) increase green space and access to the Charles River by linking to myriad path and trail networks, c) improve intersection safety at Ash St (in alternative 1) and all crossings and, d) improve transit access in the area by upgrading and consolidating bus stops, and e) provide a brand new surface for vehicles.

Specifically, the design will:

- Convert the carriage road to pedestrian and bicycle facilities
- Improve the sidewalk on the south side and reconstruct sidewalks
- Provide new pavement markings and signage
- Add pedestrian activated RRFB crossings
- Add raised crossings at side streets
- Reconstruct Ash Street (alternative 1 only)
- Maintain parking at Lyons Field

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To stay on a coordinated schedule for the MassDOT-funded project, the desired timeline for the Carriageway Redesign Project is follows:

- Public Facilities and Full Council Votes April, 2022
- o 75% design submittal Spring 2022
- o 100% design submittal Summer 2022
- Construction start Spring 2023
- Construction complete summer 2024

Two design alternatives exist for the segment of the project at Ash Street. MassDOT's preferred alternative reconstructs Ash Street to be fully accessible.

- There will be an accessible pedestrian crossing with a Rectangular Rapid Flashing Beacon (RRFB) at Ash Street across Commonwealth Avenue. The existing traffic signal will be removed.
- Traffic calming is provided on Commonwealth Avenue to slow speeds at Ash Street.
- More green space is added by closing the no-longer-needed exit onto Commonwealth Avenue from the Carriageway.
- South side crosswalks are reconstructed.
- The Ash Street intersection is tightened/squared to slow speeds and an accessible crossing is added across Ash where it currently does not exist.

Alternative design #2 reduces the limits of the project to leave Ash Street untouched. This maintains the existing traffic signal at Ash Street and none of the above improvements are made. Many of the residents of the Islington Peninsula prefer this option since they exit left out of Islington onto the Carriageway to use the existing Ash Street signal to head eastbound on Commonwealth Avenue. The State will not allow a traffic signal in a reconstructed Ash Street intersection since traffic volumes and patterns do not meet the warrant rules.

Both the Planning and Public Works Departments support Alternative #1, as does the City's ADA Coordinator Jini Fairley. The pros and cons of each alternative will be presented in detail at the upcoming council committee meeting to aid in decision-making.

There is no funding request associated with this docket request. The CPA is providing \$390,000 for final design funding. MassDOT has fully funded construction, which is estimated at \$5.5 million, for funding year FY23.

Please see the attached memo from Transportation Planning Director Nicole Freedman.

Thank you for your consideration of this matter.

Sincerely,

Mayor Ruthanne Fuller



# City of Newton, Massachusetts

Department of Planning and Development 1000 Commonwealth Avenue Newton, Massachusetts 02459 Telephone (617) 796-1120 Telefax (617) 796-1142 TDD/TTY (617) 796-1089 www.newtonma.gov

Barney S. Heath Director

March 16, 2022

Ruthanne Fuller, Mayor Newton City Hall 1000 Commonwealth Avenue Newton Centre, MA 20459

RE: Request to docket Council review and vote on design of the Commonwealth Avenue Carriageway Redesign Project, also known as MassDOT Project #610674.

Dear Mayor,

I respectfully request to docket a meeting with Council to:

- 1. Review the 25% design of the Commonwealth Avenue Carriageway Redesign project
- 2. Select one of the two alternatives for Ash Street, and
- 3. Vote to approve the design with the selected alternative

#### **COUNCIL VOTE**

As you know, Council must vote to approve changes to traffic operations. As we have done with similar large capital projects like the West Newton and Newtonville Village Enhancement Projects, we request a vote to approve the design at the 25% design level so we have confidence that further design money will be spent on a project that goes to completion. While the vote will be a final vote by Council on the project, the City will continue to consult with Council through completion of the project.

#### **TIMELINE**

The timeline and design for this project is closely coordinated with MassDOT's \$23.8M Project 110980 Newton-Weston-Bridge Rehabilitation South Avenue (Rt. 30) over the Charles River, which shares a project limit at the Marriott Driveway on Commonwealth Avenue. To stay on a coordinated schedule, which is required to maintain our funding with MassDOT, our timeline <u>must</u> remain as follows:

- o Public Facilities and Full Council Votes April, 2022
- o 75% design submittal Spring 2022
- o 100% design submittal Summer 2022
- Construction start Spring 2023
- Construction complete summer 2024

#### PROJECT OVERVIEW

The Commonwealth Avenue Carriageway Redesign Project will reconstruct a critical compromised segment of the Commonwealth Avenue Carriageway from Lyons Field to the Marriott Driveway. The project will: a) improve bicycle and pedestrian safety and connectivity and ADA compliance b) increase green space and access to the Charles River by linking to myriad path and trail networks c) improve intersection safety at Ash St (in alternative 1) and all crossings and d) improve transit access in the area by upgrading and consolidating bus stops

Specifically, the design will:

- Convert the carriage road to pedestrian and bicycle facilities
- Improve the sidewalk on the south side and reconstruct sidewalks
- Provide new pavement markings and signage
- Add pedestrian activated RRFB crossings
- · Add raised crossings at side streets
- Reconstruct Ash Street (alternative 1 only)
- Maintain parking at Lyons Field

#### **DESIGN ALTERNATIVES**

Two design alternatives exist for the segment of the project at Ash Street. MassDOT's preferred alternative reconstructs Ash Street to be fully accessible.

- There will be an accessible pedestrian crossing with an RRFB at Ash Street across Commonwealth Avenue. The existing signal will be removed.
- Traffic calming is provided on Commonwealth Avenue to slow speeds at Ash Street
- More green space is added by closing the no-longer-needed exist onto Commonwealth Avenue from the Carriageway.
- South side crosswalks are reconstructed
- The Ash Street intersection is tightened/squared to slow speeds and an accessible crossing is added across Ash where it currently doesn't exist.

The alternative design reduces the limits of the project to leave Ash Street untouched. This maintains the existing signal at Ash Street, at the cost of not implementing the above improvements. Many of the residents of the Islington Peninsula prefer this option since they exit left out of Islington onto the Carriageway to use the existing Ash Street signal head eastbound on Commonwealth Avenue.

#### PROJECT FUNDING

There is no funding request associated with this docket request. The CPA is providing \$390,000 for final design funding. MassDOT has fully funded construction, which is estimated at \$5.5M, for funding year FY23.

For more information on the project, please go to: <a href="https://www.newtonma.gov/government/planning/transportation-planning/projects/commonwealth-avenue-carriageway-redesign/-fsiteid-1#!/">https://www.newtonma.gov/government/planning/transportation-planning/projects/commonwealth-avenue-carriageway-redesign/-fsiteid-1#!/</a>

# Islington Road to Ash Street - Preferred Design (with Ash)



# Islington Road to Ash Street – Alt Design (without Ash)





# City of Newton, Massachusetts

Office of the Mayor

Telephone (617) 796-1100 Fax (617) 796-1113 TDD/TTY (617) 796-1089 Email rfuller@newtonma.gov

March 28, 2022

Honorable City Council Newton City Hall 1000 Commonwealth Avenue Newton, MA 02459

Honorable City Councilors:

I respectfully submit this docket item to this Honorable Council requesting a discussion of MassDOT's proposed modification to the roundabout design located at the Grove Street intersection with the I-95 SB off-ramp and Quinobequin Road consistent with the requirements of Riverside Special Permit #27-20 (2), Condition 14c.

The relevant language from the Riverside Special Permit states:

Any material modifications to the final design of the Interchange Improvements by either MassDOT or FHWA will be considered consistent with the conceptually approved plan if, in the opinion of the Commissioner of Public Works, after consultation with the appropriate committee(s) of the City Council, the modified design achieves the same performance objectives as the conceptually approved design.

Please see the attached memo from Commissioner of Public Works James McGonagle and the detailed report from VHB on behalf of the project proponents.

Thank you for your consideration of this matter.

Sincerely,

Mayor Ruthanne Fuller

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City of Newton Ruthanne Fuller

# DEPARTMENT OF PUBLIC WORKS

# OFFICE OF THE COMMISSIONER

1000 Commonwealth Avenue Newton Centre, MA 02459-1449

March 25, 2022

To:

Jonathan Yeo, Chief Operating Officer

From:

James McGonagle, Commissioner

Subject: Request for Docket Item for Discussion of Riverside Station Off-site Transportation

**Improvements** 

Consistent the requirements of Special Permit #27-20(2), Condition 14.c., DPW would like to discuss MassDOT's proposed modification to the roundabout design located at the Grove Street intersection with the I-95 SB off-ramp and Quinobequin Road.

The relevant language from the Riverside Special Permit states:

Any material modifications to the final design of the Interchange Improvements by either MassDOT or FHWA will be considered consistent with the conceptually approved plan if, in the opinion of the Commissioner of Public Works, after consultation with the appropriate committee(s) of the City Council, the modified design achieves the same performance objectives as the conceptually approved design.

Sincerely,

James McGonagle Commissioner of Public Works

cc:

Shawna Sullivan, DPW Deputy Commissioner Louis M. Taverna, P.E., City Engineer Jason Sobel, P.E., PTOE, Director of Transportation Operations

Isaac Prizant, Transportation Engineer

Telephone: 617-796-1009 • Fax: 617-796-1050 • Jmcgonagle@newtonma.gov



To: City of Newton

Date: 02/04/2022

Memorandum.

Project #: 10865.03

From: Randy Hart, Principal Matthew Duranleau, PE Re: Grove Street at I-95 Southbound Ramps Potential Intersection Treatments

VHB, on behalf of Mark Development (the Proponent) has prepared this memorandum to discuss the evaluation of the various different treatments that were done for the intersection of Grove Street at the I-95 Southbound Ramps in Newton, Massachusetts. This intersection will be reconstructed as part of the approved Riverside redevelopment, which will include the construction of approximately 1,025,000 of new development on the existing site of the MBTA Riverside station parking lot and the Hotel Indigo. As part of the development, significant roadway improvements will be implemented, including the reconstruction of the I-95 Northbound Exit 38 off-ramp to Grove Street, an extension of Recreation Road to Grove Street, the installation of three adaptive traffic signals, and improvements at the intersection of Grove Street at the I-95 Southbound Ramps.

