Public Facilities Committee Agenda

City of Newton
In City Council

Wednesday, April 6, 2022

Note Early Start time 6 pm

The Public Facilities Committee will hold this meeting as a virtual meeting on Wednesday, April 6, at 6:00 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

Item Scheduled for Discussion:

Referred to Public Facilities and Finance Committees

#170-22 **Appropriate funds for the replacement of the residential water meter system**
HER HONOR THE MAYOR requesting authorization to appropriate and expend an amount of funds and authorize a general obligation borrowing of an equal amount for the replacement of the residential water meter system and project oversight and authorization to apply any premium received upon the sale of the bonds or notes, less the cost of preparing, issuing, and marketing them, and any accrued interest received upon the delivery of the bonds or notes to the costs of the project and

Start time for Public Hearings 7 pm

Public Hearing

#203-22 **Verizon petition for a Grant of Location on Pleasant Street**
VERIZON petitioning for a grant of location to relocate one jointly-owned pole, (P. 358/23) 7' ± in a southerly direction from its existing location to accommodate a new driveway. (Ward 6)

Public Hearing

#240-22 **Request for a drain main extension in Newtonville Avenue**
AUREL GARBAN, on behalf of Garrison Equity, LLC, 1334 Beacon Street, Brookline, petitioning for a drain main extension in NEWTONVILLE AVENUE from the end of the line manhole west of property to be extended easterly ±180 ft to a manhole in front of the 164 Newtonville Avenue. (Ward 1)
PETITIONER TO PAY ENTIRE COST

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: jfairley@newtonma.gov or (617) 796-1253. The city's TTY/TDD direct line is: 617-796-1089. For the Telecommunications Relay Service (TRS), please dial 711.

Chair's Note: *The Committee will be joined by Public Safety & Transportation to discuss items #239-22 and #243-22*

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.

#242-22 **Discussion on the Commonwealth Avenue Carriageway Project**
COUNCILORS GENTILE, KRINTZMAN, AND MARKIEWICZ requesting an update from the Commissioner of Public Works and the Planning Director on the Commonwealth Avenue Carriageway project along with a discussion about the future of the traffic light at Ash Street.

Referred to Public Safety & Transportation and Public Facilities Committees

#243-22 **Discussion regarding MassDOT's intersection project**
HER HONOR THE MAYOR requesting a discussion of MassDOT's proposed modification to the roundabout design located at the Grove Street intersection from the I-95 SB off-ramp and Quinobequin Road consistent with the requirements of Riverside Special Permit #27-20(2), Condition 14c.

Respectfully submitted,

Alison M. Leary, Chair

170-22

RUTHANNE FULLER
MAYOR

City of Newton, Massachusetts
Office of the Mayor

Telephone
(617) 796-1100
Telefax
(617) 796-1113
TDD
(617) 796-1089
E-mail
rfuller@newtonma.gov

February 14, 2022

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

Councilors:

I respectfully submit a docket item to your Honorable Council requesting authorization to appropriate and expend an amount of funds yet to be determined and authorize a general obligation borrowing of an equal amount for the replacement of the residential water meter system and project oversight.

Further, I request that your Honorable Council authorize any premium received upon the sale of the bonds or notes, less the cost of preparing, issuing and marketing them, and any accrued interest received upon the delivery of the bonds or notes be applied to the costs of the project being financed by the bonds or notes and to reduce the amount authorized to be borrowed for the project by a like amount.

The requested funding will provide for new meters and endpoints for all residential properties, installation of these meters and endpoints, a software and billing interface including a customer portal, training, and associated meter reading equipment. Additional information on the amount of funding will be forthcoming as the bidding process continues.

Thank you for your consideration of this matter.

Sincerely,

Ruthanne Fuller

Ruthanne Fuller
Mayor

Newton Water Meter System Timeline 2009 – 2022

2009

Newton selects Elster/AMCO meters and endpoints. RTM endpoints and C700 meters.

- This technology is a mesh network on a public frequency.
- The mesh tech failed to give us the guaranteed 95% reading rate.
- Frequent failures due to battery depletion.

2012-2013

Elster/AMCO contracts with KP Electronics to replace failed RTM endpoints

- KP Electronics provides a private frequency endpoint tech with greater reliability and increased range.
- Newton reaches it's 95% reading rate (over a 28 day window)

2013-2015

- KP Electronics provides timely software updates to keep system operating well
- Transmitter warranty service has a 30 day turnaround time.
- BETA program to test out two-way MTU systems offered to Newton

2015-2017

- Newton introduces the Irrigation Meter Program to residents
    - This increases the work load on our AMI system
    - Thousands of applicants in the first two years

2017

- March
    - KP Electronics announces Mueller acquisition of AMI software system
        - Muller takes over MegaNET AMI system but promises full support
    - KP Software support and RMA Warranty service ends
- November
    - Newton's AMI system has software and hardware issues
        - RAM shortage
        - Hard Disk Drive space issues
    - Limited support from Mueller
        - No one is fully trained on MegaNET to solve problems

2018

- January
    - Ober Water Tower Antenna has serious issues
        - Transmissions per day drop from 30,000 to 2,000
        - Residents begin to complain of estimated bills in area around Ober Tower

- August 2018
    - Support from Mueller is unacceptable. No solutions offered.
    - Residents have endured three quarters of estimated bills around Ober Tower
    - Mueller does not return RMA warranty units and offers no explanation
- September
    - Full report of on-going AMI system issues sent to Mueller HQ. Department heads copied
        - Failure of Ober Tower
        - RMA Process delays
        - 30,000 endpoint threshold recommendations
        - Growing list of non-reporting endpoints due to lack of RMA warranty replacement
        - Request assistance in replacing non-active endpoints with Mueller supplied MTUs
- October
    - Mueller responds to full report letter
        - Will send representatives to troubleshoot tower concerns
        - RMA clarification – 10 years Full, 10 years pro-rated
        - Acknowledges 30,000 endpoint limitation in KP system
        - Mueller suggests we purchase endpoints as this will be faster than receiving RMA warranty units. Will not send reps to assist in replacement process.
- November
    - Mueller & Newton meet in person at Utilities to discuss issues 11/13/2018
        - Mueller believes that we need a new antenna at Ober & Stanton
        - Mueller will look into a system upgrade (>30,000 endpoints)

2019

- March
    - Mueller recommends replacement antennas at three sites
        - Paid for by Utilities, installed by private contractor
        - Stanton, Ober, Recycling Center
    - Computer failures at:
        - Willow Fire HQ
        - Stanton
        - Ober
    - Need to pay for replacement antenna computers – Only two year warranty
- July
    - Mueller proposes a $30,000 system upgrade to fix numerous issues.
        - Includes system updates to allow for more than 30,000 endpoints
        - New Two-way endpoint deployed to Newton.

- September
    - System update completed
    - Results
        - 30-40% drop in communication with antennas city wide
        - Residents around City Hall, Waban Hill, and Fire HQ see more estimated bills.
        - No explanation available from Mueller. KP is their tech support and there is a delay in solving issues.
- November
    - Total failure of Stanton Tower. New computer is non-functional.
        - Residents west of Stanton Tower (Wellesley border) have high amount of estimated bills.
    - City Hall main AMI system computer crashes
        - Zero disk space, ballooning system file error.
        - No support from Mueller
    - Lead contact at Mueller (Brian Harwood) refuses to honor RMA warranty on endpoints.
        - Out of 559 units sent, 5 accepted and returned
            - Sites short wire contact voids warranty
- December
    - List of issues sent to Mueller
        - System upgrade failure
        - Four month delay on purchasing new endpoints
        - Ten month delay on returning RMA warranty units
        - Warranty process not being honored
    - Vice President of Mueller (Jon DeYarman) responds to Newton's issues
        - Will honor warranty in full
        - Will prioritize RMA warranty shipments
        - Will send employees to diagnose failing towers

2020

- January
    - Upgrade of City Hall computers
        - Move to Virtual Machines with IT support
        - Fixes RAM & Disk space issues
        - Improves speed of meter software
- June
    - Antennas are still running at reduced capacity
    - Need to flash five computer motherboards
        - Completed by Utilities & KP (Remote)

- September
    - City Hall computers are upgraded and operational
    - Software upgrade applied to MCM Meter Reading Utility
        - Lost all data prior to December 2019
        - KP/Mueller unable to recover
- November
    - Failure of Mueller customer support
        - Mueller looses key IT support help during move to Atlanta
        - Shipment dates for MTUs pushed out to 12+ months
        - Ted Jerdee sends letter to Mueller demanding assistance
- December 2020
    - 8 additional antennas installed by contractor paid for by Mueller
        - Improves communication from two-way endpoints
        - Does not improve legacy endpoint traffic

2021

- Utilities reaches out to new AMI system operators
    - Begins pilot program studies on next AMI/AMR system
    - Failure rate of existing Mueller AMI is at 53% of all endpoints
- RMA Warranty replacement shipments delayed
    - Expected turnaround time is 12-16 months
    - We are owed 4,000+ endpoints

City of Newton
Water Meter Replacement Budget

Engineering

Procurement of Meter Installer				$ 15,000.00	
Water Meter and AMI Endpoint Installation Administration				$ 175,000.00	
					$ 190,000.00

Materials

Neptune R900 RF Meter Interface		28793	$ 97.81	$ 2,816,243.33	
Neptune R900 Gateway V4 data Collectors		8	$ 26,000.00	$ 208,000.00	
					$ 3,024,243.33
Residential					
5/8 x 3/4	Neptune T-10 Meter	17716	$ 129.50	$ 2,294,222.00	
3/4 NeptuneT-10 Meter		5933	$ 195.68	$ 1,160,969.44	
1 Neptune T-10 Meter		4216	$ 270.50	$ 1,140,428.00	
1-1/2 Neptune Mach 10 Meter		479	$ 598.56	$ 286,710.24	
2 Neptune Mach 10 Meter		449	$ 729.50	$ 327,545.50	
					$ 5,209,875.18
Neptune 360 Advanced AMI Set-up		1	$ 6,892.00	$ 6,892.00	
Neptune 360 Advanced AMI cost per end point per year		28793	$ 2.38	$ 68,527.34	
					$ 75,419.34
Neptune R900 Belt Clip Transceiver		3	$ 4,000.00	$ 12,000.00	
Neptune MXR920 Mobil Data Collector		1	$ 10,000.00	$ 10,000.00	
					$ 22,000.00
Large Commercial					
3" Neptune Mach 10 Meter		23	$ 2,546.57	$ 58,571.11	
4" Neptune Mach 10 Meter		26	$ 3,273.20	$ 85,103.20	
6" Neptune Mach 10 Meter		32	$ 5,526.45	$ 176,846.40	
8" Neptune Mach 10 Meter		18	$ 8,617.66	$ 155,117.88	
10" Neptune Mach 10 Meter		1	$ 10,766.24	$ 10,766.24	
12" Neptune Mach 10 Meter		1	$ 12,546.17	$ 12,546.17	
2" Neptune Mach 10 Meter		17	$ 729.50	$ 12,401.50	$ 511,352.50

Installation

Install Residential Meters		28973	$ 200.00	$ 5,794,600.00	
Install Large Commecial meters		118	$ 2,500.00	$ 295,000.00	$ 6,089,600.00
					$ 15,122,490.35
10% Contingency					$ 1,500,000.00
			Total		**$ 16,622,490.35**

City Council Meeting
Department of Public Works

Water Meter System Replacement Program

April 4, 2022

ENVIRONMENTAL PARTNERS
— An Apex Company —

Agenda

- INTRODUCTION TO WATER METER TERMINOLOGY
- METER HISTORY IN NEWTON
- PROPOSED METER REPLACEMENT PROGRAM
- QUESTION & ANSWER

Water Meter Terminology

Water Meter Terminology

- Water Meter

- Meter Transmission Unit (MTU)
  - Transmit readings at intervals to be read by drive-by or fixed network system

- Advanced Metering Infrastructure (AMI)
  - Real-time data and alerts for customer service
  - Billing Frequency
  - Two types: cellular and fixed network

- Data Processed & Billed

Meters

- Moving parts subject to wearing by friction
  - Residential and commercial
  - Irrigation or fire
  - Batteries for MIUs, lifespan of 15-20 years
- Results in loss of accuracy over time
- MassDEP recommends replacement every 10 years (5/8”-1” sizes)
- AWWA Accuracy Standards
  - New 95-101%, 5 yr. warranty (5/8”-1” sizes)
  - Repaired >90%, 10 yr. warranty from purchase date
  - Shorter warranties typically on older meters and also for commercial meters (sizes 1.5” and larger)

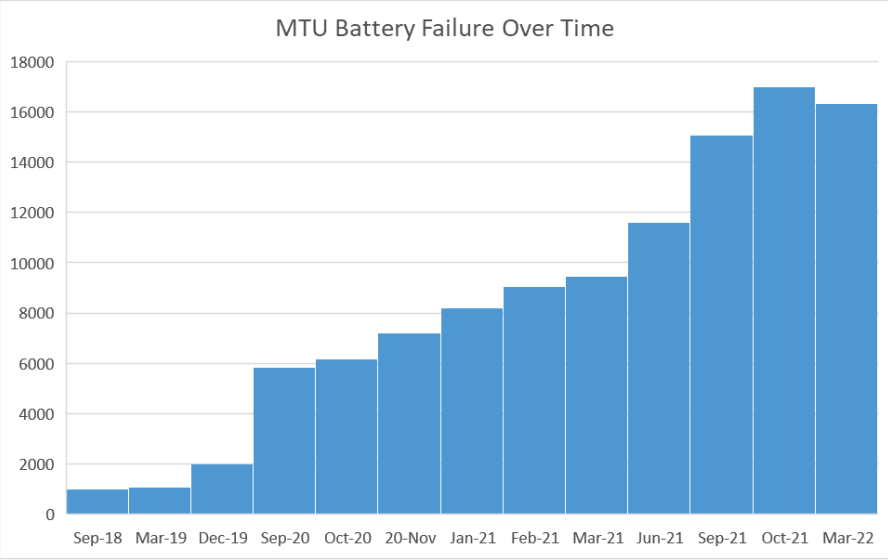
Meter History in Newton

Water Meters by Size

- Current Meters by Size – Total 28,911 meters
  - 5/8": 17,716
  - 3/4": 5,933
  - 1": 4,216
  - 1.5": 479
  - 2": 449
  - Large Meters (3"+): 118
- Irrigation Meters: 3,900 approx.
- Current Annual MWRA Assessments
  - Water: $13.78M
  - Sewer: $22.49M