In the local and state filings, the intersection of Grove Street at the I-95 Southbound Ramps was proposed to be replaced with a single-lane roundabout with four approaches: Grove Street from the east and west, the I-95 Southbound Ramps from the south, and Asheville Road from the north. As development of the 25-percent design plans began, the Proponent has been in close coordination with MassDOT regarding all aspects of the offsite design. During these detailed consultations, MassDOT has stressed the need to create more deflection on the various approaches to the proposed intersection reconstruction, specifically the Grove Street westbound and I-95 Southbound Off-Ramp approaches to the intersection. Increasing deflection will slow the traffic entering the roundabout thereby enhancing the pedestrian environment.

# **Revised Roundabout Concept**

To meet the requests of MassDOT, the roundabout has been shifted a short distance to the northeast and by doing so, the geometry and right-of-way doesn't allow for Asheville Road to be included in the roundabout. Under this scenario, Ashville Road becomes a right-in/right-out at Grove Street south of the roundabout and drivers exiting Asheville Road would only be able to take a right turn onto Grove Street. To access Grove Street eastbound, drivers would need to use Pine Grove Avenue or Pierrepont Road to turn left onto Grove Street instead. Alternatively, drivers could use Pierrepont Road to turn right onto Grove Street and reverse direction at the roundabout. The proposed roundabout would consist of three approaches: Grove Street from the east and west and the I-95 Southbound Ramps from the south.

The shifting of the roundabout is a minor change from what was previously contemplated for the design of this intersection, and the only significant change is the shifting of the Roundabout easterly and the treatment of Asheville Road. There are benefits and disadvantages associated with this change, which include the following:



#### Benefits

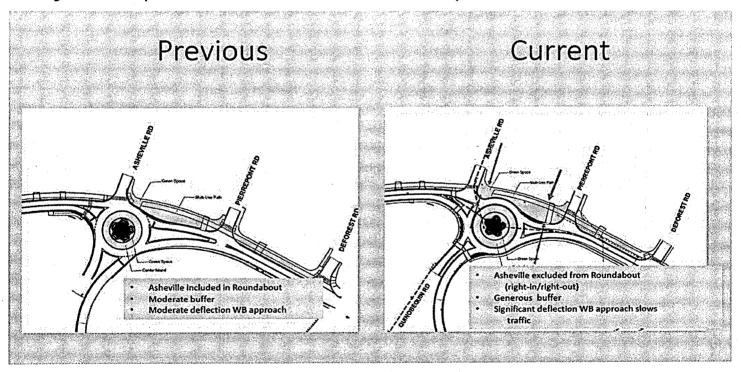
- > Increased deflection of the approaches will slow traffic even more than former concepts
- > Increased (substantially) green buffer between Grove Street and residents in northwest quadrant of intersection
- > Deemphasizes traffic movements onto Asheville Road (northern neighborhood traffic will likely not use Asheville to gain access to the roundabout)
- > Lower speed and more green space results in enhanced pedestrian environment

#### **Detriments**

> Residents on Asheville Road will not be able to turn left at Grove Street from Ashville's intersection with Grove.

To demonstrate the two roundabout options that have been considered, Figure 1 provides a side-by-side comparison of the previous four-legged roundabout concept and the currently proposed three-legged roundabout concept.

Figure 1 Comparison of Previous and Current Roundabout Concepts





## **Additional Intersection Concepts**

At the initial Riverside Redevelopment Liaison Committee meeting on Tuesday January 25, 2022, the revised concept for the roundabout was presented. The initial feedback from members of the community was concern for the changes that would be introduced to Asheville Road. As a result of the comments and concerns, additional review of potential options has been considered and further discussion is being planned with MassDOT and the City of Newton.

To aid in those conversations, this memorandum has been prepared to evaluate various options that have been considered. These include:

- > Original Four-Legged Roundabout Concept (with Asheville Road included)
- > Revised Three-Legged Roundabout Concept (with Asheville Road excluded)
- > Signalized intersection with slight shift of northbound approach (the I-95 Southbound Ramps approach is shifted slightly west from its current location to directly align with Asheville Road)
- Signalized intersection in current location (each approach has the same geometry as existing conditions with the I 95 Southbound Ramps and Asheville Road slightly offset from each other)

Concept plans for the two signalized scenarios are provided in the Attachments to this memorandum.

The following section summarizes the intersection capacity results of the proposed roundabout and signalized intersection concepts.

## **Intersection Operations**

To demonstrate future traffic operations at the intersection under different concept alternatives, intersection capacity analyses have been conducted based on the 2031 Build Conditions with mitigation traffic volumes as presented in the most recent MEPA filings for the Riverside redevelopment project<sup>1</sup>. The traffic volumes present a future condition that includes a growth in traffic over existing conditions due to the Riverside redevelopment as well as due to other background projects. The intersection capacity analyses have been conducted for the weekday morning, weekday evening, and Saturday midday peak hours using Synchro 10 software for the signalized concepts and using Sidra 8 software for the roundabout concepts.

#### **Roundabout Concepts**

Table 1 presents a summary of the capacity analyses for intersection under the four-legged and three-legged roundabout alternatives. The intersection capacity worksheets are included in the Attachments to this memorandum.

<sup>1</sup> Supplemental Draft Environmental Impact Report, EEA No. 16024, Riverside Station Redevelopment; Prepared by VHB; May 17, 2021.



**Table 1** Roundabout Intersection Capacity Analysis Summary

			nditions v our-Legge					nditions w/ ee-Legged	_	on
Location	D a	v/c <sup>b</sup>	Delay <sup>c</sup>	LOS d	95 <sup>th</sup> Q °	D	v/c	Delay	LOS	95 <sup>th</sup> Q
Grove Street at I-95 South	bound Ra	mps / A	sheville Ro	oad		·				
Weekday Morning										
Grove Street EB LTR	575	0.75	20	C	321	590	0.76	20	C	339
Grove Street WB LTR	380	0.38	7	Α	50	380	0.38	7	Α	: 50
I-95 SB Off-Ramp NB LTR	375	0.67	20	C	143	375	0.66	20	.C	142
Asheville Road SB LTR	15	0.03	6	Α	2	n/a	n/a	n/a	n/a	n/a
Overall			16	С				16	c	į
Weekday Evening										
Grove Street EB LTR	260	0.43	12	В	56	265	0.43	12	В	57
Grove Street WB LTR	730	0.76	17	C	212	730	0.75	. 17	C	212
I-95 SB Off-Ramp NB LTR	190	0.25	7	Α	25	190	0.25	7	Α	. 25
Asheville Road SB LTR	10	0.02	8	Α	1	n/a	n/a	n/a	n/a	n/a
Overall			14	. В				14	В	
Saturday Midday										
Grove Street EB LTR	220	0.28	7	Α	-29	235	0.29	7	Α	31
Grove Street WB LTR	350	0.36	7	Α	45	350	0.36	7	Α	45
I-95 SB Off-Ramp NB LTR	280	0.33	7	Α	37	280	0.32	7	Α	37
Asheville Road SB LTR	15	0.02	- 5	Α	2	n/a	n/a	n/a	n/a	n/a
Overali			7	Α			Υ.	7	Α	

Source: analyzed with Sidra 8 software.

- a Demand (input)
- b volume-to-capacity ratio
- c average total delay, in seconds per vehicle
- d level of service
- e 95th percentile queue length, measured in feet

As shown in Table 1, the intersection with either roundabout concept is proposed to operate at overall LOS C or better during each peak hour. Each approach is also expected to operate at LOS C or better and the queues on each approach are expected to be less than 350 feet during each peak hour. Operations are expected to be comparable between the four-legged and the three-legged roundabout concepts.

#### **Signalized Intersection Concepts**

Table 2 presents a summary of the capacity analyses for intersection under the two different signalized alternatives (Concept 1 assumes the I-95 Southbound Ramps approach is shifted slightly west to directly align with Asheville Road and Concept 2 assumes each approach has the same geometry as under existing conditions). The intersection capacity worksheets are included in the Attachments to this memorandum.



Table 2 Four-Legged Signalized Intersection Capacity Analysis

	203		ondition: Concept	s w/ Mitiga 1	ntion	2031	Build Con Co	ditions oncept	-	ation
Location	v/c ª	Delay <sup>b</sup>	LOS c	50 <sup>th</sup> Q <sup>d</sup>	95 <sup>th</sup> Q <sup>e</sup>	v/c	Delay	LOS	50 <sup>th</sup> Q	95 <sup>th</sup> Q
Grove Street at I-95 Sout	hbound R	lamps / As	heville F	Road						
Weekday Morning										
Grove Street EB LTR	0.80	27	C	192	#526	0.73	24	C	158	#587
Grove Street WB L	0.45	. 7	Α	22	103	0.50	11	В	22	148
Grove Street WB TR	0.12	5	Α	12	61	0.12	6	Α	12	81
I-95 SB Off-Ramp NB LT	0.03	33	C	2	15	0.03	31	C	2	15
I-95 SB Off-Ramp NB R	0.64	25	C	115	#374	0.74	32	C	120	#426
Asheville Road SB LTR	0.10	35	C	6	28	0.10	34	C	5	29
Overall		21	С				22	С		
Weekday Evening										
Grove Street EB LTR	0.58	27	C	81	220	0.64	32	, <b>C</b>	86	#302
Grove Street WB L	0.56	8	Α	46	212	0.61	13	В	47	#344
Grove Street WB TR	0.23	5	Α	26	122	0.25	7	Α	26	162
I-95 SB Off-Ramp NB LT	0.25	33	C	14	62	0.28	34	C	15	62
I-95 SB Off-Ramp NB R	0.20	10	В	19	102	0.19	11	В	22	104
Asheville Road SB LTR	0.04	31	C	2	18	0.04	33	C	3	18
Overall		13	В				16	В		
Saturday Midday										
Grove Street EB LTR	0.51	23	C	51	173	0.50	23	C	49	188
Grove Street WB L	0.36	7	Α	22	104	0.36	9	Α	20	131
Grove Street WB TR	0.12	6	Α	11.	56	0.12	7	Α	10	71
I-95 SB Off-Ramp NB LT	0.16	25	· C	9	52	0.18	28	C	9	56
I-95 SB Off-Ramp NB R	0.32	11	В	28	157	0.33	14	В	28	194
Asheville Road SB LTR	0.08	26	C	4	27	0.07	30	C	4	30
Overall		13	В				15	В	·	

Source: analyzed with Synchro 10 software.

Note: analyzed with right turns on red prohibited on all approaches to provide a conservative analysis.

- a volume-to-capacity ratio
- b average delay in seconds per vehicle
- c level of service
- d 50th percentile queue length, measured in feet
- e 95th percentile queue length, measured in feet
- # 95<sup>th</sup> percentile volume exceeds capacity, queue may be longer

As shown in Table 2, the intersection with the four-legged signalized concept is proposed to operate at overall LOS C or better during each peak hour under both concepts. Each approach is also expected to operate at LOS C or better during each peak hour under both concepts.

Overall, operations are slightly better under signalized Concept 1 compared to signalized Concept 2. Under Concept 1, the I-95 Southbound Ramps is shifted slightly west to directly align with Asheville Road. This means that the Asheville Road and the I-95 Southbound Ramps approaches can run concurrently and have green lights at the same time. Under Concept 2, the two approaches cannot run concurrently and have green lights at different times due to the



approaches being offset from each other. By not allowing the two approaches to run at the same time, there is additional lost time at the intersection with the needed yellow and all-red time for the additional signal phase, which causes slightly higher delays and queues for all the approaches.

It should be noted that under both signalized concepts the queues are expected to be longer then compared to the roundabout concepts. For example, during the weekday morning peak hour, the 95<sup>th</sup>-percentile queue on the Grove Street eastbound approach is expected to be approximately 526 feet or 587 feet under the two signalized concepts but only 339 feet under the three-legged roundabout concept. In addition, the 95<sup>th</sup>-percentile queue on the I-95 Southbound Off-Ramp is expected to be approximately 374 feet or 426 feet during the weekday morning peak hour under the two signalized concepts but only 142 feet under the three-legged roundabout option.

## **Comparison of Options**

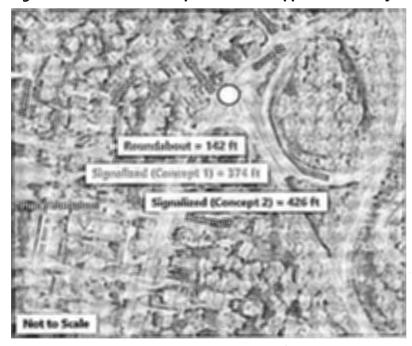
The operational analyses presented above show the difference in operations between a roundabout and traffic signal options. As highlighted, there is significant difference in vehicle queuing along Grove Street northbound and on the Southbound Ramp. To demonstrate, visually, the differences in options the following two graphics have been created to demonstrate the difference between the two critical periods. Figure 2 and Figure 3 provide illustrative comparisons of the 95<sup>th</sup>-percentile queues during the weekday morning peak hour on the Grove Street eastbound and I-95 SB Off-Ramp northbound approaches, respectively.



Figure 2 Grove Street Eastbound Approach Weekday Morning Peak Hour 95<sup>th</sup> Percentile Queues



Figure 3 I-95 SB Off-Ramp Northbound Approach Weekday Morning Peak Hour 95<sup>th</sup> Percentile Queues





As shown in Figures 1 and 2, queues on critical approaches to the intersection are substantially shorter with the roundabout proposed. This is particularly true along the I-95 Southbound Off-Ramp, where the queue under the proposed roundabout concept is less than one-third the length of the queue under the potential signalized options.

As part of the proposed Project, the Proponent is being required to do clearing in the interior of the I-95 Southbound Grove Street Off-Ramp to increase sight lines to ensure visibility to back of queue is available. This is a very important safety consideration for MassDOT and therefore treatments that minimize ramp queues should be considered preferable.

In addition, a major difference between the proposed roundabout concept and the signalized options is the elimination of the right-turn slip lane from the I-95 Southbound Off-Ramp to Grove Street eastbound. Under existing conditions, the slip lane does not provide adequate deflection to significantly reduce the speed of drivers exiting the interstate. Although the signalized options would include a signal on the slip lane, drivers will still be able to travel at high speeds onto Grove Street without significantly slowing down when the signal is green. Under the roundabout concept, the slip lane is eliminated, and all right-turning traffic must travel through the roundabout. The deflection provided in the three-legged roundabout will force drivers to slow down as they turn onto Grove Street.

#### Conclusion

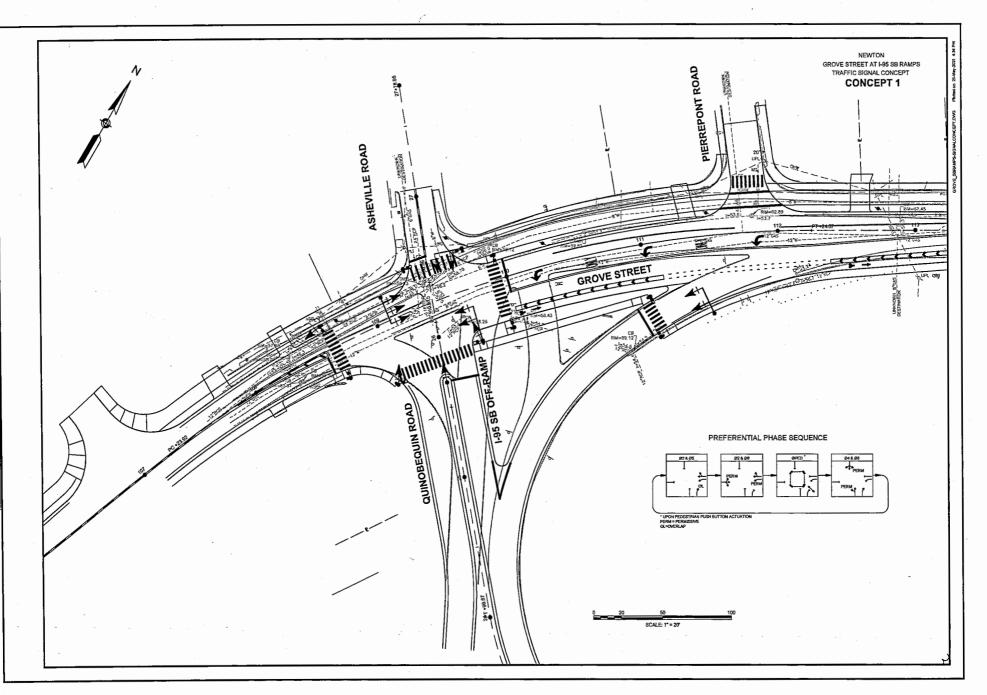
As outlined in this memorandum, future traffic conditions at the intersection of Grove Street at the I-95 Southbound Ramps are expected to operate at acceptable levels-of-service under both the roundabout concepts and the four-legged signalized concepts. However, the queues on each approach are expected to be much shorter under the roundabout concepts than under the signalized concepts. In addition, the three-legged roundabout concept is expected to provide improved safety for all users over the signalized concepts with lower vehicle speeds through the intersection and the elimination of the right-turn slip lane from the I-95 Southbound Off-Ramp to Grove Street eastbound.

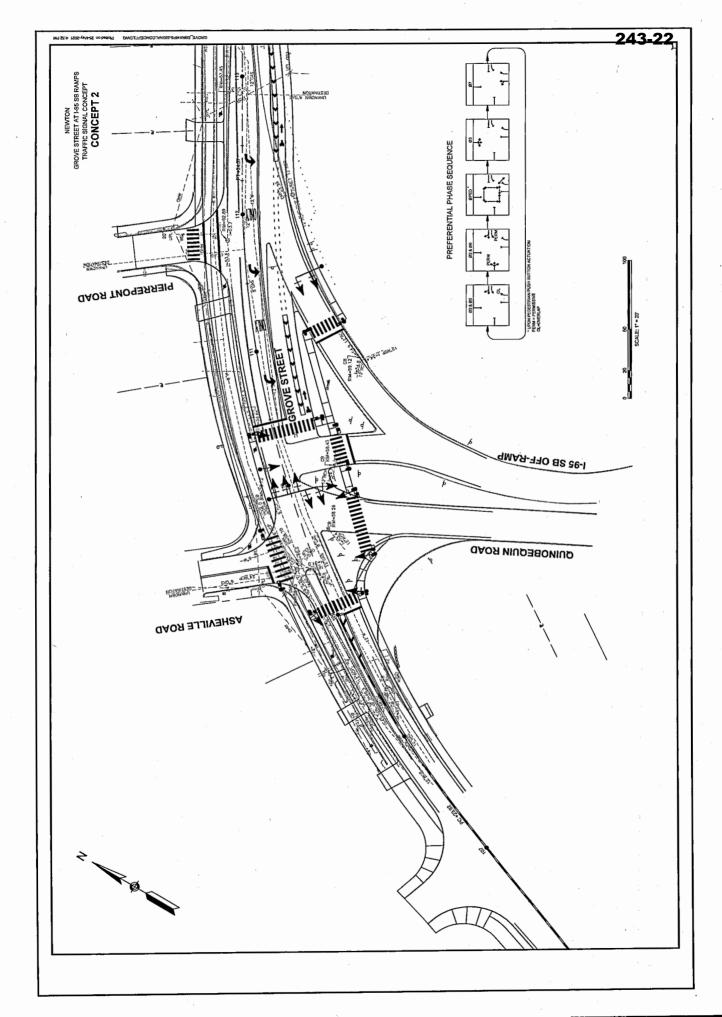
City of Newton Ref: 10865.03 02/04/2022 Attachments