Water Meter History in Newton

- 2009 – Last replaced all water meters via contract installer
- 2012-2013 – Replaced all outside MIUs to increase range
- 2018 – MTU Failures Began



Proposed Meter Replacement Program

Benefits of a Meter Replacement Program

- Increased accuracy of new meters
  - Reduction of Unaccounted-for Water
  - Right-Size larger meters
- New Technology to Increase Reading & Billing Efficiency
- Standardization of all meters in Newton
- Installation program will locate and fix illegal/unregistered water connections.
- Customer Portal
  - Residents can track their own usage
- Backwards Compatibility

Meter Program Timeline

- Procurement of meters, MTUs and data collectors through cooperative bid immediately
- Meter Installation Procurement
  - Bids received and processed by June-July
- Installation Program
  - Public outreach, notices and scheduling begins in July
  - Installations begin in July-August 2022
  - Program substantial completion by December 2023

Installation Program At-a-Glance

- MGL Chapter 30, Section 39M bid package
- Includes the labor to install the meters and MTUs
  - DPW staff will assist with implementation to expedite
- Sealed bids where lowest price is chosen
- Minimum quality requirements to ensure a “responsible” bidder
- Technical specifications will identify steps and minimum criteria for a public outreach and scheduling program

Public Outreach

- Project Kickoff
  - Newspaper advertisement
  - Webpage dedicated for the project
- How to Schedule Appointments
  - Phone line
  - Webpage
  - Mailers = 2 minimum, at least 7 days apart
  - Property postings = 2 minimum
  - Handing unresponsive customers, denial, vacant properties
- Performing the work
  - Health and safety protocols
  - Sign and review work performed
  - Collect contact information

Records

- Database in excel format
  - Customer name, phone, email
  - Property address
  - Account number
  - Old/new meter
    - Size
    - Manufacturer
    - Serial numbers
    - Readings
  - Meter transmission units
    - Manufacturer
    - Serial numbers
  - Work performed
  - Photographs
  - Notes

Meter Program Cost

- Meters, MTUs & Fixed Network System: $8.85M
- Installation Program: $6M
- Engineering: $0.19M
- Contingency: $1.5M
- **Total Suggested Meter Program Budget: $16.55M**

Q&A

THANK YOU

Ryan J. Trahan, P.E.
President | COO

ENVIRONMENTAL PARTNERS
— An Apex Company —

CITY OF NEWTON
MASSACHUSETTS

PETITION for GRANT OF LOCATION

To the Petitioner:

City of Newton Ordinance Section 23-52 requires that each petition for grant of location be submitted to the City Council before it is sent to the Public Works Department for a preliminary review. The comments of the Public Works Commissioner will be part of the record submitted to the City Council. Upon filing with the City Council, the petition will be scheduled for a public hearing before the Public Facilities Committee of City Council. **The petitioner is responsible for insuring that the petition is complete and all required materials are in order for review.** Attached please find the City Engineer's Standard Requirements for Plans and the Department of Public Works Permit Processing brochure.

Grant of Location Process:

1. Applicant submits completed Petition Form and required materials to the City Council
2. Public Works Department conducts preliminary review and gives written comments to the applicant
3. Engineering Division files Petition Form with comments with the Clerk of the City Council
4. City Council schedules petition for a public hearing before the Public Facilities Committee of the City Council
5. Public Facilities Committee recommendations are forwarded to the City Council for a final decision

Questions may be directed to:

Lou Taverna, City Engineer, 617-796-1020
Cassidy Flynn, Clerk of the Public Facilities Committee 617-796-1213

I. IDENTIFICATION (Please Type or Print Clearly)

Company Name VerizonNew England Inc

Address 85 High St, 3rd Flr

Pawtucket, RI 02860

Phone Number 774-409-3170 Fax Number

Contact Person Karen Levesque Title ROW Manager

Signature Karen Levesque Date 3/9/2022
Person filing application

If a telecommunications company, indicate how certified by the Department of Telecommunications and Energy:

II. DESCRIPTION OF PROJECT: to be completed by petitioner

A. Write here or attach a description of the project including, location, proposed time frame for completion, type of materials to be used, benefit provided to the City, project mitigation plan as applicable, street reconstruction plan including timetable for completion.

Pleasant Street:Relocate one (1) jointly-owned pole, P.358/26 located on the easterly side of Pleasant Street approximately 7' southerly from its existing location.
The petition is necessary to accommodate a new driveway.

B. Include or attach a sketch to provide a visual description of the project. If plans are attached, provide:
Title of Plan 4A0R7QK Date of plan 1/27/2022

III. PUBLIC WORKS DEPARTMENT REVIEW

Date received by Public Works Department March 9, 2022

Check One:
Minor Project ☑ Major Project ☐ Lateral ☐

(Refer to City Engineer Standard Requirements for Plans for definition of minor and major project)

Plans Submitted:
Certified Plot Plan ☐ Stamped Plans ☐

DATE AND COMMENTS:	RECOMMENDATIONS:
This request is on behalf of the homeowner that has an approved building permit which entails the expansion of the driveway thus necessitating the need to relocate the utility pole. Once approved Verizon will need to obtain a Sidewalk Crossing Permit with DPW prior to the relocation of the pole. Pedestrian access shall be accommodated for the duration.	*John Daghlian, Associate City Engineer* *March 14, 2022*

V. RECOMMENDATION TO PUBLIC FACILITIES COMMITTEE:

Commissioner, Public Works

Date

Karen Levesque
Right of Way Manager

verizon

85 High Street, 3rd Floor
Pawtucket, RI 02860

Office 774-409-3170
Mobile 774-504-1279
Karen.levesque@one.verizon.com

March 9, 2022

Newton City Council
Newton City Hall, Room 105
1000 Commonwealth Avenue
Newton, MA 02459

RE: Petition for Verizon job # 4A0R7QK
Pleasant Street, Newton, MA

Dear Honorable City Council:

Enclosed find the following items in support of the above-referenced project:

1. Petition;
2. Petition Plan;
3. Order;
4. Abutters.

A Public Hearing and notice to abutters is required. A Verizon representative will attend the Public Hearing. Should any questions or comments arise concerning this matter prior to the hearing, please contact me at 774-409-3170. Your assistance is greatly appreciated.

Sincerely,

Karen Levesque

Karen Levesque
Right of Way Manager

Enc

PETITION FOR JOINT OR IDENTICAL POLE LOCATIONS

January 21, 2022

To the City Council

In **NEWTON**, Massachusetts

VERIZON NEW ENGLAND, INC. and **NSTAR ELECTRIC COMPANY d/b/a EVERSOURCE ENERGY** request permission to locate poles, wires, cables and fixtures including the necessary anchors, guys and other such sustaining and protecting fixtures to be owned and used in common by your petitioners, along and across the following public way or ways:

Pleasant Street:

Relocate one (1) jointly-owned pole, P.358/26 located on the easterly side of Pleasant Street approximately 7' southerly from its existing location.

The petition is necessary to accommodate a new driveway.

Wherefore they pray that after due notice and hearing as provided by law, they be granted joint or identical locations for and permission to erect and maintain poles, wires and cables, together with anchors, guys and other such sustaining and protecting fixtures as they may find necessary, said poles to be erected substantially in accordance with the plan filed herewith marked-VZ N.E. Inc. Plan No. **4A0R7QK** Dated **January 21, 2022.**

Also for permission to lay and maintain underground laterals, cables and wires in the above or intersecting public ways for the purpose of making connections with such poles and buildings as each of said petitioners may desire for distributing purposes.

Your petitioners agree that space shall be reserved and maintained for the limited purpose of attaching one-way low voltage fire and police signaling wires owned by the municipality or governmental entity for public safety purposes only.

VERIZON NEW ENGLAND INC.

By Karen Levesque
Karen Levesque - Manager - Rights of Way

Dated this 8th day of March, 2022

NSTAR ELECTRIC COMPANY d/b/a EVERSOURCE ENERGY

By _____
Right of Way Representative

Dated this 9th day of March, 2022

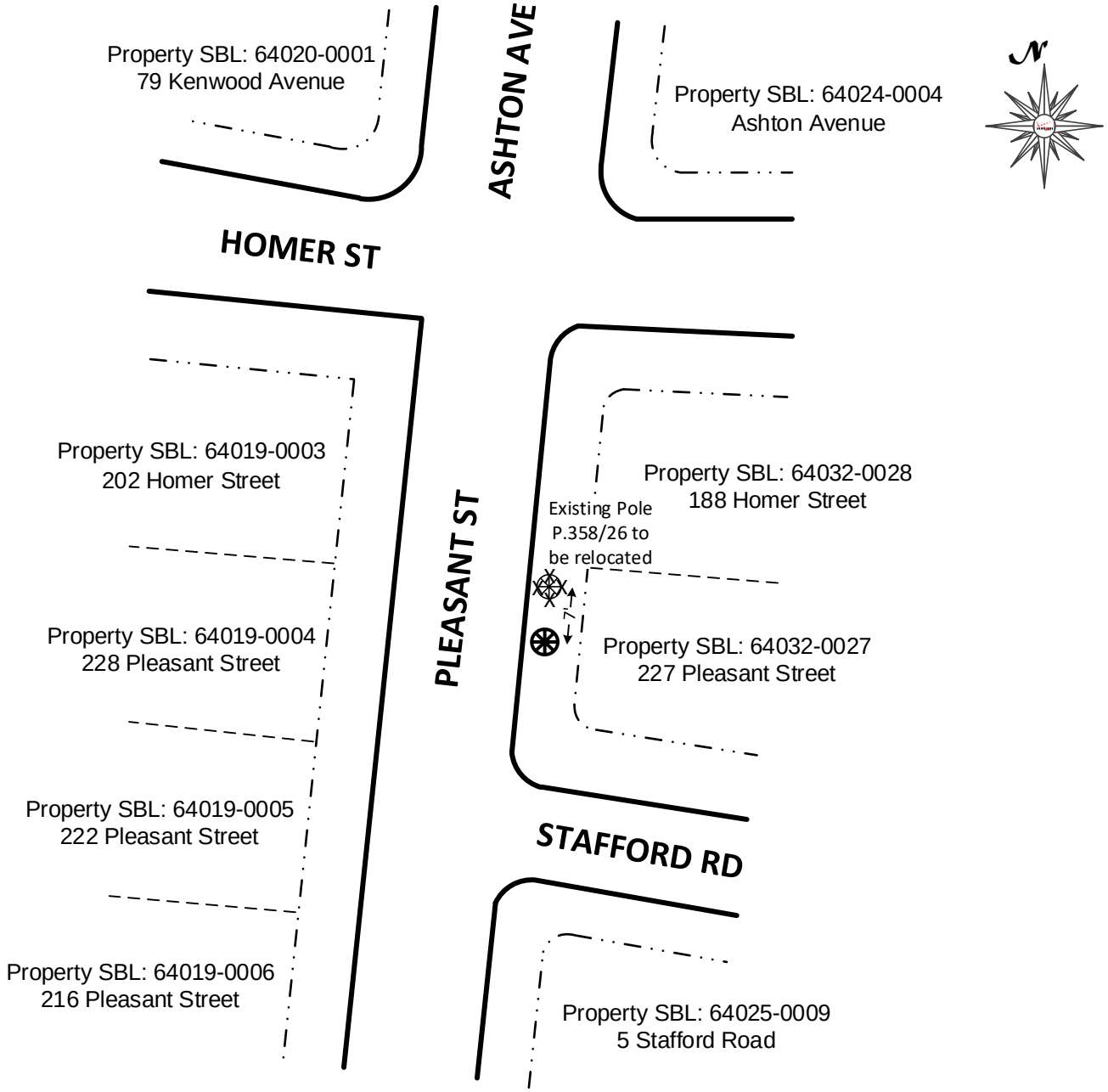
verizon

PETITION PLAN

MUNICIPALITY NEWTON VZ N.E. Inc. No. 4A0R7QK

VERIZON NEW ENGLAND INC. AND
NSTAR ELECTRIC COMPANY d/b/a EVERSOURCE ENERGY DATE : JANUARY 21, 2022

SHOWING PROPOSED RELOCATION OF ONE POLE ON PLEASANT STREET



NOT TO SCALE

LEGEND

- EDGE OF PAVEMENT
- EDGE OF ROADWAY
- PROPERTY LINE
- EXISTING JOINTLY OWNED POLE TO BE REMOVED
- PROPOSED NEW JOINTLY OWNED POLE TO BE INSTALLED

ORDER FOR JOINT OR IDENTICAL POLE LOCATIONS

By the City Council of the City of NEWTON, Massachusetts.

Notice having been given and a public hearing held, as provided by law,
IT IS HEREBY ORDERED:
that VERIZON NEW ENGLAND INC. and NSTAR ELECTRIC COMPANY d/b/a EVERSOURCE ENERGY be, and they are hereby granted joint or identical locations for and permission to erect and maintain poles and their respective wires and cables to be placed thereon, together with anchors, guys and other such sustaining and protecting fixtures as said Companies may deem necessary, in public way or ways hereinafter referred to, as requested in petition of said Companies dated the 8th day of March, 2022.

Pleasant Street:

Relocate one (1) jointly-owned pole, P.358/26 located on the easterly side of Pleasant Street approximately 7' southerly from its existing location.

The petition is necessary to accommodate a new driveway.

All construction under this order shall be in accordance with the following conditions:

Poles shall be of sound timber, and reasonably straight and shall be set substantially at the points indicated upon the plan marked-VZ N. E. Inc. No. **4A0R7QK** in a package Dated **January 21, 2022** - filed with said petition.

The following are the public ways or parts of ways along which the poles above referred to may be erected, and the number of poles, which may be erected thereon under this order:

Pleasant Street
1 JO pole to be relocated

Also that permission be and hereby is granted to each of said Companies to lay and maintain underground laterals, cables and wires in the above or intersecting public ways for the purpose of making connections with such poles and buildings as each may desire for distributing purposes.

I hereby certify that the foregoing order was adopted at a meeting of the City Council of the City of NEWTON, Massachusetts held on the _____ day of _____ 2022.