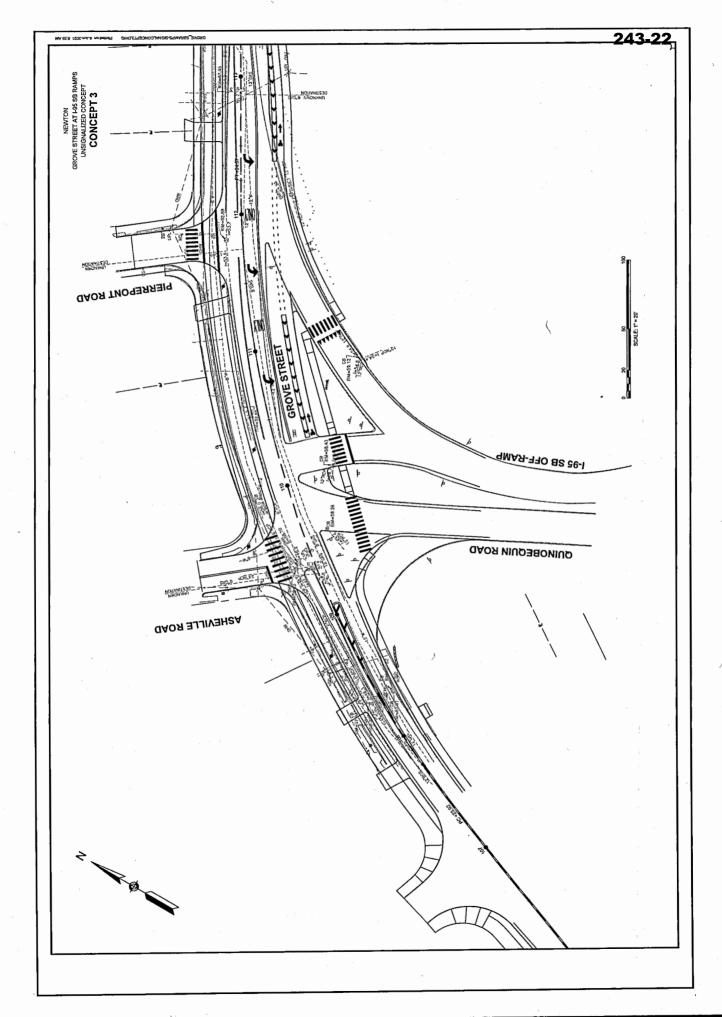


# **Attachments**

- > Concept Plans Signalized
- ) Intersection Capacity Analyses Roundabout
- > Intersection Capacity Analyses Signalized







Site: 101 [Weekday Morning\_2031 Build with Mitigation]

Grove Street at Asheville Road / I-95 SB Ramps Site Category: (None)

Roundabout

Lane Use a			nce	este - victoria de		dere i maliciar de l'esconomic	percentage of the second of the	community	en vau haiseen en en	Rodone mikonomi senomena	sace transcorrent contra	a Leathard	oweer-tenden
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South: I-95 S		The state of the s					964 444					10000	16.4
Lane 1 <sup>d</sup>	409	2.0	615	0.665	100	20.0	LOS C	5.6	143.1	Full	1600	0.0	0.0
Approach	409	2.0		0.665		20.0	LOS C	5.6	143.1				
East: Grove S	Street	art.		5.50			0.00	nigeria di Turka Maren					
Lane 1 <sup>d</sup>	413	3.0	1089	0.379	100	7.2	LOSA	2.0	50.1	Fuli	1600	0.0	0.0
Approach	413	3.0		0.379		7.2	LOSA	2.0	50.1				
North: Ashev	ille Road	amenia.			Marie Land	THE RESERVE							
Lane 1 <sup>d</sup>	17	7.0	690	0.025	100	5.5	LOSA	0.1	2.1	Full	1600	0.0	0.0
Approach	17	7.0		0.025		5.5	LOS A	0.1	2.1				
West: Grove	Street												
Lane 1 <sup>d</sup>	626	2.0	832	0.752	100	20.0	LOS C	12.6	321.1	Full	1600	0.0	0.0
Approach	626	2.0		0.752		20.0	LOS C	12.6	321.1				
Intersection	1465	2.3		0.752		16.2	Los C	12.6	321.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Sign Control.

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 2010).

Roundabout Capacity Model: US HCM 2010.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies. Gap-Acceptance Capacity: Traditional M1.

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

#### d Dominant lane on roundabout approach

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Project: \\vhb\gbl\proj\Wat-TS\10865.03 Mark Inv Riverside Newto\tech\Traffic\Sidra\TIAS\February 2021 TIA\Grove Street at I-95 SB

Ramps\_Asheville Road\_No Slip Lane.sip8

# ♥ Site: 101 [Weekday Evening\_2031 Build with Mitigation]

Grove Street at Asheville Road / I-95 SB Ramps

Site Category: (None)

Roundabout

Lane Use	and Perfo	rmar	тсе	· Harri					. 7. <sup>A.V.</sup>				
	Demand F Total veh/h	HV	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Veh	Queue Dist	Lane Config	Lane Length	Cap Adj	CHARLES TO THE COMMENT
South: I-95				Analisa alia									
Lane 1 <sup>d</sup>	207	5.0	840	0.246	100	6.9	LOSA	0.9	24.7	Full	1600	0.0	0.0
Approach	207	5.0		0.246		6.9	LOSA	0.9	24.7				
East: Grove	Street						A constitution			e o			Table 1
Lane 1 <sup>d</sup>	793	2.0	1051	0.755	100	16.9	LOS C	8.3	212.0	Full	1600	0.0	0.0
Approach	793	2.0		0.755		16.9	LOS C	8.3	212.0				1
North: Ashe	ville Road								Mention of the Control				
Lane 1 <sup>d</sup>	9	0.0	486	0.018	100	7.6	LOS A	0.1	1.4	Full	1600	0.0	0.0
Approach	9	0.0		0.018		7.6	LOS A	0.1	1.4				
West: Grov	e Street											1450	
Lane 1 <sup>d</sup>	284	3.0	665	0.427	100	11.5	LOS B	2.2	56.0	Full	1600	0.0	0.0
Approach	284	3.0		0.427		11.5	LOS B	2.2	56.0				
Intersection	1292	2.7		0.755		14.1	LOSB	8.3	212.0				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Sign Control.

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 2010).

Roundabout Capacity Model: US HCM 2010.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies. Gap-Acceptance Capacity: Traditional M1.

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

#### d Dominant lane on roundabout approach

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Project: \https://doi.org/10.1009/10.10

Ramps\_Asheville Road\_No Slip Lane.sip8

Site: 101 [Saturday Midday\_2031 Build with Mitigation]

Grove Street at Asheville Road / I-95 SB Ramps Site Category: (None) Roundabout

Lane Use	and Perfo	ormai	псе				rain da san						
	Demand F Total veh/h	- HV	Cap veh/h	Deg Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back o Veh	of Queue Dist ft	Lane Config	Lane Length ft		Prob. Block %
South: I-95	SB Ramps				Y Line								
Lane 1 <sup>d</sup>	304	1.0	934	0.326	100	7.3	LOSA	1.5	37.1	Full	1600	0.0	0.0
Approach	304	1.0		0.326		7.3	LOSA	1.5	37.1				
East: Grove	e Street												
Lane 1 <sup>d</sup>	380	1.0	1065	0.357	100	7.0	LOSA	1.8	45.2	Full	1600	0.0	0.0
Approach	380	1.0		0.357		7.0	LOSA	1.8	45.2				1
North: Ashe	eville Road												
Lane 1 <sup>d</sup>	17	0.0	745	0.023	100	5.1	LOSA	0.1	1.9	Full	1600	0.0	0.0
Approach	17	0.0		0.023		5.1	LOS A	0.1	1.9				
West: Grov	e Street												
Lane 1 <sup>d</sup>	239	1.0	855	0.280	100	7.2	LOSA	1.2	29.3	Full	1600	0.0	0.0
Approach	239	1.0	-	0.280		7.2	LOSA	1.2	29.3				
Intersection	941	1.0		0.357		7,1	LOS A	1.8	45.2				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Sign Control.

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 2010).

Roundabout Capacity Model: US HCM 2010.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies. Gap-Acceptance Capacity: Traditional M1.

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

#### d Dominant lane on roundabout approach

₩ Site: 101 [Weekday Morning\_2031 Build with Mitigation]

Grove Street at Asheville Road / I-95 SB Ramps

Site Category: (None)

Roundabout

Lane Use	and Perfo	rmai	nce										
	Demand F		Cap.			Average	Level of	95% Back	Strategic Strategic Control of the C	Lane	Services and Associated William	Cap.	
	Total veh/h	A TRANSPORT	veh/h	Satn v/c	Util. %	Delay sec	Service	⊥ Veh	Dist ft	Config	Length ft	Adj. I %	ыоск. %
South: I-95	SB Ramps		alle a		fra Ab		<u>Álada a</u>						
Lane 1 <sup>d</sup>	408	2.0	616	0.662	100	19.9	LOS C	5.6	141.8	Full	1600	0.0	0.0
Approach	408	2.0		0.662		19.9	LOS C	5.6	141.8				
East: Grove	Street												
Lane 1 <sup>d</sup>	413	3.0	1091	0.379	100	7.2	LOS A	2.0	50.0	Full	1600	0.0	0.0
Approach	413	3.0		0.379		7.2	LOS A	2.0	50.0				
West: Grov	e Street				D cui			. Property					
Lane 1 <sup>d</sup>	641	2.0	847	0.757	100	20.0	LOS C	13.4	339.3	Full	1600	0.0	0.0
Approach	641	2.0		0.757		20.0	LOSC	13.4	339.3				
Intersection	1462	2,3		0.757		16.3	LOSC	13.4	339.3		25 (1997) 25 (1997) 26 (1997)	1.2	

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Sign Control.