_____
City Clerk

We hereby certify that on _____ 2022, at _____ o'clock _____m., at the _____ a public hearing was held on the petition of the VERIZON NEW ENGLAND INC. and NSTAR ELECTRIC COMPANY d/b/a EVERSOURCE ENERGY for permission to erect the poles, wires, cables, fixtures and connections described in the order herewith recorded, and that we mailed at least seven days before said hearing a written notice of the time and place of said hearing to each of the owners of real estate (as determined by the last preceding assessment for taxation) along the ways or parts of ways upon which the Companies are permitted to erect poles, wires, cables, fixtures and connections under said order. And that thereupon said order was duly adopted.

_____ _____ _____

_____ _____ _____

_____ _____ _____

_____ _____ _____

City Council of the City of NEWTON**,** Massachusetts

CERTIFICATE

I hereby certify that the foregoing is a true copy of location order, and certificate of hearing with notice adopted by the City Council of the City of NEWTON, Massachusetts, on the _____ day of _____ 2022, and recorded with the records of location orders of said City, Book _____ Page _____. This certified copy is made under the provisions of Chapter 166 General Laws and any additions thereto or amendments thereof.

Attest:

_____

City Clerk

ABUTTERS LIST

Property SBL: 64024-0004
Ashton Avenue

WALTER F CARTER
ELIZABETH H CARTER TRUST
177 Homer Street
Newton, MA 02459

Property SBL: 64032-0028
188 Homer Street

MARK E FITZGERALD & MEREDITH W MILLER
188 Homer Street
Newton, MA 02459

Property SBL: 64032-0027
227 Pleasant Street

KATIE A GREENZANG & SAMUEL Y ASH
227 Pleasant Street
Newton, MA 02459

Property SBL: 64025-0009
5 Stafford Road

SHIRA A DEENER & DAVID P CHODIRKER
5 Stafford Road
Newton, MA 02459

Property SBL: 64019-0006
216 Pleasant Street

LYNN A SCHELLER
216 Pleasant Street
Newton, MA 02459

Property SBL: 64019-0005
222 Pleasant Street

LYNN S AUERBACH & H SANDFORD, TRS
LYNN S AUERBACH TRUST
222 Pleasant Street
Newton Centre, MA 02459

Property SBL: 64019-0004
228 Pleasant Street

COURTNEY M & JASON F COLE
228 Pleasant Street
Newton, MA 02459

ABUTTERS LIST

Property SBL: 64019-0003
202 Homer Street

WAYNE G HASER & CHRISTINE A FRDERICK
202 Homer Street
Newton, MA 02459

Property SBL: 64020-0001
79 Kenwood Avenue

SURRENDRA A DUDANI & SHALINI SEN
79 Kenwood Avenue
Newton, MA 02459

Final Label Report

SBL	Owner	Number	Street	Unit
64032 0028	FITZGERALD MARK E	188	HOMER ST	
64019 0003	HASER WAYNE G	202	HOMER ST	
64025 0007	WEINSTEIN MANUEL & MARTHA	209	PLEASANT ST CTR	
64019 0007	WONG NELSON	210	PLEASANT ST CTR	
64019 0006	SCHELLER LYNN A	216	PLEASANT ST CTR	
64019 0005	AUERBACH SANFORD H & LYNN S	222	PLEASANT ST CTR	
64032 0027	GREENZANG KATIE A	227	PLEASANT ST CTR	
64019 0004	COLE JASON F	228	PLEASANT ST CTR	
64025 0009	CHODIRKER DAVID P	5	STAFFORD RD	
64032 0026	WALSH MARCIA S	10	STAFFORD RD	
64025 0010	LANGER GEORGE S	11	STAFFORD RD	

PETITION FOR WATER, DRAIN AND/OR SEWER

City of Newton

Date: 03/04/2022

To the City Council of Newton:

The undersigned believing that the public convenience the public health require it respectfully petition that a water main, main drain and/or common sewer be constructed in

164 Newtonville Ave to extend the drainline

Insert street, way, or private lands, give names of owners

from Intersection of Newtonville Ave and Howard St

to 164 Newtonville Ave. Approx. 180 linear ft.

in that part of Newton called Ward 1

The petitioner will pay the entire cost.

Signatures of petitioners here:	*Addresses*
[signature]	14 Ramsdell Rd., Brookline, MA 02467

CITY OF NEWTON

Department of Public Works

ENGINEERING DIVISION

Memorandum

To: Councilor Alison Leary, Facilities Committee Chair.

From: John Daghlian, Associate City Engineer

Re: 164 Newtonville Avenue Drain Main Extension

Date: March 14, 2022

CC: Jim Mcgonagle, Commissioner
Shawna Sullivan, Chief of Staff
Lou Taverna, PE City Engineer
Thomas Fitzgerald, Director of Utilities
Doug Valovcin, Deputy Director
Cassidy Flynn, Associate City Clerk

In reference to the above location, the following are my comments for a plan entitled:

Proposed Conditions Site Plan
164 Newtonville Avenue
Prepared by: Dellorco Associates
Dated: November 30, 2021
Revised: 1-21-2022

Executive Summary:

This property was granted a Building Permit on February 10, 2022, the site improvements include a stormwater collection system based on the City Design Standards, however, due to soil conditions and seasonal high groundwater table an overflow connection is needed. The homeowner is fund 100% of the drain main extension from the end of the line manhole west of the site, will install approximately +/-180 feet easterly of 12-inch reinforced concrete drainpipe to a manhole in front of the property that will facilitate the overflow connection. It has been the policy of the DPW to allow overflow connections provided the proposed site improvement

include a stormwater collection system designed to the most practical extent given the site conditions and the availability of a City drainpipe, this extension will provide the needed overflow connection.

Conditions & Special Provisions:

1. All trenches within the roadway shall be milled 1-1/2" deep and overlaid with Type I-1 HMA curb line to curb line and 25' beyond the limits of the trench in both directions. The limits will be determined in the field by the City Engineer.

2. If any service connections are disturbed by the contractor of record during construction, they shall be updated and replaced to the City's current Construction Standards.

3. The contractor shall make accommodations to allow pedestrian access around the construction zone in accordance with the DPW requirements.

4. All downstream catch basins shall be retrofitted with an approved type of siltation control devices, details of this shall be submitted to the City Engineer. The contractor of record shall maintain these catch basins throughout the construction process and ensure that street and property flooding does not occur during construction.

5. Upon final installation of the drain main an As Built drawing [plan & profile] indicating rim, invert elevations, and slopes shall be submitted in digital and hard copy format to the City Engineer.

6. The contractor of record shall obtain a Trench, Street Opening, Sidewalk Crossing, and Utility Connection Permits with the DPW prior to construction.

7. The contractor of record shall contact the Newton Police Department 48 hours in advanced and arrange for Police detail to help residents & commuters navigate around the construction activity

If you have any questions or concerns, please call me at 617-796-1023.

240-22

TP-1	ELEV. 159.9+/-
DEPTH	SOIL
0–2"	Asphalt
2"–8"	Fill-Gravel
8"–132"	Sandy Loam, 10 YR 5/4 5% Gravel, No Cobbles Roots to 24"

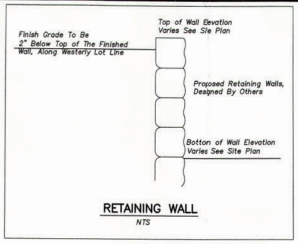
Mottling @ 26" 7.5 YR 5/6
Weeping @ 42"
No Refusal

TP-2	ELEV. 164.6+/-
DEPTH	SOIL
0–24"	Fine Sandy Loam 10 YR 3/3
24"–30"	Fine Sandy Loam 10 YR 6/6
30"–60"	Medium Sandy Loam Few Small Stones 2.5 Y 6/4
60"–96"	Silt Loam 10 YR 5/4

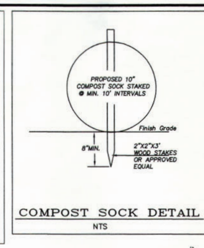
Mottling @ 60" 7.5 YR 5/6
Weeping @ 78"
Water @ 94"
No Refusal

TP-3	ELEV. 170.8+/-
DEPTH	SOIL
0–9"	Fine Sandy Loam 10 YR 2/6, Rooted
24"–30"	Fine Sandy Loam 10 YR 6/6
30"–72"	Medium Sandy Loam Few Small Stones 10 YR 6/6
72"–108"	Medium Sandy Loam Few Small Stones 10 YR 5/4

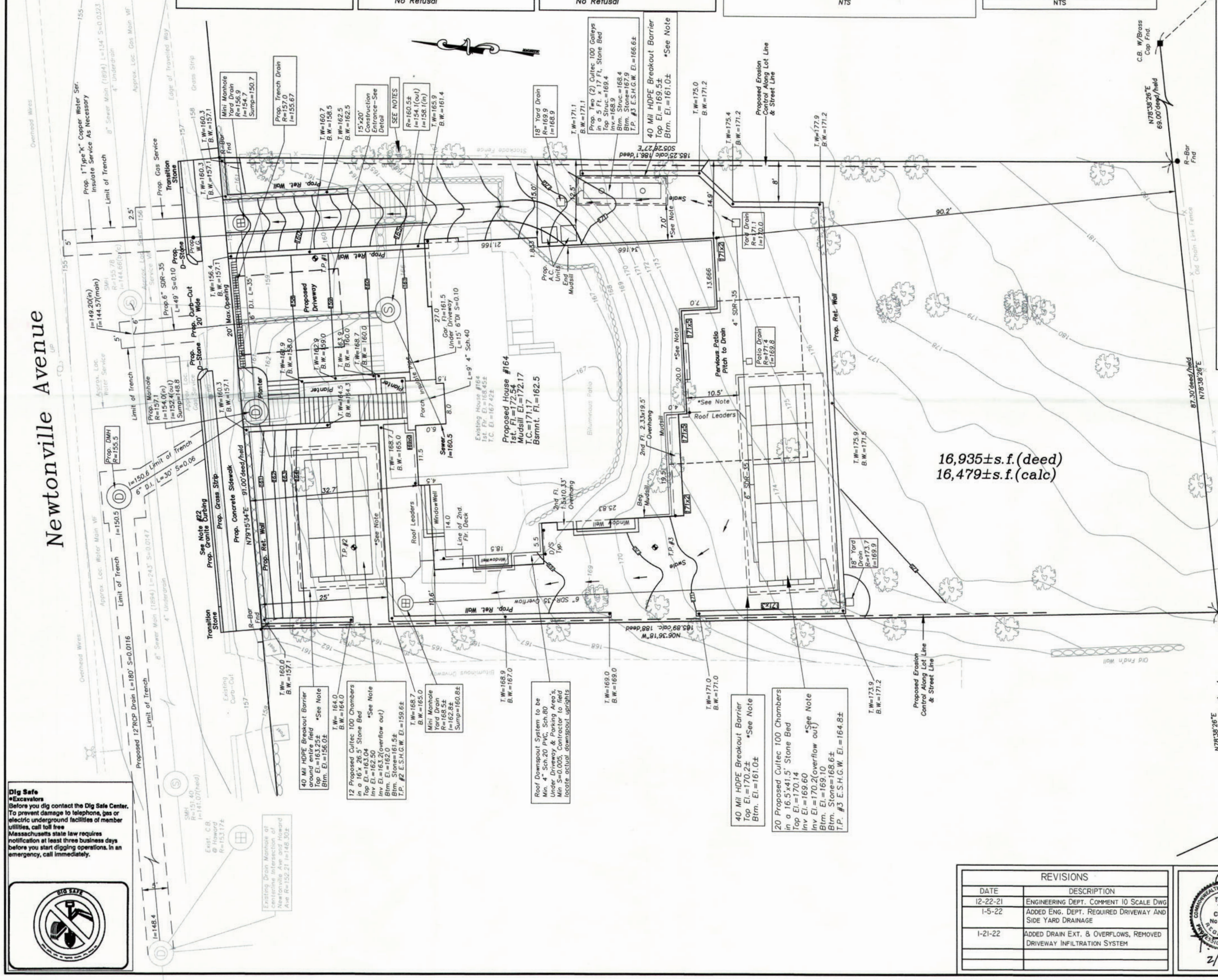
Mottling @ 72" 7.5 YR 5/6
No Weeping
No Water
No Refusal



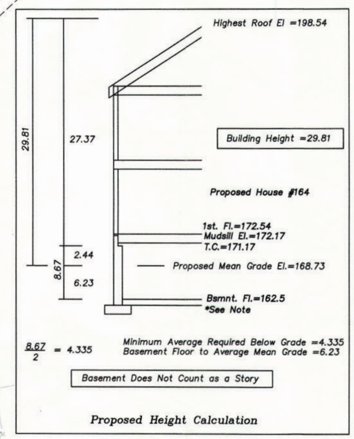
RETAINING WALL
NTS



COMPOST SOCK DETAIL
NTS

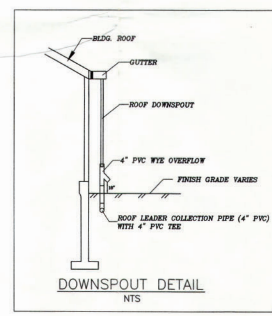


Newtonville Avenue
Howard Street
Weldon Road
16,935±s.f.(deed)
16,479±s.f.(calc)
Proposed House #164
1st. Fl.=172.54
Mudsill El.=172.17
T.C.=171.17
Bsmnt. Fl.=162.5
Prop. Ret. Wall
Proposed Driveway
Prop. Concrete Sidewalk
Prop. Grass Strip
Pervious Patio Pitch to Drain
Proposed Erosion Control Along Lot Line & Street Line
12 Proposed Cultec 100 Chambers in a 16'x 26.5' Stone Bed
20 Proposed Cultec 100 Chambers in a 16.5'x41.5' Stone Bed
40 Mil HDPE Breakout Barrier
Proposed 12"RCP Drain L=180' S=0.0116
N78°38'26"E 73.20'(field) 70'(deed)
N78°38'26"E 87.30'deed/field
N78°38'26"E 69.00'deed/field
N79°15'34"E 91.00'deed/field
S48°00'19"E Tie Only 38.06'
Dig Safe
•Excavators
Before you dig contact the Dig Safe Center. To prevent damage to telephone, gas or electric underground facilities of member utilities, call toll free
Massachusetts state law requires notification at least three business days before you start digging operations. In an emergency, call immediately.