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 2010).

Roundabout Capacity Model: US HCM 2010.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies. Gap-Acceptance Capacity: Traditional M1.

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

d Dominant lane on roundabout approach

Site: 101 [Weekday Evening\_2031 Build with Mitigation]

Grove Street at Asheville Road / I-95 SB Ramps Site Category: (None) Roundabout

Lane Use	and Perfo	rmar	тсе										
	Demand F						Level of	95% Back of		Lane		Cap.	
	Total veh/h	HV	Cap. veh/h	Sain v/c	Util. %	Delay sec	Service	Véh :	Dist	Config	Length	Adj. %	Block %
South: I-95	The second livery of the secon		AV-IVATE		70					106.004		- 70	275 275
Lane 1 <sup>d</sup>	207	5.0	841	0.245	100	6.9	LOS A	0.9	24.6	Full	1600	0.0	0.0
Approach	207	5.0		0.245		6.9	LOS A	0.9	24.6				
East: Grove	Street			15.65									
Lane 1 <sup>d</sup>	793	2.0	1052	0.754	100	16.8	LOS C	8.3	211.8	Full	1600	0.0	0.0
Approach	793	2.0		0.754		16.8	LOS C	8.3	211.8				
West: Grov	e Street	newal carmon			70077								
Lane 1 <sup>d</sup>	288	3.0	670	0.430	100	11.5	LOS B	2.2	57.0	Full	1600	0.0	0.0
Approach	288	3.0		0.430		11.5	LOS B	2.2	57.0				
Intersection	1288	2.7		0.754		14,1	LOS B	8.3	211.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Sign Control.

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 2010).

Roundabout Capacity Model: US HCM 2010. HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies. Gap-Acceptance Capacity: Traditional M1.

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

d Dominant lane on roundabout approach

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Project: \\vhob\gb\\proj\\Vat-TS\10865.03 \text{Mark Inv Riverside Newto\tech\Traffic\Sidra\TIAS\February 2021 TIA\January 2022\_No Asheville Road
Approach\Grove Street at I-95 SB Ramps Asheville Road\_No Slip Lane.sip8

Site: 101 [Saturday Midday\_2031 Build with Mitigation]

Grove Street at Asheville Road / I-95 SB Ramps

Site Category: (None)

Roundabout

Lane Use	and Perf	ormar	ıce			g. Pager							
	Demand F Total veh/h	HV	Cap. veh/h	Sath	Lane Util. %	Average Delay sec	Level of Service	95% Back of Veh	Queue Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	
South: I-95	SB Ramps		CONTRACT.		le sui								
Lane 1 <sup>d</sup>	304	1.0	939	0.324	100	7.3	LOS A	1.5	36.9	Full	1600	0.0	0.0
Approach	304	1.0		0.324		7.3	LOS A	1.5	36.9				
East: Grove	Street												
Lane 1 <sup>d</sup>	380	1.0	1071	0.355	100	7.0	LOS A	1.8	44.9	Full	1600	0.0	0.0
Approach	380	1.0		0.355		7.0	LOS A	1.8	44.9				
West: Grove	e Street											- Constitution of	
Lane 1 <sup>d</sup>	250	1.0	869	0.288	100	7.2	LOSA	1.2	30.5	Full	1600	0.0	0.0
Approach	250	1.0		0.288		7.2	LOS A	1.2	30.5				
Intersection	935	1.0		0.355		7.2	LOSA	1.8	44.9				

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Site tab). Roundabout LOS Method: Same as Sign Control.

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 2010).

Roundabout Capacity Model: US HCM 2010.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies. Gap-Acceptance Capacity: Traditional M1.

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

d Dominant lane on roundabout approach

101: Route 128 SB Ramps/Asheville Road & Grove Street Timing Plan: Weekday Moming t 4 NBL NBT NBR WBT Lane Group Lane Configurations Traffic Volume (vph) 370 Future Volume (vph) 520 55 240 135 5 370 10 5 0 deal Flow (vphpl) 1900 900 1900 900 1900 1900 1900 900 1900 Storage Length (ft) Λ ٥ 200 Λ n 200 Λ Λ Storage Lanes - 1 25 0 25 0 0 25 Taper Length (ft) 25 1752 Satd. Flow (prot) 0 0 0 0.243 Flt Permitted 0.837 0.843 Satd. Flow (perm) 448 1559 1497 Right Turn on Red No No No No Satd. Flow (RTOR) Link Speed (mph) 30 30 30 30 Link Distance (ft) 1604 920 838 182 Travel Time (s) 36.5 20.9 19.0 4.1 Confl. Peds. (#/hr) Confl. Bikes (#/hr) Peak Hour Factor Heavy Vehicles (%) 2% 2% 2% 3% 3% 3% 2% 2% 2% 7% 7% 7% Shared Lane Traffic (% n 626 0 261 152 0 402 n 16 Lane Group Flow (vph) n 6 ٥ Turn Type NA n+pt NA NA ot+ov NA I Protected Phases 6 2 8 58 9 Permitted Phases **Detector Phase** 6 6 2 8 58 4 Switch Phase Minimum Initial (s) 10.0 10.0 6.0 6.0 6.0 6.0 6.0 4.0 Minimum Split (s) 14.0 14.0 10.0 14.0 10.0 10.0 10.0 10.0 20.0 Total Split (s) 39.0 39.0 19.0 58.0 12.0 12.0 12,0 20.0 12.0 Total Split (%) 3% 3.3% 4.4% 3.3% 3.3% 3.3% Yellow Time (s) 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 All-Red Time (s) 1.0 1.0 1.0 1.0 1.0 1.0 1.0 Lost Time Adjust (s) 0.0 0.0 0.0 ሰበ 0.0 Total Lost Time (s) 4.0 4.0 4.0 4.0 4.0 Lead/Lag Lag Lag Lead Lead-Lag Optimize Recall Mode Min Min None Min None None None None None Act Effct Green (s) 28.0 45.8 45.8 8.4 6.8 Actuated g/C Ratio 0.43 0.70 0.70 0.13 0.40 0.10 v/c Ratio 0.80 0.45 0,12 0.03 0.64 0.10 Control Delay 27.0 7.0 33.0 25,3 34.5 Queue Delay 0.0 0.0 0.0 0.0 0.0 7.0 Total Delay 27.0 4.5 33.0 25.3 34.5 Los To. 34.5 Approach Delay 27.0 61 254 Approach LOS C . . . ıΑ C 115 22 Queue Length 50th (ft) 192 12 2 6 Queue Length 95th (ft) #374 #526 103 Internal Link Dist (ft) 1524 840 758 102 Tum Bay Length (ft) Base Capacity (vph) 1026 626 1531 199 683 191 Starvation Cap Reductn Spillback Cap Reductn 0 0 Storage Cap Reductn 0 0 0.61 0.03 0.59 0.08 Reduced v/c Ratio 0.42 0.10 ntersection Summary Area Type: Cycle Length: 90 Other Actuated Cycle Length: 65.4 Natural Cycle: 90 Control Type: Actuated-Uncoordinated Maximum v/g Ratio: 0.80 Intersection LOS: C Intersection Signal Delay: 20.7 ICU Level of Service C Intersection Capacity Utilization 6 Analysis Period (min) 15 # 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles. Splits and Phases: 101: Route 128 SB Ramps/Asheville Road & Grove Street

#1<sub>09</sub> ₽<u>Ø4</u> **₹** Ø2 12 s 58 s **₹** 105 PM

101. Route 120 OB Re	ampa//tanevii	iic rtoad d	Olove Oue						Timing Tion	Trockery Evening
	<i>→</i>	•	<b>✓</b>	• •	<b>†</b>	· / `	<b>L</b>	4		
		¥	•	•	•		· ·			
Lane Group	EBL EBT		VBL WBT	WBR NB			BL SBT	SBR Ø9		
Lane Configurations	4 <b>4</b> 1 215	45	<b>" ↑</b> 445 275	10 4	্ৰ	<b>7</b> 145	<b>♣</b> 5 2			
Traffic Volume (vph) Future Volume (vph)	1 215		445 275 445 275	10 4		145	5 2 5 2	1		
Ideal Flow (vphpl)	1900 1900	1900 1	900 1900	1900 190	0 1900 -		3 300   1900			
Storage Length (ft)	0		200		0	200	0	0		
Storage Lanes	0		17		0	1 1		0		
Taper Length (ft)	25		25	2	5		25	SP-MINE STATE OF THE SPACE OF T		
Satd. Flow (prot)	0 1802		770 1851	0	0 1732	1538	0 1812	- 0		
Flt Permitted	0.999		341		0.743		0.813		The control of the same of	
Satd, Flow (perm)	0 1800		635 1851		0 = 1344	1538	0 1518			والموارية والمراك والمراكبة
Right Turn on Red Satd. Flow (RTOR)		No		No		No		No	AND THE PERSON NAMED IN COLUMN TWO	
Link Speed (mph)	30		30	100000	30		30		Care Care and Adams	
Link Distance (ft)	1604		883		838		182	The state of the s	NAMES OF THE PERSONS	
Travel Time (s)	36.5		20,1	III SUUGA SAIRESAA SAIRESAA	19.0	in Automobio fortenes	4.1	ALCOHOLD WITH THE SHOP HAVE THE PARTY OF	Marie Colored	Turket de arbitential transport for 2000
Confl. Peds. (#/hr)	16			16						
Peak Hour Factor	0.92 0.92		0.92	0.92 0.9		0.92 0	.92 0.92	0.92		The second secon
Heavy Vehicles (%)	3% 3%	3%	2% 2%	2% 5%	% -5%	5%	0% 0%	0%		
Shared Lane Traffic (%)			Carlo		Zikimini ilikuwa zami	DEPOSITE OF THE RESERVOIS		A second second second		
Lane Group Flow (vph)	0 284	and the second section is the	484 310	San Maria San Carlo Company of the C	0 48		0 8	0		
Turn Type Protected Phases	Perm NA 6		n+pt NA 5 2	Pern	n NA		erm NA	er e		
Protected Phases Permitted Phases	6	2001/05/14/2017	ე 2		8	0.0	4	9		
Detector Phase	6 6		5 + 2		o 8 - 8 -	58	4 4		Navar ingles in wash	
Switch Phase	magnification of the second								mang bles pelistici is indice is isb	
Minimum Initial (s)	10.0 10,0		6.0 6.0	6.	0 6.0		6.0 6.0	4.0		
Minimum Split (s)	14.0 14.0		10.0 10.0	10.	0 10.0		0.0 10.0	20.0		MONEYA SEMEDIO NEGLECI SEMESTE SEMESTA SEMESTE SEMESTA SEMESTE SEMESTE SEMESTA SEMESTE SEMESTA
Total Split (s)	29.0 29.0		29.0 58.0	12.	0 12.0		2.0 12.0	20.0		
Total Split (%)	32.2% 32.2%		.2% 64.4%	13.3%	% 13.3%	13.		22%		
Yellow Time (s)	3.0 3.0		3.0	3.		APPRECIATION CONTRACTOR OF THE PARTY OF THE	3.0 3.0	3.0		
All-Red Time (s)	1.0 1.0		1.0 1.0	1.0	0 1.0		1.0 1.0	1.0		
Lost Time Adjust (s)	0.0		0.0 0.0		0.0		0.0	<u>. 1646 - 2044 - 20</u>		
Total Lost Time (s)	4.0		4.0 4.0		4.0		4.0		A MANAGEMENT OF THE PROPERTY O	PRANCIPLA NAMES OF THE PROPERTY OF THE PROPERT
Lead/Lag Lead-Lag Optimize?	Lag Lag	<u> Messille JL</u>	ead	Harris Harris di			process and the second			
Recall Mode	Min Min	N.	one None	None	e None	War and the same of the same o	ne None	None		
Act Effct Green (s)	15.2		10.4 41.9	S. Tarania and T. Tarania	8.1	29.5	8.1	None	And in the section of the section of	
Actuated g/C Ratio	0.27	(	0.72 0.74		0.14	0.52	0.14			
v/c Ratio	0.58		0.56 0.23	De Manufactura de Maria de Maria de Cara de Ca	0.25	0.20	0.04		AND SECURITION OF THE PARTY OF	market and instrument of the second
Control Delay	26.7		8.1 5.0		33.0	10.4	31.0	Jan Stein Line		
Queue Delay	0.0		0.0 0.0		0.0	0.0	0.0			
Total Delay	26.7		8.1 5.0		33.0	10.4	31.0			1960
LOS	C	nun kanana ya sa	A A		C	В	C			
Approach Delay	26.7		6.9		15.6	100	31.0	3.00		
Approach LOS	C 81	TOURS OF THE OWNER, THE	A 46 26	manifestation of the service of the	8 14	19	C 2	TO SHARE THE PARTY OF THE PARTY OF	TO SHEET THE SECOND	
Queue Length 50th (ft) Queue Length 95th (ft)	220		46 <u>26</u> 212 122		62	102	∠ 18			لمستحكك
Internal Link Dist (ft)	1524		803		758	102	102		HAVE TO BE THE PARTY OF THE PAR	
Turn Bay Length (ft)	3 1941		200			200			and the second of the second	
Base Capacity (vph)	907		027 1660		216	975	244			
Starvation Cap Reductn	0	commenced many management	0 0		0	0	0	TO THE RESERVE OF THE PARTY OF		
Spillback Cap Reductn			0 0		0.5		0			
Storage Cap Reductn	0	THE RESERVE OF THE PERSON NAMED OF THE PERSON	0 0		0	0	0	NACCES OF STREET		
Reduced v/c Ratio	0.31		).47 0.19		0.22	0.16	0.03		27000	
ntersection Summary				200					191	
	her Salas in 1994			C 3 / C C C C C C C C C C C C C C C C C	2	Light at			er Karama	
Cycle Length: 90		ence protest market from an or		AND THE PARTY OF THE PARTY OF		usada islahin bila	and the Property of the Paris	THE RESERVE OF THE PROPERTY OF THE PARTY OF		MANAGEMENT OF THE PARTY OF THE
		114 (175)			Si cremba comana					<b>1</b>
Actuated Cycle Length: 56.3		The Manual Company of the State		Mark Committee (Carlottee)	The state of the s					
Natural Cycle: 65			And the second section of the second					THE RESERVE OF THE PERSON OF T	THE RESERVE OF THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN	COLUMN TO SERVICE STREET, SANDERS OF THE SERVICE STREET, SANDE
Natural Cycle: 65 Control Type: Actuated-Uncoordi	nated		arote Language	no a la la la la Allina de la la con-		Land Market	فيكنفوا برواني فيأفلنك والراوكيد			
Natural Cycle: 65 Control Type: Actuated-Uncoordi Maximum v/c Ratio: 0.58	nated									
Natural Cycle: 65 Control Type: Actuated-Uncoordi Maximum v/c Ratio: 0.58 Intersection Signal Delay: 12.8			Intersection							
Natural Cycle: 65 Control Type: Actuated-Uncoordi Maximum v/c Ratio: 0.58 Intersection Signal Delay: 12.8 Intersection Capacity Utilization 5	53.8%		Intersection ICU Level o							
Natural Cycle: 65 Control Type: Actuated-Uncoordi Maximum v/c Ratio: 0.58 Intersection Signal Delay: 12.8	53.8%									
Natural Cycle: 65 Control Type: Actuated-Uncoordi Maximum v/c Ratio: 0.58 Intersection Signal Delay: 12.8 Intersection Capacity Utilization 5 Analysis Period (min) 15	53.8%	sheville Road &	ICU Level o							
Natural Cycle: 65 Control Type: Actuated-Uncoordi Maximum vic Ratio: 0.58 Intersection Signal Delay: 12.8 Intersection Capacity Utilization 5 Analysis Period (min) 15  Splits and Phases: 101: Route	53.8%	sheville Road &	ICU Level o						1.0	
Natural Cycle: 65 Control Type: Actuated-Uncoordi Maximum vic Ratio: 0.58 Intersection Signal Delay: 12.8 Intersection Capacity Utilization 5 Analysis Period (min) 15  Splits and Phases: 101: Route	53.8%	sheville Road &	ICU Level o				Ak <sub>Ø9</sub>		J. 304	
Natural Cycle: 65 Control Type: Actuated-Uncoordi Maximum vic Ratio: 0.58 Intersection Signal Delay: 12.8 Intersection Capacity Utilization 5 Analysis Period (min) 15  Splits and Phases: 101: Route	53.8%		ICU Level o				Ak <sub>09</sub>		£ 12 s	· ·
Natural Cycle: 65 Control Type: Actuated-Uncoordi Maximum vic Ratio: 0.58 Intersection Signal Delay: 12.8 Intersection Capacity Utilization 5 Analysis Period (min) 15  Splits and Phases: 101: Route	53.8%	1.	ICU Level o	of Service A			∯ 20 s			

Riverside Station Development :: 10865.03 101: Route 128 SB Ramps/Asheville Road & Grove Street

101. 1(00to 120 02 ) (dilipos to	icynic read	a Grove Greece			1 /	
<i>•</i>	→ >	<b>* *</b>	<b>~ ^ 1</b>	· / ·	• 🗼 🍫	
Lane Group EBL	EBT EBR	The state of the s	WBR NBL NB	r nbr sei	SBT SBR	Ø9
Lane Configurations Fraffic Volume (vph). 5	<b>4</b> }- 150 65	230 115	5 35		<b>4</b> )	The first of the second se
Future Volume (vph) 5	150 65	230 115	5 35	5 240 10		
the same of the second state of the same same state of the same state of the same same same same same same same sam	1900 1900		1900 1900 190			
Storage Length (ft) 0 Storage Lanes 0	0	200	0 0	200 (		
Taper Length (ft) 25		25	25	25	)	
Satd, Flow (prot) 0  Flt Permitted 0	1804 0 0.995	1787 1868 0.398	0 0 180 0.76	2 1599 ( 7	0.849 0.849	是一种,也是不是是一个种的原义。 地名美国
Satd. Flow (perm) 0	1797 0	749 1868	0 144	1599 (	) 1600 0	
Right Turn on Red Satd. Flow (RTOR)	No		No	No	No	
Link Speed (mph)	30	30	3(	)	30	
Link Distance (ft) Travel Time (s)	1604 36.5	883 20.1	75 17.		182 4.1	
Confl. Peds. (#/hr) 4		20.1	4			
Peak Hour Factor 0.92 Heavy Vehicles (%) 1%	0.92 0.92 1% 1%	0.92 0.92 1% 1%	0.92 0.92 0.93 1% 1% 1%		2 0.92 0.92 5 0% 0%	
Heavy Vehicles (%) 1% Shared Lane Traffic (%)	170 170	170 170	170 170 17	i 176 U7	1 . U70 . U70	
Lane Group Flow (vph) 0	239 0	250 130	0 0 4			
Turn Type Perm Protected Phases	NA 6	pm+pt NA 5 2	Perm NA		NA 4	9
Permitted Phases 6		2	8	4		
Detector Phase 6 5 5 Switch Phase	6	5 2	8 11111 8	5.58	41	
Minimum Initial (s) 10.0	10.0	6.0 10.0	6,0			4.0
	14.0 34.0	10.0 14.0 23.0 57.0	10.0 <b>1</b> 0.0 13.0 13.0			20.0
Total Split (%) 37.8% 3	7.8%	25.6% 63.3%	14.4% 14.4%	14.4%	14.4%	22%
Yellow Time (s) 3.0 All-Red Time (s) 1.0	3.0 1.0	3.0 3.0 1.0 1.0	3.0 3.0 1.0 1.0			1.0
All-Red Time (s) 1.0 Lost Time Adjust (s)	0.0		1.0 1.0 		0.0	
Total Lost Time (s)	4.0	4.0 4.0	4.(	)	4.0	
Lead/Lag Lag Lead-Lag Optimize?	Lag	Lead			1	
Recall Mode Min	Min	None Min	None None			None
Act Effct Green (s) Actuated g/C Ratio	12.9 0.26	29.4 29.4 0.59 0.59	9.0 0.18		6.9 0.14	
v/c Ratio	0.51	0.36 0.12	0.16	0.32	80.0	
Control Delay Queue Delay	22.5 0.0	7.4 5.9 0.0 0.0	25.0 0.0		25.9 0.0	
Total Delay	22.5	7.4 5.9	25.0	10.8	25.9	
LOS Approach Delay	C 22.5	A A 6.9	12.8	В	C 25.9	
Approach LOS	С	A A	English and the second	A STATE OF THE PARTY OF T	С	
Queue Length 50th (ft) Queue Length 95th (ft)	51 173	22 11 104 56	52		. 4	
Internal Link Dist (ft):	1524	803	679	)	102	
Turn Bay Length (ft) Base Capacity (vph)	1179	200 876 1738	283	200 1052	315	
Starvation Cap Reductn	0	0 0	20.	0	0	
Spillback Cap Reductn	0	0 0		0 0	0	
Storage Cap Reductn Reduced v/c Ratio	0.20	0 0 0.29 0.07	0.15	The second section of the second section will be second section and the second section	0.05	
ntersection Summary	***************************************					and the State
Area Type: Other			or warer we			
Cycle Length: 90 Actuated Cycle Length: 49.5			ga manananan kacamatan ar set		do Arma dilectora della	
Natural Cycle: 60			The second of the second secon			
Control Type: Actuated-Uncoordinated		ld April Victor alle				
Maximum v/c Ratio: 0.51 Intersection Signal Delay: 13.1		Intersection LO				
Intersection Capacity Utilization 42.4%		ICU Level of Se		C. Mark South Self-Construction of		
Analysis Period (min) 15						
Splits and Phases: 101: Route 128 SB Ram	nps/Asheville Road	& Grove Street		<del> </del>		
₹ @2					<b>A</b> Ø9	₩ 04
57 s	- I A			20	S	13s
Pos						`Yøs