Highest Roof El =198.54
Building Height =29.81
Proposed House #164
1st. Fl.=172.54
Mudsill El.=172.17
T.C.=171.17
Proposed Mean Grade El.=168.73
Bsmnt. Fl.=162.5
*See Note
29.81
27.37
2.44
8.67
6.23
8.67/2 = 4.335
Minimum Average Required Below Grade =4.335
Basement Floor to Average Mean Grade =6.23
Basement Does Not Count as a Story

Proposed Height Calculation



DOWNSPOUT DETAIL
NTS

NOTES

UTILITIES SHOWN WERE COMPILED FROM ACTUAL FIELD LOCATIONS, BEST AVAILABLE INFORMATION AND MAY OR MAY NOT BE COMPLETE OR ACCURATE. FIELD VERIFY PRIOR TO ANY EXCAVATION.

PLAN IS ON THE CITY OF NEWTON SEWER ELEVATION BASE

WALLS, FENCES AND TREE LOCATIONS, ETC. SHOWN ALONG AND NEAR LOT LINES ARE APPROXIMATE, ACTUAL OWNERSHIP TO BE DETERMINED UPON LOT LINES BEING STAKED, OWNERSHIP TO BE AGREED UPON BY ALL POTENTIAL OWNERS PRIOR TO ANY REMOVAL

ALL PROPOSED RETAINING WALLS TO BE LESS THAN 4' TALL IN A SETBACK. ALL WALLS DESIGNED BY OTHERS.

CONTRACTOR TO NOTIFY DESIGN ENGINEER A MIN. OF 72 HOURS PRIOR TO THE EXCAVATION AND INSTALLATION OF ANY PROPOSED DRAINAGE, UTILITIES, SERVICES, ROOF LEADER SYSTEM PIPING, ETC. THE CITY OF NEWTON ENGINEERING DIVISION REQUIRES THE DESIGN ENGINEER TO AS BUILT ALL PROPOSED UTILITIES LOCATIONS AND ELEVATIONS, CONTRACTORS NOTES ARE NOT ACCEPTABLE. ANY INSTALLED UTILITY WITHOUT DESIGN ENGINEER OBTAINING NECESSARY LOCATIONS AND ELEVATIONS WILL HAVE TO BE RE-EXCAVATED TO ALLOW FOR THIS INFORMATION TO BE OBTAINED.

ALL TOP, SUB AND UNSUITABLE MATERIAL BELOW DRAINAGE FIELDS IS TO BE REMOVED AND REPLACED WITH APPROPRIATE 2–3" MINUS SCREENED BANK RUN GRAVEL BROUGHT UP TO THE BOTTOM OF STONE ELEVATION

ONSITE DRAINAGE IS ONLY DESIGNED TO COLLECT AND HANDLE A PORTION OF ROOF, DRIVEWAY AND OTHER SURFACE RUNOFF (SEE DRAINAGE REPORT) AND NOT GROUNDWATER. SUMP PUMPS, PERIMETER DRAINS ETC. ARE NOT TO BE DISCHARGED INTO ONSITE DRAINAGE. IF SITE CONTRACTOR/BUILDER DEEMS NECESSARY GROUNDWATER CONTROL TO BE DESIGNED BY OTHERS.

*BUILDER/CONTRACTOR TO SEEK GROUNDWATER, FOUNDATION/BASEMENT WATERPROOF SYSTEM PROFESSIONALS TO PROTECT BASEMENT FROM EXISTING HIGH GROUNDWATER CONDITIONS AND POSSIBLE WATER INFILTRATION FROM HIGH GROUNDWATER, RUNOFF AND THE PROPOSED DRAINAGE SYSTEMS CLOSE PROXIMITY TO THE STRUCTURE. BEST AVAILABLE CONSTRUCTION METHODS TO BE USED.

ALTHOUGH IT WAS NOT REQUIRED BY THE CITY OF NEWTON ENGINEERING DEPT AS PART OF THIS PLAN APPROVAL IT IS HIGHLY ADVISED THAT THE OWNER, BUILDER, DEVELOPER UPON ISSUANCE OF A BUILDING PERMIT SEEK PERMISSION FROM THE CITY TO OBTAIN A DRAIN LINE EXTENSION PERMIT TO EXTEND THE EXISTING DRAIN LINE FROM HOWARD AVE TO THE LOCUS IN ADDITION A REQUEST FOR AN OVERFLOW CONNECTION PERMIT SHALL BE MADE TO TIE INTO THIS DRAIN LINE. THIS IS DUE IN FACT TO THE CURRENT HIGH GROUNDWATER FOUND UPON ONSITE SOIL TESTING, THE PROPOSED BASEMENT FLOOR BEING PROPOSED SUBSTANTIALLY BELOW THIS GROUNDWATER ELEVATION AND THE NEWLY ADDED DRAINAGE BEING BELOW THIS ELEVATION, AS REQUIRED BY THE CITY.

SEE DETAIL SHEET FOR ADDITIONAL NOTES

Lot Area=16.479±s.f./calc.

Zoning District: SR2
Old Lot Status
Final determination as to compliance with zoning shall be made by the City of Newton Inspectional Services

Allowed/Required
Lot Coverage=30% Max.
Open Space=50% Min.

Proposed
Lot Coverage=18.14%
Open Space=76.39%

Total Impervious Area Calculation
Existing Impervious Surface=2300±sf
Proposed Impervious Surface=5150±sf
Increase of Impervious Surface=2850±sf

APPROVED
CITY OF NEWTON
ENGINEERING DIVISION
DATE 2-14-2022

RECEIVED
FEB 2 2022
ENGINEERING DIVISION
PROJECT #:

~Proposed Conditions Site Plan~

164 Newtonville Avenue
Newton, Massachusetts
Scale: 1"=10' November 30, 2021

Dellorco Associates
Land Surveyors – Civil Engineers
214 East Street, Foxborough, Ma. 02035
508-549-9965 dellorcoassociates@gmail.com

0 10 20 30 40

Sheet 1 of 3

Project:
Designed By:
Drawn By:
Checked By:

REVISIONS

DATE	DESCRIPTION
12-22-21	Engineering Dept. Comment 10 Scale Dwg
1-5-22	Added Eng. Dept. Required Driveway And Side Yard Drainage
1-21-22	Added Drain Ext. & Overflows, Removed Driveway Infiltration System

Commonwealth of Massachusetts — Tsung Ting Chiang — Civil — No. 23089 — Registered Professional Engineer
2/1/22

Commonwealth of Massachusetts — Verne T. Porter Jr. — Land Surveyor — 37239 — Registered Professional Land Surveyor

Notes:
1. Prior to an occupancy permit being issued, the water and sewer services must be in place and accepted by the Engineering Division.

2. The contractor needs to notify the Engineering Department 48 hours in advance and schedule an appointment to have the drainage system, water and sewer services inspected. The system and utilities must be fully exposed for the inspector. Once the inspector is satisfied, the system and utilities may be back filled.

3. The applicant must apply for a Street Opening and Utilities Connection Permit as well as a sidewalk crossing permit with DPW.

4. The utilities shown were compiled from field locations and available plans of utility companies and may or may not be correct. Contractor is to contact Dig Safe and all local utility companies as required prior to any excavation.

5. All work shall be done in accordance with "City of Newton Standard Specifications" and "City of Newton Construction Details", copies of which may be obtained at the Engineering Office. All work shall be subject to inspection and approval by the City of Newton Engineering Department.

6. The contractor shall provide Police Details for the direction and control of traffic, as required by the city engineer. All roads effected by construction shall remain open to emergency vehicles at all times. Contractor is to coordinate with Police and Fire Department to ensure public safety.

7. An erosion control barrier shall be in place prior to any construction and all materials must be contained on site.

8. The existing water service shall be completely removed from the dwelling to the corporation at the main. The corporation shall be capped, and a new tap shall be made for the new service. Each phase of this process must be inspected by a representative of the Engineering Division, failure to having this inspection performed, may result in the delay or denial of the water service permit.

9. The existing sewer service shall be completely removed from the existing dwelling and to the existing connection at the main. The abandonment, along with the new connection must be witnessed by a representative of the Engineering Division. Failure to having these inspections may result in the denial or delay of issuing a sewer permit.

10. The contractor shall be responsible for all proposed grading as shown on plan. Any variations to proposed grading shown and/or any changes to proposed structure may result in non compliance with zoning regulations.

12. All utilities trenches with the exception of gas, within the City of Newton right-of-way will be backfield with type IE (excavatable) controlled density fill, as specified by the City of Newton Engineering Specifications

13. The new sewer service and/or structures shall be pressure tested or videotaped after final installation is complete. Method of final inspection shall be determined solely by the Engineering inspector from the City of Newton. All sewer manholes shall be vacuum tested in accordance with City of Newton Specifications. The sewer service will not be accepted until one of the two methods stated above is completed. All testing must be witnessed by a representative of the Engineering Division.

14. All roof drains are to be connected to proposed drywells. Roof drains with less than 4' cover to be Sch 80 PVC or ductile iron.

15. Contractor to relocate existing drive opening and curb cut, match existing sidewalk, existing loam/seed grass berm area as necessary.

16. All construction activities within the City of Newton right-of-way must fully comply with all City of Newton Construction Specifications as well as 521 CMR 21.00 and 22.00

17. No excavation is allowed within any City right of way between November 15th and April 15th. If an emergency exists or there are extenuating circumstances, Applicant ma seek permission for such work from the City DPW Commissioner via City Engineer. If permission is granted, special construction standards will be applied. Applicant or Applicant's representative must contact the City Engineering Department prior to start of work for clarification.

18. As of January 1, 2009, all trench excavation contractors shall comply with M.G.L. Chapter 82A, Trench Excavation Safety Requirements, to protect the general public from unauthorized access to unattended trenches. Trench Excavation Permit required. This applies to all trenches on public and private property.

19. Any tree removed from site must comply with City of Newton Tree Ordinance.

20. Proposed drainage design and calculations meet the minimum standards as required by the City of Newton Engineering Division for this development as shown.

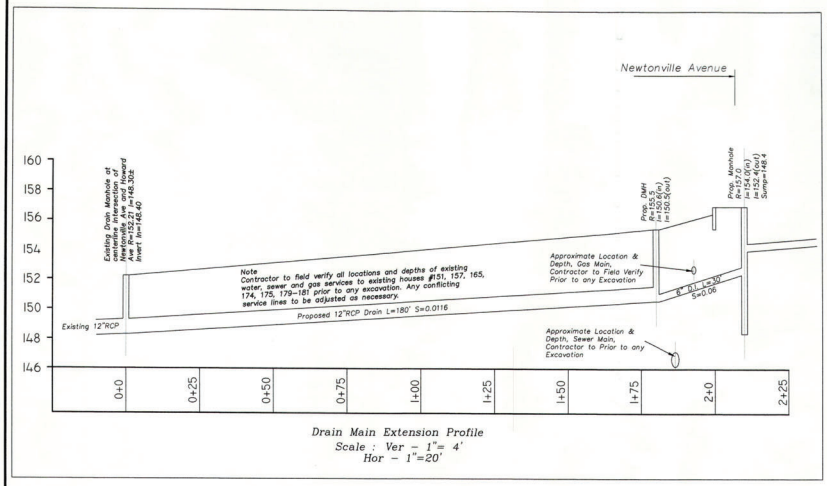
21. Contractor to close existing curb cut, match all existing materials and loam and seed as necessary. All work done within the City of Newton right-of-way must be fully ADA compliant.

22. Per City of Newton Ordinance #B-42, Council Item #251-19, Building Sewer, Water Service Pipe and Sidewalk/Curb Replacement Ordinance. The applicant is required to install/replace sidewalk and curb along the entire frontage. This shall include appropriate transition to adjoining curbing and walkways, including accessible curb cuts and other access as required. The Engineering Construction Inspector makes a determination, based on the material and manner of construction of the existing sidewalk and curb, that the existing sidewalk and curb has the ability to be re-set or reused without replacement.

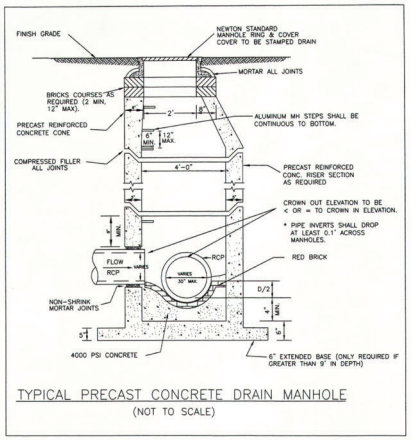
23. If at the time of construction the roadway is under a 5 year moratorium, the roadway must be milled and paved gutter to gutter for a distance of 25' in each direction from the outermost trenches.

24. Prior to the Engineering Division recommending that a Certificate of Occupancy be issued, an As-Built plan must be submitted. With the following certification. "I certify that the construction so shown was inspected prior to backfill and that all work conforms with the Approved Plans'. The As-Built plan must show the dimensional ties from fixed points(foundation corners) to all subsurface components as well as final grading. The As-Built plan must be stamped, signed and dated by this office.

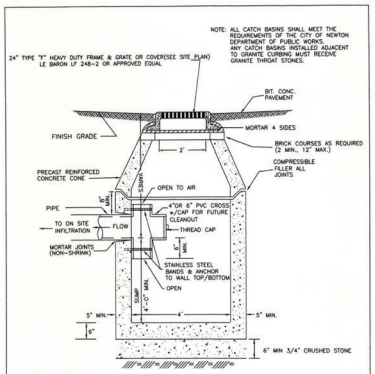
25. This office is responsible for on-site inspections(s) of the locations and elevations of all subsurface structures. This includes but is not limited to drainage, water & sewer services, roof leader collection system, trench drains, manholes, catch basins, etc. A representative from this office must also conduct a "bottom hole inspection" prior to any subsurface drainage system(s) being installed and also after the system is installed prior to back filling. Contractor shall notify this office no less than 48 hours prior to the installations or necessary above inspections. Failure to notify this office of any of the above will result in any and all utilites having to be exposed so the required inspection can be performed.