t ٩ NBR EBT WBL WBT NBT SBT Lane Group Lane Configurations Traffic Volume (vph) 240 520 Future Volume (vph) 55 240 135 5 370 10 0 5 1900 deal Flow (vphpl) 1900 900 1900 1900 900 QUU 900 1900 Storage Length (ft) n Λ 200 Λ n 200 Λ ٥ Storage Lanes 0 Taper Length (ft) 25 25 25 25 Satd. Flow (prot) 1752 Ö 0 0 Fit Permitted 0.253 0.832 Satd. Flow (perm) 467 1550 Right Turn on Red No No No No Satd, Flow (RTOR) Link Speed (mph) 30 30 30 30 1604 920 838 182 Link Distance (ft) Travel Time (s) 36.5 20.9 19.0 4.1 Confl. Peds. (#/hr) Confl. Bikes (#/hr) 1 1 Peak Hour Factor Heavy Vehicles (%) 3% 2% 2% 2% 3% 3% 2% 2% 2% 7% 7% 7% Shared Lane Traffic (% 261 626 152 n n 402 0 16 0 Lane Group Flow (vph) Λ ٥ 6 Turn Type NA n+pt NA ot+ov NA Protected Phases 6 57 3 9 Permitted Phases **Detector Phase** 6 6 5 2 57 3 3 Switch Phase Minimum Initial (s) 10.0 10.0 6.0 10.0 6.0 6.0 6.0 6.0 4.0 Minimum Split (s) 14.0 14.0 10.0 14.0 10.0 10.0 10.0 10.0 20,0 34.0 34.0 20.0 Total Split (s) 14.0 48.0 12.0 12.0 10.0 10.0 Total Split (%) .8% 5.6% 3.3% 1.1% .8% 3.3% 1.1% 3% 3.0 Yellow Time (s) 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.0 All-Red Time (s) 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 0.0 0.0 Lost Time Adjust (s) 0.0 0.0 0.0 Total Lost Time (s) 4.0 4.0 4.0 4.0 4.0 Lead/Lag Lag Lag Lead Lag Lag Lead Lead Lead-Lag Optimize Recall Mode Min Min None Min None None None None None Act Effct Green (s) 30.8 45.2 45.2 8.2 6.2 Actuated g/C Ratio 0.47 0.68 0.68 0.12 0.34 0.09 v/c Ratio 0.73 0,50 0.12 0.03 0.74 0.10 Control Delay 23.8 11.0 6,4 31.3 32.4 33.6 Queue Delay 0.0 0.0 0.0 0.0 0.0 0.0 Total Delay 23.8 11.0 31.3 32.4 33.6 6.4 OS В 32.4 33.6 Approach Delay 23.8 93 Approach LOS 22 Queue Length 50th (ft) 158 120 12 2 5 #148 #426 Queue Length 95th (ft) #587 Internal Link Dist (ft) 1524 840 758 102 Turn Bay Length (ft) Base Capacity (vph) 856 519 1254 192 541 165 Starvation Cap Reductn Spillback Cap Reductn 0 n n 0 Storage Cap Reductn 0 Ö 0 0.74 0.10 0.73 0.50 0.12 0.03 Reduced v/c Ratio intersection Summary Other Area Type: Cycle Length: 90 Actuated Cycle Length: 66 Natural Cycle: 90 Control Type: Actuated-Uncoordinated Maximum v/c Ratio: 0.74 Intersection LOS: C Intersection Signal Delay: 22.2 ICU Level of Service C Intersection Capacity Utilization 6 Analysis Period (min) 15 # 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles. Splits and Phases: 101: Route 128 SB Ramps/Asheville Road & Grove Street **≪**₽<sub>Ø7</sub> ₩ Ø2 #R09 ₽<sub>Ø3</sub>

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9	100	100	Metal Cal	
Lane Configurations Traffic Volume (vph)		<b>4</b> > 215	45	<b>ኝ</b> 445	<b>1&gt;</b> 275	10	40	र्व	7 145	E	<b>4</b> } 2			and a pending	CONTRACTOR OF THE		
Future Volume (vph)	1	215	45	445	275 275	10	40	5 5 5	145	5 5	2	1					
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900					
Storage Length (ft) Storage Lanes	0		0	200 1		0	0 0	1.7	200 1	0		0					
Taper Length (ft)	25			25			25		Material September 1997	25		ALLEGA MARIE AND			io inventamentale, speine	(SECONDARY CHIRALES C	
Satd. Flow (prot) Fit Permitted	0	1802 0.999	0	1770 0.283	1851	0	0	1732 0.743	1538	0	1812	0				لفتحدث	
Satd. Flow (perm)	0	1800	0	527	1851	0	. 0		1538	0.7	1868	0					
Right Turn on Red Satd, Flow (RTOR)			No			No	er og grande		No			No			000000000000000000000000000000000000000		
Link Speed (mph)		30			30	W. 1525.		30			30						
Link Distance (ft)		1604			883	<b>第一规划</b>		838			182		fat 1				
Travel Time (s) Confl. Peds, (#/hr)	16	36.5			20.1	16	Level 1	19.0			4.1		10 L	1540		NUSAS 0011	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92					
Heavy Vehicles (%) Shared Lane Traffic (%)	3%	3%	3%	2%	2%	2%	5%	5%	5%	0%	0%	0%	**************************************		21.02.11	Ale in	
Lane Group Flow (vph)	0	284	0	484	310	0	0	48	158	0	A STATE OF THE PARTY OF THE PAR	Ō		and the same of th	American Action		Perpose and the second
Turn Type Protected Phases	Perm	NA 6		pm+pt 5	NA 2		Perm	NA 7	pt+ov 5.7	Perm	NA 3		o de la companya de	學服務地別	The state of the state of		
Permitted Phases	6			2	and the second	Zan Se in more communication of the	7		U	3							
Detector Phase	6	6		5	2		7	7	5.7	3	3						
Switch Phase Minimum Initial (s)	10.0	10.0		6.0	6.0		6.0	6.0		6.0	6.0		4.0				
Minimum Split (s)	14.0	14.0		10.0	10.0		10.0	10.0		10.0	10.0		20.0	A STATE OF THE STA			
Total Split (s) Total Split (%)	20.0 22.2%	20.0	第32.11	28.0 31.1%	48.0 53.3%		12.0 13.3%	12.0 13.3%		10,0 11,1%	10.0 11.1%		20.0 22%	ALE PURCHER NOTE AND	distributes middle	Strandens 28 (St.	
Yellow Time (s)	3.0	3,0		3.0	3.0		3.0	3.0		3.0	3.0		3.0				
All-Red Time (s)	1.0	1.0		1.0	1.0	CHARLESTON THE	1.0	1.0		1.0	1.0	nanos de la compansión de	1.0	er en	na ostanomene		
Lost Time Adjust (s) Total Lost Time (s)	والنفيدة ويوانين	#0.0 4.0		0.0 4.0	0.0 4.0	man light year and		0.0 4.0		december 110	0.0 4.0	Control of the Contro		**************************************			
Lead/Lag	Lag	Lag		Lead			Lag	Lag		Lead	Lead	Orom y			The state of		
Lead-Lag Optimize? Recall Mode	Min	Min		None	None		None	None		None	None		None				
Act Effct Green (s)		15.2		40.9	40.9	a constant and	1.010	7.8	33.5	7,010	6.3		1010	San Marca III		and the same of th	
Actuated g/C Ratio v/c Ratio		0.25 0.64		0.67 0.61	0,67 0,25		was also	0.13 0.28	0.55 0.19		0.10			Da Eromonia			
Control Delay		32.4		12.7	7.0		121	34,4	10.8		32.9						
Queue Delay	qraeeeee	0.0		0.0	0.0		TO SUPERIOR CONTRA	0.0	0,0	SICCESION PROPERTY.	0.0	contributed assessed	An derivativities and de	nancos controles		en proposition of	
Total Delay LOS	and a different	32,4 C		12,7 B	7,0 A	L. Children of the Color		34,4 C	10.8 B		32,9 C			And the Control of th	200	A-THER RESIDENCE	
Approach Delay		32.4			10.5			16.3			32.9						
Approach LOS Queue Length 50th (ft)	A VENT	C 86		47	B 26			B 15	22		C				the age of the control of	PRINCIPLE DE LA	
Queue Length 95th (ft)		#302	orinila cuationistics	#344	162			62	104	4 maria 10 da 40 da 40 d	18	in the second	J. 12. 10. 10. 10. 10. 10. 10. 10. 10. 10. 10		NON-SELLANT PASS		articol Control
Internal Link Dist (ft) Turn Bay Length (ft)		1524	210	200	803			758	200		102		-		100		
Base Capacity (vph)		497		866	1405			185	904		193			1	. 1		
Starvation Cap Reductn	medical sections	0		0	0			0	0	en ande en en en help de	0			e sa enema		a na zavjejan godine	
Spillback Cap Reductn Storage Cap Reductn		0		0 0	0			0 0	0 0		0				and the soul		
Reduced v/c Ratio		0.57		0.56	0.22			0.26	0.17	Tak conse	0.04						
ntersection Summary			600 2000														
Area Type: Oth	ier,				<b>.</b> (2)			15.4					فأنجأك				
Cycle Length: 90 Actuated Cycle Length: 61.2		and the second		or in the s								Cr. Alt			ATT TO SHAPE		
Natural Cycle: 80	micron Securita mana									1 - Page 2 and 1 and 1 and 1	SECTION OF THE SECTION	ACT AUTOMITE SCHOOL	the second second	Charles and the control of the contr			OFFICE OF THE PARTY OF T
Control Type: Actuated-Uncoordin Maximum v/c Ratio: 0.64	nated				dia martin			A SHAPPING								and the second	S. September 1
Intersection Signal Delay: 16.4					ersection l												
Intersection Capacity Utilization 5 Analysis Period (min) 15	3.8%		Secondary would	ICI	J Level of	Service A				1 02 THE STREET	A CHARLES IN THE REAL PROPERTY.			v v m			
# 95th percentile volume exceed	ds capacit	y, queue r	may be long	jer.													
Queue shown is maximum afte		***************************************				1.40		0					din Hati		1		
Splits and Phases: 101: Route	128 SB R	amps/Ash	eville Road	& Grove	Street			4.2					T <sub>rea</sub>		<b>12</b>		$\neg$
₩ 02 48 s				a Die Will aller		A 250 120 200		. <b>∱</b> Å.	Ø9				∳ <sup>≽</sup> ø3	188375	12 s		
		Section 1995		A <sub>106</sub>			SOURCE OF STREET	20.5	2000							784	
<b>€</b> €05 28 s	Market less		2	06 0 s			51,77 (136)	6									