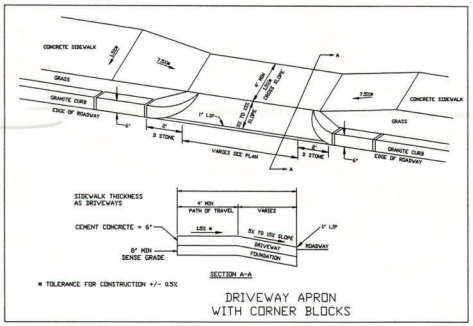
Drain Main Extension Profile
Scale : Ver - 1"= 4'
Hor - 1"=20'



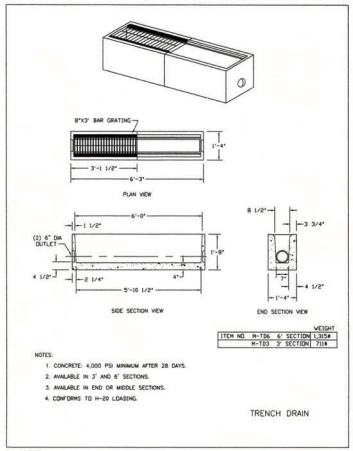
TYPICAL PRECAST CONCRETE DRAIN MANHOLE
(NOT TO SCALE)



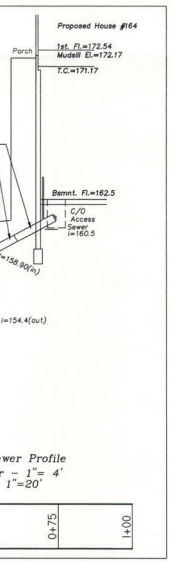
TYPICAL PRECAST CONCRETE CATCH BASIN
WITH GAS TRAP FOR RESIDENTIAL APPLICATION
(NOT TO SCALE)



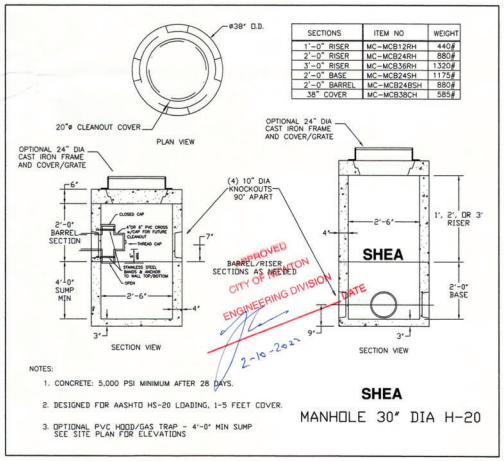
DRIVEWAY APRON
WITH CORNER BLOCKS



TRENCH DRAIN



Proposed Sewer Profile
Scale : Ver - 1"= 4'
Hor - 1"=20'



SHEA
MANHOLE 30" DIA H-20

Dig Safe
•Excavators
Before you dig contact the Dig Safe Center. To prevent damage to telephone, gas or electric underground facilities of member utilities, call toll free Massachusetts state law requires notification at least three business days before you start digging operations. In an emergency, call immediately.

REVISIONS	
DATE	DESCRIPTION
12-22-21	ENGINEERING DEPT. COMMENT 10 SCALE DWG
1-5-22	ADDED ENG. DEPT. REQUIRED DRIVEWAY AND SIDE YARD DRAINAGE
1-21-22	ADDED DRAIN EXT. & OVERFLOWS, REMOVED DRIVEWAY INFILTRATION SYSTEM

COMMONWEALTH OF MASSACHUSETTS TSUNG TING CHIANG No. 23019 REGISTERED PROFESSIONAL ENGINEER
2/1/22

~Detail Sheet~

164 Newtonville Avenue
Newton, Massachusetts

Scale: As Noted November 30, 2021

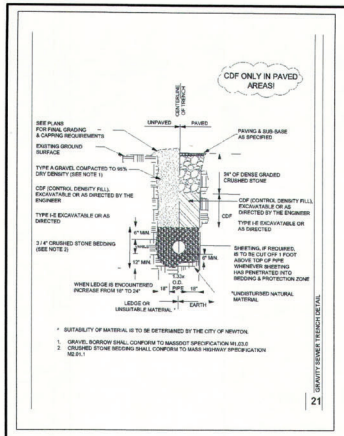
Dellorco Associates
Land Surveyors - Civil Engineers
214 East Street, Foxborough, Ma. 02035
508-549-9965 dellorcoassociates@gmail.com

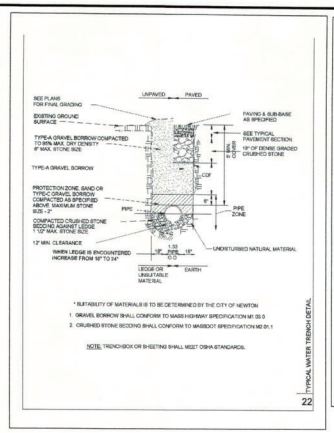
240-22

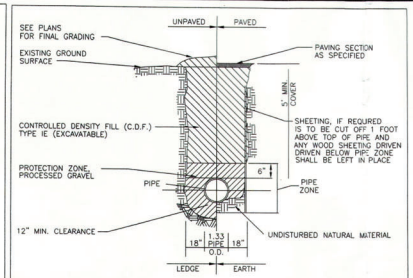
0 20 40 60 80

Project:
Designed By:
Drawn By:
Checked By:

Sheet 2 of 3



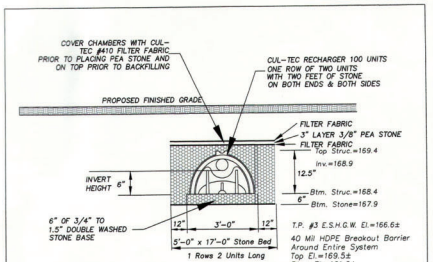




TYPICAL C.D.F. WATER TRENCH DETAIL

NOT TO SCALE

PROCESSED GRAVEL SHALL CONFORM TO MASS HIGHWAY SPECIFICATION M2.01.7

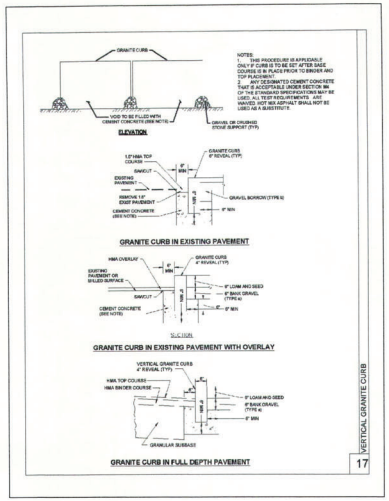


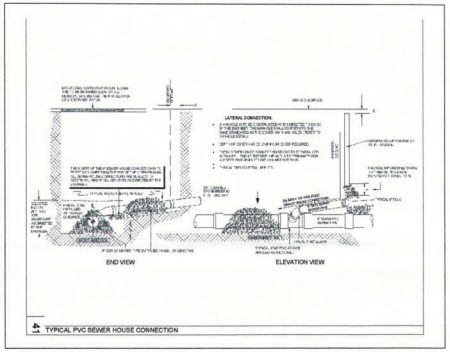
*NOTE: SEE SITE PLAN FOR SYSTEM SIZE AND ELEVATIONS

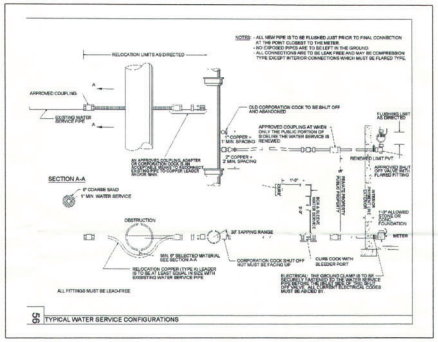
SIDE DRAINAGE SYSTEM DETAIL

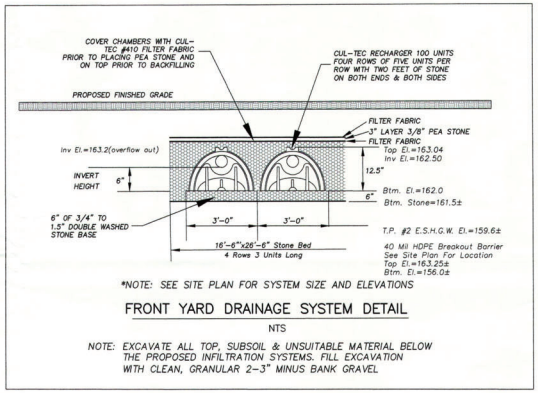
NTS

NOTE: EXCAVATE ALL TOP, SUBSOIL & UNSUITABLE MATERIAL BELOW THE PROPOSED INFILTRATION SYSTEMS. FILL EXCAVATION WITH CLEAN, GRANULAR 2-3" MINUS BANK GRAVEL







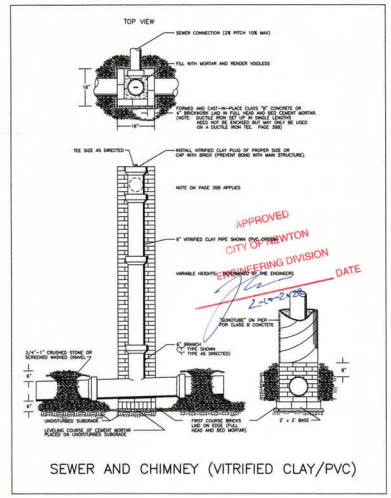


*NOTE: SEE SITE PLAN FOR SYSTEM SIZE AND ELEVATIONS

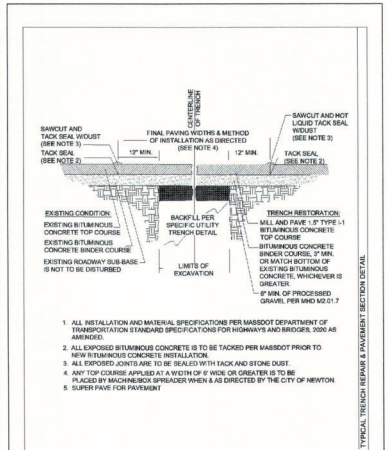
FRONT YARD DRAINAGE SYSTEM DETAIL

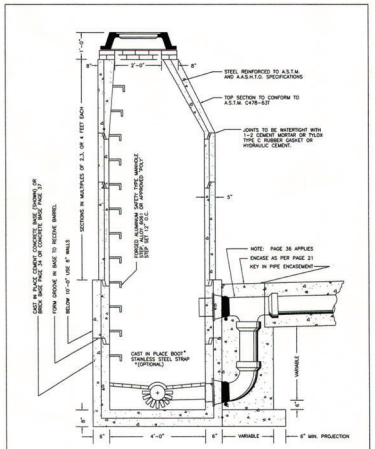
NTS

NOTE: EXCAVATE ALL TOP, SUBSOIL & UNSUITABLE MATERIAL BELOW THE PROPOSED INFILTRATION SYSTEMS. FILL EXCAVATION WITH CLEAN, GRANULAR 2-3" MINUS BANK GRAVEL

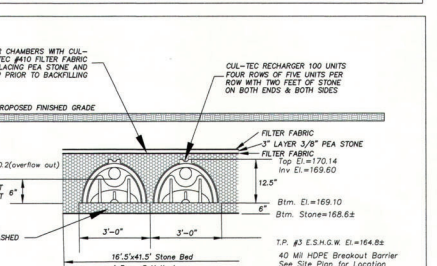


SEWER AND CHIMNEY (VITRIFIED CLAY/PVC)





PRECAST CONCRETE SEWER MANHOLE W/OUTSIDE DROP



*NOTE: SEE SITE PLAN FOR SYSTEM SIZE AND ELEVATIONS

REAR YARD DRAINAGE SYSTEM DETAIL

NTS

NOTE: EXCAVATE ALL TOP, SUBSOIL & UNSUITABLE MATERIAL BELOW THE PROPOSED INFILTRATION SYSTEMS. FILL EXCAVATION WITH CLEAN, GRANULAR 2-3" MINUS BANK GRAVEL

Dig Safe
•Excavators
Before you dig contact the Dig Safe Center. To prevent damage to telephone, gas or electric underground facilities of member utilities, call toll free Massachusetts state law requires notification at least three business days before you start digging operations. In an emergency, call immediately.

DIG SAFE

REVISIONS	
DATE	DESCRIPTION
12-22-21	ENGINEERING DEPT. COMMENT 10 SCALE DWG
1-5-22	ADDED ENG. DEPT. REQUIRED DRIVEWAY AND SIDE YARD DRAINAGE
1-21-22	ADDED DRAIN EXT. & OVERFLOWS, REMOVED DRIVEWAY INFILTRATION SYSTEM

COMMONWEALTH OF MASSACHUSETTS
TSUNG TING CHIANG
No. 23091
REGISTERED PROFESSIONAL ENGINEER
2/1/22

~Detail Sheet~

164 Newtonville Avenue

Newton, Massachusetts

Scale: As Noted November 30, 2021

Dellorco Associates
Land Surveyors - Civil Engineers
214 East Street, Foxborough, Ma. 02035
508-549-9965 dellorcoassociates@gmail.com

240-22

0

Sheet 3 of 3

Project:	
Designed By:	
Drawn By:	
Checked By:	

City of Newton

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION
OFFICE OF THE CITY ENGINEER
1000 Commonwealth Avenue
Newton Centre, MA 02459-1449

Ruthanne Fuller
Mayor

April 8, 2019

Engineering Division Policy

Overflow Connections to City Drainage System

Under certain circumstances, the City allows overflow connections into the city's storm water system (drain pipes) provided there is capacity in the system and the system is functioning properly. DPW requires that the applicant retain a professional engineer licensed in Massachusetts to create an existing condition plan and to investigate the possibility of installing an on-site drainage system to receive the flows from a sump pump or by gravity provided the soils are conducive to percolating [leaching] into the soil. The bottom of the proposed recharge system must be a minimum of 2-feet above the seasonal high groundwater elevation, as determined by a Massachusetts licensed Soil Evaluator.

The licensed soil evaluator shall study soils maps and perform on-site soil testing (percolation test(s)) to determine the infiltration rate of the soils as well as determine the seasonal high ground water elevation. The drainage system shall be designed to receive the flow from the sump pump or by gravity, so that water is infiltrated on-site to the maximum extent possible and then an overflow connection may be permitted so long as the system is functioning properly and there is capacity in the City system. The engineer shall provide information that clearly shows that the city's drainage system is suitable to receive the additional flow. All design and calculations shall be submitted to the Permits Engineer for review, comment and possible approval.

If the home is heated with oil heat and an overflow connection is requested, the design shall incorporate an oil/water separator in line with the overflow connection to the City's drainage system. Details are available on the DPW website. If the home has natural gas heat, there is no need for an oil/water separator.

Any overflow connection to the city's drainage system shall require submission of design plans stamped by the engineer. Pre-& Post Closed Circuit Television (CCTV) inspections of the City drain system shall be required. An inspector from the Engineering Division shall be present during the CCTV operations. After installation is complete, but prior to backfill operations, an As-Built plan shall be prepared and stamped by the engineer. The as-built plan shall show the existing footprint of the dwelling the drainage system (underground dry well, chambers, pipes, and all appurtenances). The applicant shall retain a contractor that is properly bonded and insured to install the system and overflow connection. The contractor shall be responsible for obtaining all necessary City permits.

In the event that city drain pipes are not in the vicinity of the dwelling or structure, a main drain extension may be proposed, designed and installed with permission of the City Engineer and approval of the City Council. The costs associated with the design and installation of the main drain extension shall be the responsibility of the Applicant (the Homeowner).

Louis M. Taverna, P.E.
City Engineer

cc: James McGonagle, DPW Commissioner
Amy Hamel, DPW Chief of Staff
Ted Jerdee, Director of Utilities

Telephone: (617) 796-1020 • Fax: (617) 796-1051 • Ltaverna@newtonma.gov

City of Newton

Ruthanne Fuller
Mayor

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION
OFFICE OF THE CITY ENGINEER
1000 Commonwealth Avenue
Newton Centre, MA 02459-1449

MEMORANDUM

DATE: October 24, 2019

TO: Developers, Contractors, Owners

FROM: Louis M. Taverna, P.E., City Engineer

RE: Ordinance No. B-42, Council Item #251-19, Building Sewer, Water Service Pipe and Sidewalk/Curb Replacement Ordinance

EFFECTIVE DATE OCTOBER 29, 2019

City Council has approved amendments to Chapter 29 Sections 157 – 166 of the Revised Ordinances of the City of Newton to create a building sewer and water service pipe update ordinance that requires the removal and replacement of sewer and water connections, and replacement of sidewalk and curb when a dwelling is demolished or substantially remodeled or rehabilitated (as determined by the Commissioner of Inspectional Services Department).

The purpose of this ordinance is to require property owners to replace and install water and sewer connections and replace and install sidewalks and curb whenever a dwelling or building is demolished and a new building is constructed, or when a building is substantially remodeled or rehabilitated.

The City has had a longstanding policy, administered by the DPW Engineering Division, that regulates the replacement of water and sewer connections. This ordinance updates the terms of the policy, and it also includes the additional requirement that the sidewalk along the entire frontage must be replaced, and curb installed.

The following is intended to highlight the key parts of the ordinance:

Sec. 29-158. Updates to building sewer, water service pipes and sidewalks.
(a) When a dwelling or building is demolished and a new building is constructed, or when a building is substantially remodeled or rehabilitated, the following shall be removed and replaced at the owner's expense:

(1) The building sewer pipe(s) to the public sewer main;
(2) The water service pipe(s) to the water valve; and
(3) The sidewalk and curbing across the entire public way frontage of the lot(s) the dwelling or structure is located on.

Telephone: (617) 796-1020 • Fax: (617) 796-1051 • Ltaverna@newtonma.gov

(b) The existing building sewer pipe(s), water service pipe(s), and sidewalk and curbing shall be removed and replaced in accordance with the provisions of this article and shall conform to the requirements of the State Building and Plumbing Codes, any standards and specifications established by the city engineer, and any other applicable federal, state, and city laws, ordinances, rules and regulations.

Sec. 29-159. Building sewer pipe removal and replacement procedure.
When removing and replacing building sewer pipe(s) under this article, the owner shall comply with the procedures and standards set forth in sections 29-60 and 29-61 of article III, which includes the approval of materials by the commissioner of public works.

Sec. 29-160. Building sewer pipe exemption.
The commissioner, upon request from an applicant, may determine that a building sewer pipe(s) is not required to be removed and replaced if all of the following requirements are met:

(a) the existing building sewer pipe(s) is less than twenty (20) years old;

(b) the owner obtains a CCTV inspection of the interior of the existing building sewer pipe(s) by an entity licensed to conduct such an inspection and submits with the building permit application a copy of the CCTV inspection along with a signed statement from the inspector attesting to the date of the inspection and the address of the property inspected; and

(c) the commissioner makes a determination, based on the material and manner of construction of the building sewer pipe(s) and the CCTV inspection, that the existing building sewer pipe(s) has the ability to be adequately reused without replacement.

Sec. 29-161. Water service pipe update procedure.
When removing and replacing water service pipe(s) under this article, the owner shall comply with the procedures and standards set forth in section 29-27 of article II, which includes the approval of materials by the commissioner of public works.

Sec. 29-162. Water service pipe exemption.
The commissioner, upon request from an applicant, may determine that the water service pipe(s) is not required to be removed and replaced if all of the following requirements are met:

(a) the existing water service pipe(s) is less than twenty (20) years old; and

(b) the commissioner of public works makes a determination, based on the material and manner of construction of the water service pipe(s), that the existing water service pipe(s) has the ability to be adequately reused without replacement.

Sec. 29-163. Adjoining sidewalks and access curb cuts.
Removal and replacement of sidewalk and curbing under this article shall include appropriate transition to adjoining curbing and walkways, including accessible curb cuts and other access as required.

Sec. 29-164. Sidewalk exemption.

(a) The commissioner, upon request from an applicant, may determine that the sidewalk and/or curbing across the entire frontage of a lot is not required to be removed and replaced under this article at those locations where the commissioner determines that either: (1) the existing sidewalk complies with the current applicable codes, standards and specifications and is in good condition; (2) the lack of existing sidewalk and/or curbing is consistent with the current or future nature of the neighborhood; or (3) such updates are not feasible due to public safety, site constraints, or conflicts with future plans for the area.

Attachment: Ordinance B-42

cc: James McGonagle, Commissioner Public Works
John Lojek, Commissioner of Inspectional Services
Marie Lawlor, Law Department
Jonah Temple, Law Department
Jonathan Yeo, Chief Operating Officer
Maureen Lemieux, Chief Financial Officer
Shawna Sullivan, DPW Chief of Staff
John Daghlian, Assistant City Engineer
Frank Nichols, Engineering Project Manager
Anthony Ciccariello, Deputy Commissioner Inspectional Services

CITY OF NEWTON
ENGINEERING DIVISION
MEMORANDUM

To: Dellorco Associates

From: Frank Nichols, P.E., Director of Engineering

Re: Site Plan – Location: **164 Newtonville Ave**

Date: February 10, 2022

CC: Anthony Ciccariello, Deputy Commissioner
John Daghlian, Associate City Engineer
Nick Cence, Office Engineer

In reference to the above, approval is recommended at this time. This approval is based on information provided by the Engineer of Record.

Building Permit Plan: 164 Newtonville Ave
Prepared By: Dellorco Associates
Dated: November 30, 2021 (Latest Revision Jan. 21, 2022)

Contractor Must pick up original "Stamped" approved plan(s) and original approval memo from the Engineering Office prior to applying for a Building Permit with the Inspectional Services Department.

Site Specific Condition

1. Prior to the issuance of a building permit the City of Newton City Council must approve the "drain main" extension

2. The final trench patch must encompass all utilities into one patch with the exception of the drain main extension trench which runs parallel with the curb line. This roughly 180' long trench does not have to be captured with the other utilities

Standard Conditions

1. 5 Year Moratorium – if at time of construction the roadway is under a 5-year moratorium, the roadway must be milled and paved gutter-to-gutter for a distance of 25 feet in each direction from the outermost trenches

2. No excavation is allowed within any City right-of-way between November 15th and April 15th unless prior approval is obtained from the DPW Commissioner

3. As of January 1, 2009, all trench excavation contractors shall comply with Massachusetts General Laws Chapter 82A, Trench Excavation Safety Requirements, to protect the general public from unauthorized access to unattended trenches. Trench Excavation Permit required. This applies to all trenches on public and private property.

4. The Applicant must obtain all necessary permits from the Engineering Division and ISD prior to start of work.

5. After all engineering permits are obtained, the contractor needs to notify the Engineering Division 48-hours in advance and schedule an appointment to have the drainage, water and sewer services inspected. The system & utilities must be fully exposed for the inspector. Once the inspector is satisfied, the system & utilities may be backfilled.

6. With the exception of gas services, all utility trenches within the City of Newton right-of-way will be back filled with Type IE (excavatable) controlled density fill, as specified by the City of Newton Engineering Specifications.

7. Prior to the issuance of an Occupancy Permit, an As-Built Plan shall be submitted to the Engineering Division in both digital format and in hard copy. The plan must show all utilities and drainage (utilizing swing ties), any easements and final grading.

   The following statement must be on all As-Built plans submitted to the Engineering Division (signed, dated, and stamped):

I certify that the construction so shown was inspected prior to backfill and that all work conforms with the Approved Plan and meets or exceeds the City of Newton Construction Standards.
_____
Signature Date

8. On-site erosion control shall be provided as needed, to the satisfaction of City of Newton Inspector.

9. A copy of approved plans, approval memo and all permits must be kept at construction site all the time.

10. The new sewer service and/or structures shall be pressure tested or videotaped after final installation is complete. Method of final inspection shall be determined solely by the construction inspector from the City Engineering Division. The sewer service will NOT be accepted until one of the two methods stated above is completed. A Certificate of Occupancy will not be recommended until this test is completed and the City Engineer receives a written report.

ENGINEERING DISCLAIMER
APPROVAL OF THIS PLAN BY THE CITY OF NEWTON ENGINEERING DIVISION IMPLIES THAT THE PLAN MEETS THE MINIMUM DESIGN STANDARDS OF THE CITY OF NEWTON. HOWEVER, THE ENGINEERING DIVISION MAKES NO REPRESENTATIONS AND ASSUMES NO RESPONSIBILITY FOR THE DESIGN (S) IN TERMS OF SUITABILITY FOR THE PARTICULAR SITE CONDITIONS OR OF THE FUNCTIONALITY OR PERFORMANCE OF ANY ITEMS CONSTRUCTED IN ACCORDANCE WITH THE DESIGN (S). THE CITY OF NEWTON ASSUMES NO LIABILITIES FOR DESIGN ASSUMPTION, ERRORS OR OMISSIONS BY THE ENGINEER OF RECORD.

239-22

Ruthanne Fuller
Mayor

City of Newton, Massachusetts

Office of the Mayor

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(617) 796-1100
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(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 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

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
- 75% design submittal – Spring 2022
- 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,

Ruthanne Fuller

Mayor Ruthanne Fuller

Ruthanne Fuller
Mayor

City of Newton, Massachusetts
Department of Planning and Development
1000 Commonwealth Avenue Newton, Massachusetts 02459

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(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 must remain as follows:

- Public Facilities and Full Council Votes – April, 2022
- 75% design submittal – Spring 2022
- 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.

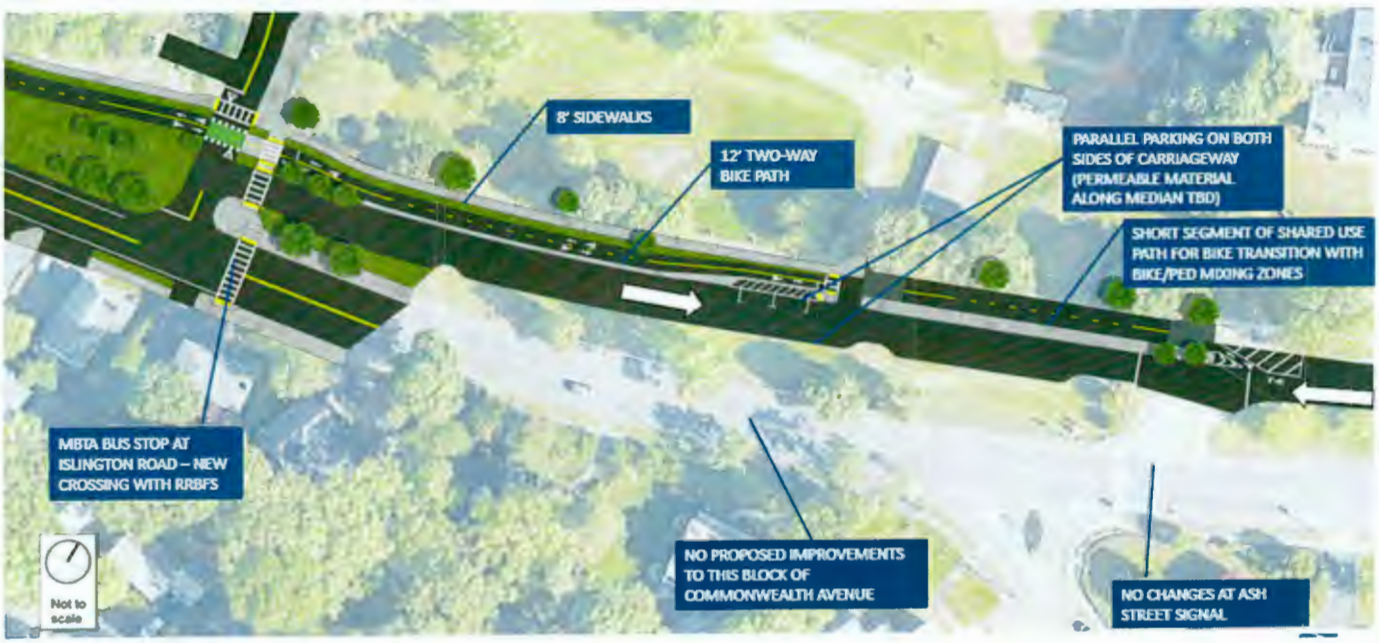
PROJECT FUNDING

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:
https://www.newtonma.gov/government/planning/transportation-planning/projects/commonwealth-avenue-carriageway-redesign/-fsiteid-1#!/

Islington Road to Ash Street – Preferred Design (with Ash)

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



243-22

Ruthanne Fuller
Mayor

City of Newton, Massachusetts

Office of the Mayor

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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,