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9	4107			
Lane Configurations	pulsus Ess	<b>4</b> > 150	· · · · · · · · · · · · · · · · · · ·	<b>*</b>	<b>%</b> 115	·	oe'	4	<b>7</b> 240	10	<b>₽</b>		on the Palmin II		BOWN STREET		
Traffic Volume (vph) Future Volume (vph)	5 5	150	65 65	230 230	115	5	35 35	- 5 5	240	10	5	1					
Ideal Flow (Vphpl)	1900 0	1900	1900 0	1900 200	1900	1900 0	1900 0	1900	1900 200	1900 0	1900	1900 0				rou tar	
Storage Length (ft) Storage Lanes	0		0	1		0	0		200	0		0.0					
Taper Length (ft) Satd. Flow (prot)	25 0	1804	0	25 1787	1868	0	25	1802	1599	25 0	1826	0		and a second many			
Fit Permitted	Ų	0.995		0.380	1000	, U	U	0.756	M0000000000000000000000000000000000000	ONE WAS THE SHOPP IN A	PANALOGIC PRINCESSI	C			aramatically now li		
Satd, Flow (perm) Right Turn on Red	. 0	1797	0 No	715	1868	0 No	0.	1422	1599 No	0	1885	0 No		outer all the			
Satd. Flow (RTOR)		an allow and a mark	IVO		and the state of t	NO						T				il. day.	
Link Speed (mph) Link Distance (ft)		30 1604			30 883	THE REPORT OF		30 759			30 182						200
Travel Time (s)		36.5			20.1	A similal de Guicia	e Carlo Contillación	17.3	ealliosimino s etti.	sinidais Sidd Sisti	4.1		and I supple				Second .
Confl. Peds. (#/hr) Peak Hour Factor	4 0.92	0.92	0.92	0.92	0.92	4 0.92	0.92	0.92	0.92	0.92	0.92	0.92					
Heavy Vehicles (%)	1%	1%	1%		1%	7.71%	1%	1%	1%	0%	0%	0%		A Carro Grand			
Shared Lane Traffic (%) Lane Group Flow (vph)	0	239	0	250	130	Ō	0	43	261	0	17	0					6213
Tum Type	Perm	NA	ŗ	m+pt	NA		Perm	NA	pt+ov	Perm	NA						Manage of the last
Protected Phases Permitted Phases	6	6		5 2	2			7	5.7	. 3	3		9				
Detector Phase	6	<b>.</b> 6 .		5	2.		7	7	57	3	3	an a partire and	ALC: N				
Switch Phase Minimum Initial (s)	10.0	10.0		6.0	10.0		6.0	6.0		6,0	6.0		4.0	ery symptomys		STATE OF	
Minimum Split (s)	14.0	14.0	J. 200 200 200 200 200 200 200 200 200 20	10.0	14.0		10.0	10.0		10.0	10.0		20.0	HERRICAN TO A PERSON			
Total Split (s) Total Split (%)	28.0 31.1%	28.0 31.1%			48.0 53.3%		12.0 13.3%	12.0 13.3%		10.0 11.1%	10.0 11.1%		20.0 22%				
Yellow Time (s)	3.0	3,0		3.0	3.0		3,0	3.0		3,0	3,0		3.0		MINERAL PROPERTY.		
All-Red Time (s) Lost Time Adjust (s)	1.0	1.0 0.0		1.0	1.0		1.0	1.0		1.0	1.0		1.0				
Total Lost Time (s)		4.0		4.0	4.0	CANADA INTERNA		4.0	aunrest innevers		4.0				were the second	ean Calair Tanii A	2071
Lead/Lag Optimize?	Lag	Lag		Lead			Lag	Lag		Lead	Lead	100 may 1 miles		1971			
Recall Mode	Min	Min		None	Min		None	None	25.6	None	None 6.6		None			No.	
Act Effct Green (s) Actuated g/C Ratio		13.7 0.27	l Lagranda	30,7 0.59	30.7 0.59			8.6 0.17	0,50		0.13		n et silen	1.5			
v/c Ratio		0.50	THE PERSON NAMED IN COLUMN TWO	0.36	0.12	CONTRACTOR CONTRACTOR		0.18	0.33 13.6	distriction of the	0.07 29.6		2000				
Control Delay  Queue Delay	uddistance de	23.0 0.0	w'a 1941) is aminos de Caracter	8.6 0.0	7.1 0.0	(عالد ساعد المحددة	is an about the	· 28.4 0.0	0.0		0.0	named in Notice and	154 (Career 197				السفالة
Total Delay		23.0	Lingi.	8.6			Total	28,4 C	13.6 B		29.6 C		Joseph W.		المناسبين المناسبين		2001
LOS Approach Delay		C 23.0		A	A 8.1			15.7		12	29,6			ar arang ar way			
Approach LOS		C 49	Manthagain and A	20	A 10		The state of the s	B 9	28	and high significan	C 4	**************************************					
Queue Length 50th (ft) Queue Length 95th (ft)		188	datu siin datusii	131	71	urma anta te relectue	196198120	56	194		30						orress
Internal Link Dist (ft)		1524		200	803		and managed a	679	200	A SECTION AND ADDRESS OF THE PARTY OF THE PA	102						
Turn Bay Length (ft) Base Capacity (vph)		924		793			5000	244	924		242	33				##   ##     #	
Starvation Cap Reductn Spillback Cap Reductn		0		0	0			0	0		0						
Storage Cap Reductn		0		0	0	dio amatanti		0	0		0						
Reduced v/c Ratio		0,26		0.32	0.08		and the second	0.18	0.28		0.07		Alexandra de la constanta de l La constanta de la constanta d				
Intersection Summary Area Type: Ot		ver a liste														ong saleks (1955)	
Cycle Length: 90	(lel	A. T. MARSHALL		index and design			tio almostació					MANAGEMENT OF STREET	to indicate proveds on the			Anterior California intrase	CHEST
Actuated Cycle Length: 51.6 Natural Cycle: 65													أخشم البالية	ad Salari of Land			
Control Type: Actuated-Uncoordi	nated					- 15 <sub>4-1</sub> 1	11120										
Maximum v/c Ratio: 0.50 Intersection Signal Delay: 14.7.				Inte	rsection L	OS: B		1332					T. T. Friend				
Intersection Capacity Utilization 4	2.4%				Level of S											INCOME.	
Analysis Period (min) 15					140,000												last II
	128 SB R	Ramps/Ash	eville Road	& Grove	Street												7
<b>▼</b> Ø2		of the second color and the color and the	Of a such the price and a			en e		A1	lø9				<b>↓</b> № <sub>Ø3</sub>	a de la companya de	<b>₹\$</b> Ø7		j 51
48 S		TA			CID DISSESSED		45.0	€ 20 s					u b	A 858.70 888		COLUMN TO LEGISLA	2
<b>€€</b> 05 20 s			5					- S									┙