Ruthanne Fuller

Mayor Ruthanne Fuller

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

Memorandum

To: City of Newton

Date: 02/04/2022

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

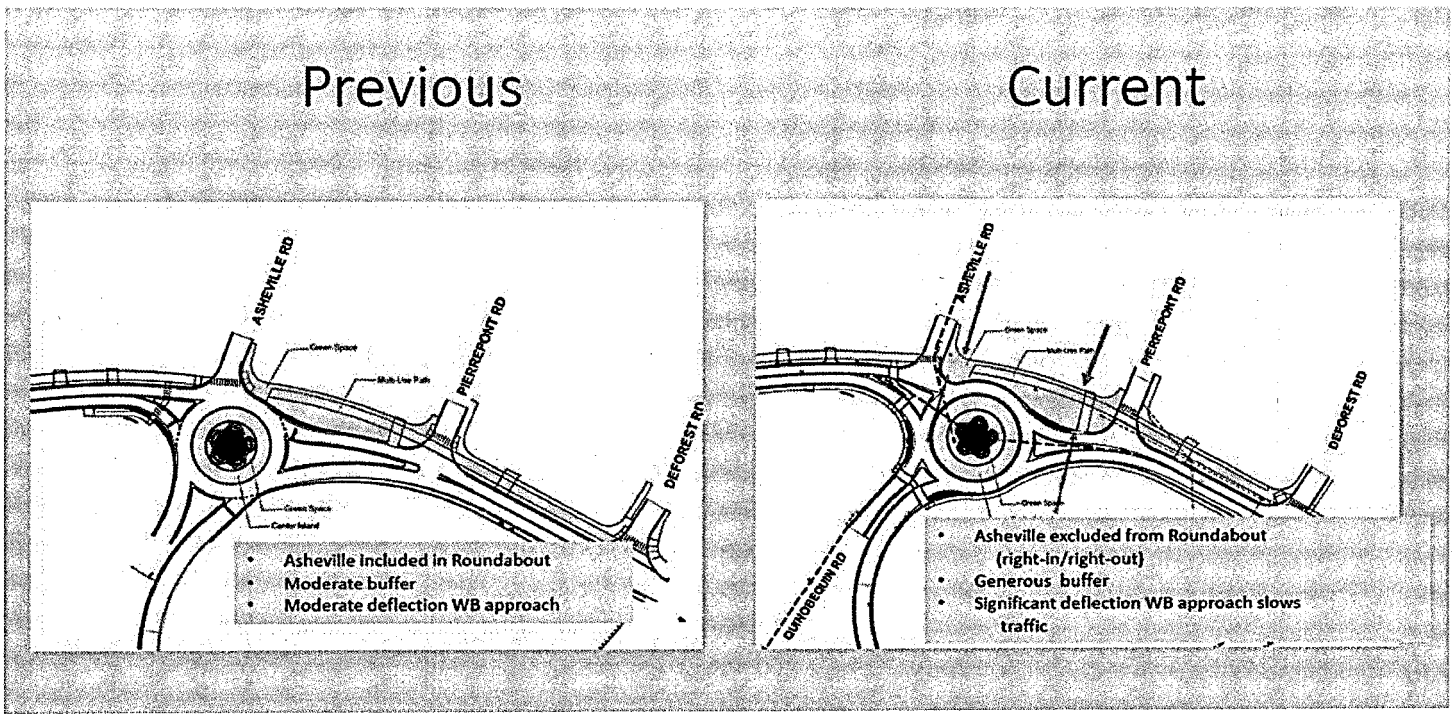
- Increased deflection of the approaches will slow traffic even more than former concepts
- Increased (substantially) green buffer between Grove Street and residents in northwest quadrant of intersection
- Deemphasizes traffic movements onto Asheville Road (northern neighborhood traffic will likely not 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[1]. 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.

[1] Supplemental Draft Environmental Impact Report, EEA No. 16024, Riverside Station Redevelopment; Prepared by VHB; May 17, 2021.

Table 1 Roundabout Intersection Capacity Analysis Summary

Location	2031 Build Conditions w/ Mitigation Original Four-Legged Concept					2031 Build Conditions w/ Mitigation Revised Three-Legged Concept				
	D [a]	v/c [b]	Delay [c]	LOS [d]	95th Q [e]	D	v/c	Delay	LOS	95th Q
Grove Street at I-95 Southbound Ramps / Asheville Road										
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	A	50	380	0.38	7	A	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	A	2	n/a	n/a	n/a	n/a	n/a
Overall			**16**	**C**				**16**	**C**	
Weekday Evening										
Grove Street EB LTR	260	0.43	12	B	56	265	0.43	12	B	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	A	25	190	0.25	7	A	25
Asheville Road SB LTR	10	0.02	8	A	1	n/a	n/a	n/a	n/a	n/a
Overall			**14**	**B**				**14**	**B**	
Saturday Midday										
Grove Street EB LTR	220	0.28	7	A	29	235	0.29	7	A	31
Grove Street WB LTR	350	0.36	7	A	45	350	0.36	7	A	45
I-95 SB Off-Ramp NB LTR	280	0.33	7	A	37	280	0.32	7	A	37
Asheville Road SB LTR	15	0.02	5	A	2	n/a	n/a	n/a	n/a	n/a
Overall			**7**	**A**				7	**A**	

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

Location	2031 Build Conditions w/ Mitigation Concept 1					2031 Build Conditions w/ Mitigation Concept 2				
	v/c [a]	Delay [b]	LOS [c]	50th Q [d]	95th Q [e]	v/c	Delay	LOS	50th Q	95th Q
Grove Street at I-95 Southbound Ramps / Asheville 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	A	22	103	0.50	11	B	22	148
Grove Street WB TR	0.12	5	A	12	61	0.12	6	A	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**	**C**				**22**	**C**		
Weekday Evening										
Grove Street EB LTR	0.58	27	C	81	220	0.64	32	C	86	#302
Grove Street WB L	0.56	8	A	46	212	0.61	13	B	47	#344
Grove Street WB TR	0.23	5	A	26	122	0.25	7	A	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	B	19	102	0.19	11	B	22	104
Asheville Road SB LTR	0.04	31	C	2	18	0.04	33	C	3	18
Overall		**13**	**B**				**16**	**B**		
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	A	22	104	0.36	9	A	20	131
Grove Street WB TR	0.12	6	A	11	56	0.12	7	A	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	B	28	157	0.33	14	B	28	194
Asheville Road SB LTR	0.08	26	C	4	27	0.07	30	C	4	30
Overall		**13**	**B**				**15**	**B**		

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
95th 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 95th-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 95th-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 95th-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 95th Percentile Queues

Figure 3 I-95 SB Off-Ramp Northbound Approach Weekday Morning Peak Hour 95th 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

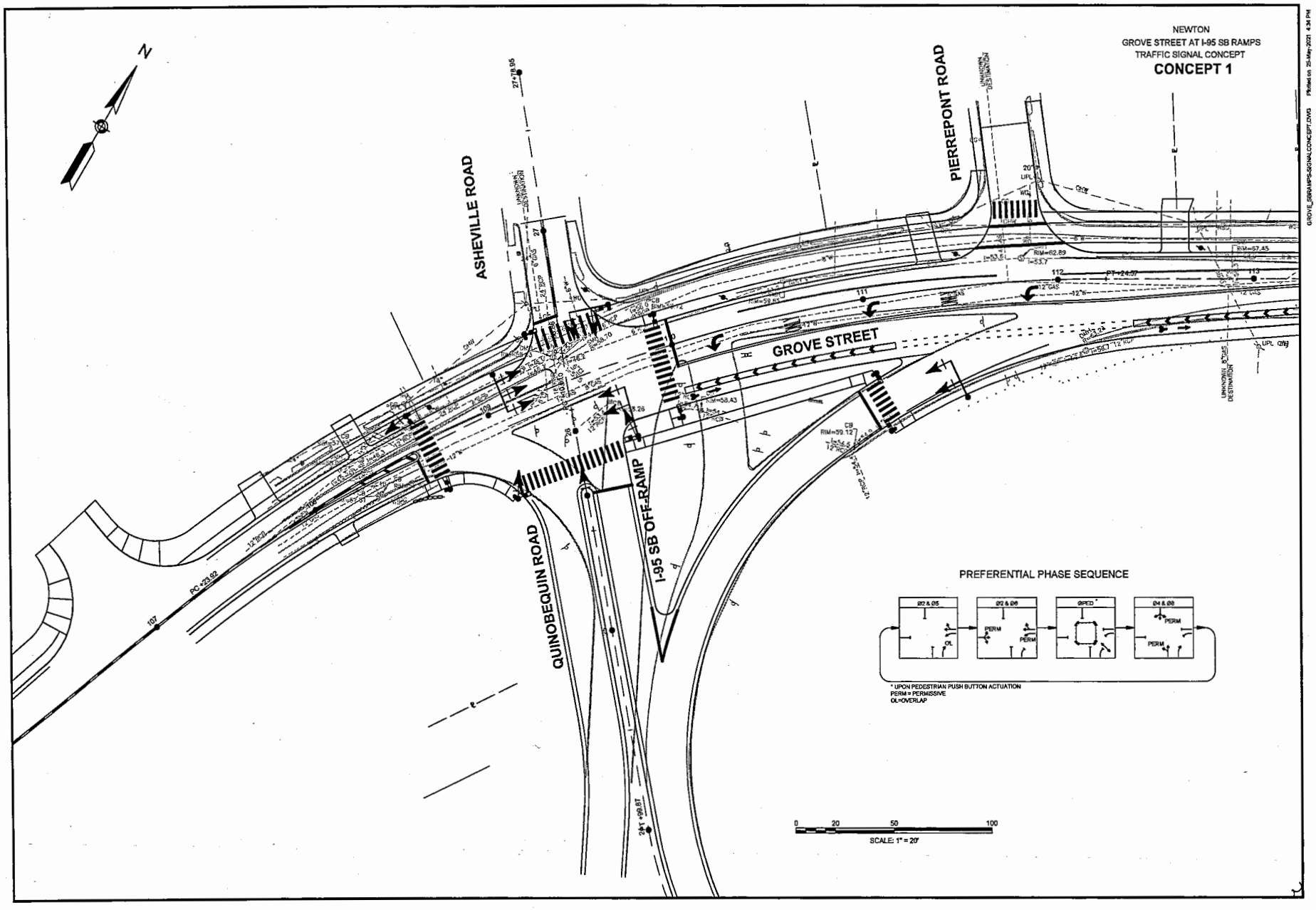
As outlined in this memorandum, future traffic conditions at the intersection of Grove Street at the I-95 Southbound Ramps are expected to operate at acceptable levels-of-service under both the roundabout concepts and the four-legged signalized concepts. However, the queues on each approach are expected 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.

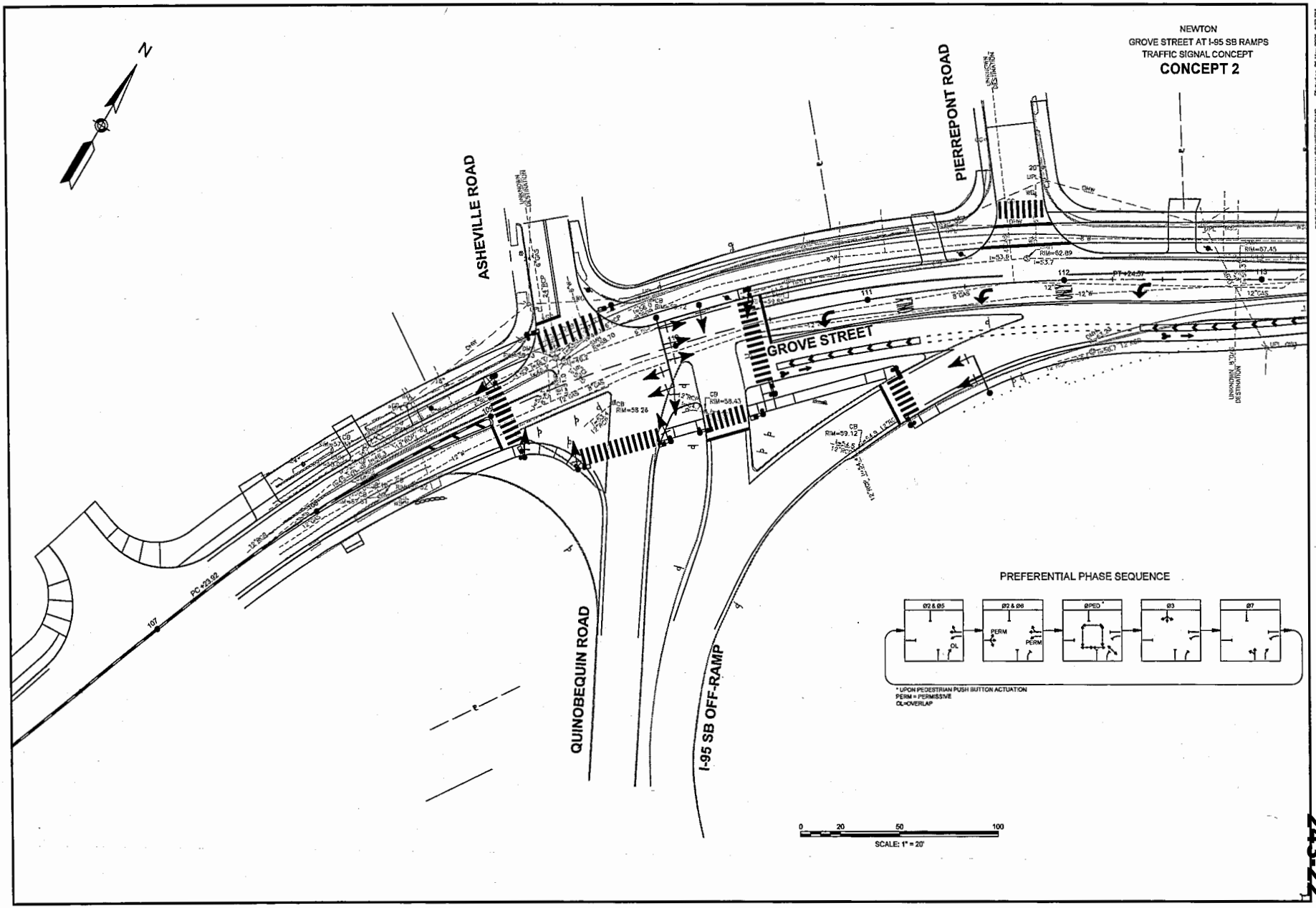
City of Newton
Ref: 10865.03
02/04/2022
Attachments

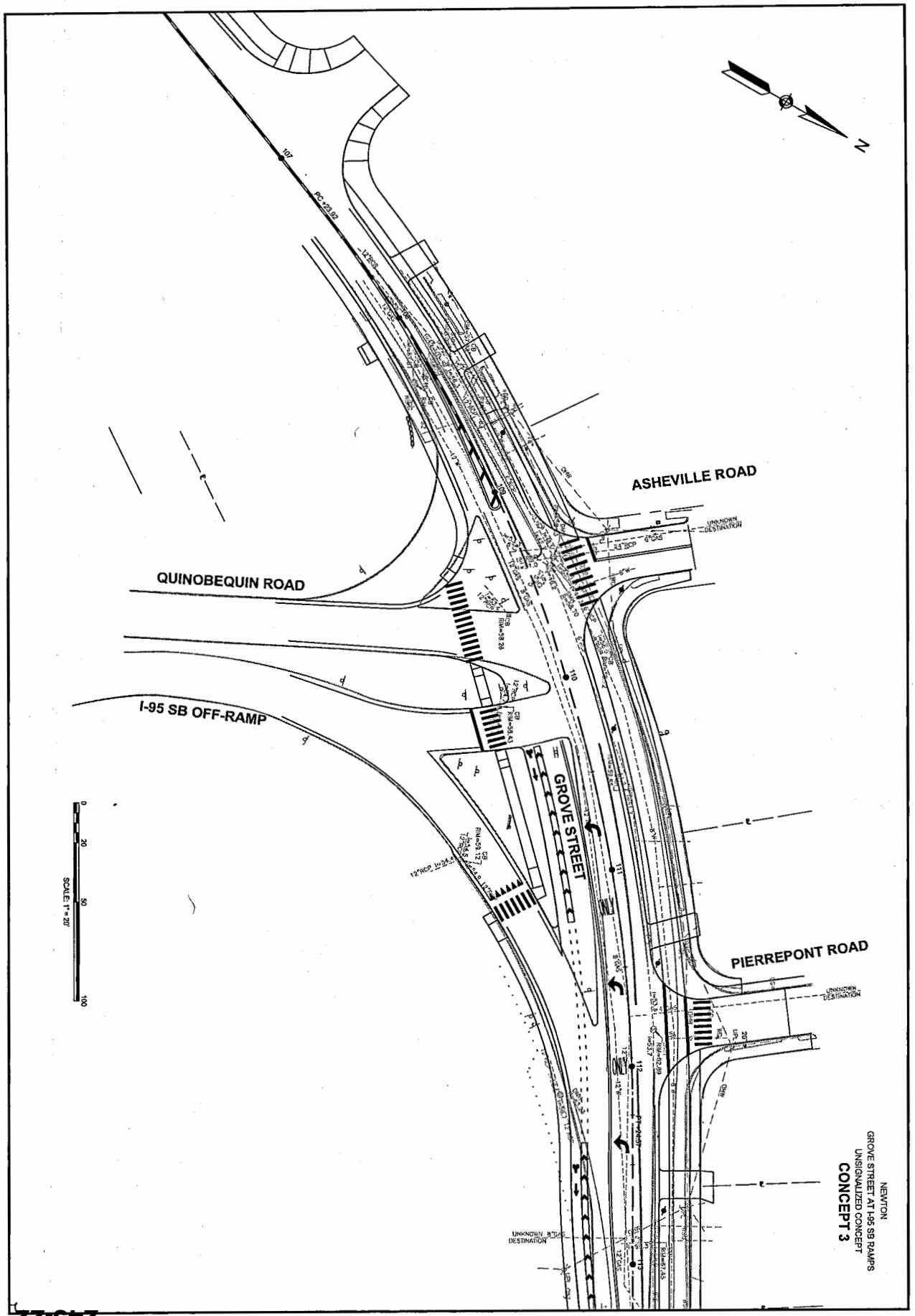
vhb
Memorandum

Attachments

- Concept Plans – Signalized
- Intersection Capacity Analyses – Roundabout
- Intersection Capacity Analyses – Signalized


NEWTON
GROVE STREET AT I-95 SB RAMPS
TRAFFIC SIGNAL CONCEPT
CONCEPT 1
N
ASHEVILLE ROAD
PIERREPONT ROAD
GROVE STREET
QUINOBEQUIN ROAD
I-95 SB OFF-RAMP
PREFERENTIAL PHASE SEQUENCE
PERM
* UPON PEDESTRIAN PUSH BUTTON ACTUATION
PERM = PERMISSIVE
OL=OVERLAP
0 20 50 100
SCALE: 1" = 20'
GROVE_SBRAMPS-SIGNAL CONCEPT.DWG Plotted on 25-May-2021 4:34 PM


NEWTON
GROVE STREET AT I-95 SB RAMPS
TRAFFIC SIGNAL CONCEPT
CONCEPT 2
N
ASHEVILLE ROAD
PIERREPONT ROAD
GROVE STREET
QUINOBEQUIN ROAD
I-95 SB OFF-RAMP
PREFERENTIAL PHASE SEQUENCE
Ø2 & Ø5
Ø2 & Ø6
ØPED *
Ø3
Ø7
PERM
PERM
OL
* UPON PEDESTRIAN PUSH BUTTON ACTUATION
PERM = PERMISSIVE
OL=OVERLAP
0
20
50
100
SCALE: 1" = 20'
243-22



NEWTON
GROVE STREET AT I-95 SB RAMPS
UNSIGNALIZED CONCEPT
CONCEPT 3

GROVE_SBRAMPS-SIGNALCONCEPT3.DWG Plotted on 4-Jun-2021 8:28 AM

LANE SUMMARY

Site: 101 [Weekday Morning_2031 Build with Mitigation]

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

Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: I-95 SB Ramps													
Lane 1[d]	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 Street													
Lane 1[d]	413	3.0	1089	0.379	100	7.2	LOS A	2.0	50.1	Full	1600	0.0	0.0
Approach	413	3.0		0.379		7.2	LOS A	2.0	50.1				
North: Asheville Road													
Lane 1[d]	17	7.0	690	0.025	100	5.5	LOS A	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[d]	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

LANE SUMMARY

Site: 101 [Weekday Evening_2031 Build with Mitigation]

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

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: I-95 SB Ramps													
Lane 1[d]	207	5.0	840	0.246	100	6.9	LOS A	0.9	24.7	Full	1600	0.0	0.0
Approach	207	5.0		0.246		6.9	LOS A	0.9	24.7				
East: Grove Street													
Lane 1[d]	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				
North: Asheville Road													
Lane 1[d]	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: Grove Street													
Lane 1[d]	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	LOS B	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

LANE SUMMARY

Site: 101 [Saturday Midday_2031 Build with Mitigation]

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

Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: I-95 SB Ramps													
Lane 1[d]	304	1.0	934	0.326	100	7.3	LOS A	1.5	37.1	Full	1600	0.0	0.0
Approach	304	1.0		0.326		7.3	LOS A	1.5	37.1				
East: Grove Street													
Lane 1[d]	380	1.0	1065	0.357	100	7.0	LOS A	1.8	45.2	Full	1600	0.0	0.0
Approach	380	1.0		0.357		7.0	LOS A	1.8	45.2				
North: Asheville Road													
Lane 1[d]	17	0.0	745	0.023	100	5.1	LOS A	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: Grove Street													
Lane 1[d]	239	1.0	855	0.280	100	7.2	LOS A	1.2	29.3	Full	1600	0.0	0.0
Approach	239	1.0		0.280		7.2	LOS A	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

LANE SUMMARY

Site: 101 [Weekday Morning_2031 Build with Mitigation]

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

Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: I-95 SB Ramps													
Lane 1[d]	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[d]	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: Grove Street													
Lane 1[d]	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	LOS C	13.4	339.3				
Intersection	1462	2.3		0.757		16.3	LOS C	13.4	339.3				

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

LANE SUMMARY

Site: 101 [Weekday Evening_2031 Build with Mitigation]

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

Lane Use and Performance	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: I-95 SB Ramps													
Lane 1[d]	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													
Lane 1[d]	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: Grove Street													
Lane 1[d]	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

LANE SUMMARY

Site: 101 [Saturday Midday_2031 Build with Mitigation]

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

Lane Use and Performance	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: I-95 SB Ramps													
Lane 1[d]	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[d]	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 Street													
Lane 1[d]	250	1.0	869	0.288	100	7.2	LOS A	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	LOS A	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.

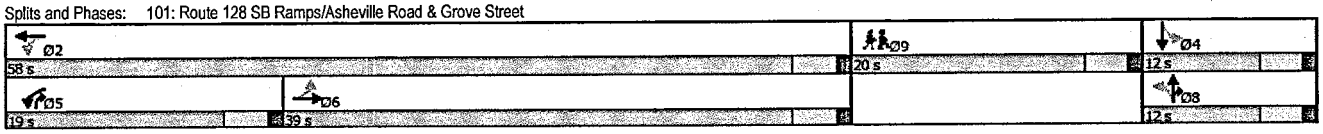
d Dominant lane on roundabout approach

Riverside Station Development :: 10865.03 — 2031 Build Conditions with Mitigation - Signal at SB Ramps - Concept 1
101: Route 128 SB Ramps/Asheville Road & Grove Street — Timing Plan: Weekday Morning

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	1	520	55	240	135	5	5	1	370	10	5	0	
Future Volume (vph)	1	520	55	240	135	5	5	1	370	10	5	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	200		0	0		200	0		0	
Storage Lanes	0		0	1		0	0		1	0		0	
Taper Length (ft)	25			25			25			25			
Satd. Flow (prot)	0	1835	0	1752	1834	0	0	1788	1583	0	1717	0	
Flt Permitted				0.243				0.837			0.843		
Satd. Flow (perm)	0	1835	0	448	1834	0	0	1559	1583	0	1497	0	
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)	7					7							
Confl. Bikes (#/hr)			1			1							
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 (%)	2%	2%	2%	3%	3%	3%	2%	2%	2%	7%	7%	7%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	626	0	261	152	0	0	6	402	0	16	0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	pt+ov	Perm	NA		
Protected Phases		6		5	2			8	5 8		4		9
Permitted Phases	6			2			8			4			
Detector Phase	6	6		5	2		8	8	5 8	4	4		
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
Total Split (s)	39.0	39.0		19.0	58.0		12.0	12.0		12.0	12.0		20.0
Total Split (%)	43.3%	43.3%		21.1%	64.4%		13.3%	13.3%		13.3%	13.3%		22%
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	1.0		1.0
Lost Time Adjust (s)		0.0		0.0	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									
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	26.1		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	4.5			33.0	25.3		34.5		
Queue Delay		0.0		0.0	0.0			0.0	0.0		0.0		
Total Delay		27.0		7.0	4.5			33.0	25.3		34.5		
LOS		C		A	A			C	C		C		
Approach Delay		27.0			6.1			25.4			34.5		
Approach LOS		C			A			C			C		
Queue Length 50th (ft)		192		22	12			2	115		6		
Queue Length 95th (ft)		#526		103	61			15	#374		28		
Internal Link Dist (ft)		1524			840			758			102		
Turn Bay Length (ft)				200					200				
Base Capacity (vph)		1026		626	1531			199	683		191		
Starvation Cap Reductn		0		0	0			0	0		0		
Spillback Cap Reductn		0		0	0			0	0		0		
Storage Cap Reductn		0		0	0			0	0		0		
Reduced v/c Ratio		0.61		0.42	0.10			0.03	0.59		0.08		

Intersection Summary
Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 65.4
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.80
Intersection Signal Delay: 20.7 — Intersection LOS: C
Intersection Capacity Utilization 68.7% — ICU Level of Service C
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

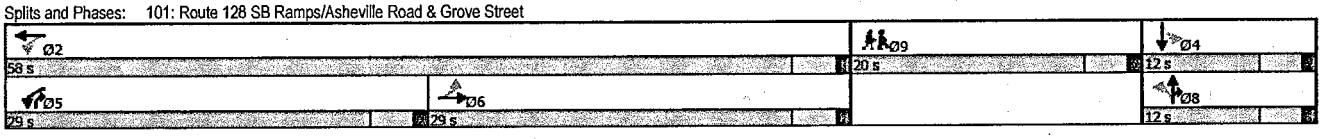


Riverside Station Development :: 10865.03 — 2031 Build Conditions w/ Mitigation - Signal at SB Ramps - Concept 1
101: Route 128 SB Ramps/Asheville Road & Grove Street — Timing Plan: Weekday Evening

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	1	215	45	445	275	10	40	5	145	5	2	1	
Future Volume (vph)	1	215	45	445	275	10	40	5	145	5	2	1	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	200		0	0		200	0		0	
Storage Lanes	0		0	1		0	0		1	0		0	
Taper Length (ft)	25			25			25			25			
Satd. Flow (prot)	0	1802	0	1770	1851	0	0	1732	1538	0	1812	0	
Flt Permitted		0.999		0.341				0.743			0.813		
Satd. Flow (perm)	0	1800	0	635	1851	0	0	1344	1538	0	1518	0	
Right Turn on Red			No			No			No			No	
Satd. Flow (RTOR)													
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		1604			883			838			182		
Travel Time (s)		36.5			20.1			19.0			4.1		
Confl. Peds. (#/hr)	16					16							
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 (%)	3%	3%	3%	2%	2%	2%	5%	5%	5%	0%	0%	0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	284	0	484	310	0	0	48	158	0	8	0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	pt+ov	Perm	NA		
Protected Phases		6		5	2			8	5 8		4		9
Permitted Phases	6			2			8			4			
Detector Phase	6	6		5	2		8	8	5 8	4	4		
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
Total Split (s)	29.0	29.0		29.0	58.0		12.0	12.0		12.0	12.0		20.0
Total Split (%)	32.2%	32.2%		32.2%	64.4%		13.3%	13.3%		13.3%	13.3%		22%
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	1.0		1.0
Lost Time Adjust (s)		0.0		0.0	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									
Lead-Lag Optimize?													
Recall Mode	Min	Min		None	None		None	None		None	None		None
Act Effct Green (s)		15.2		40.4	41.9			8.1	29.5		8.1		
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			0.25	0.20		0.04		
Control Delay		26.7		8.1	5.0			33.0	10.4		31.0		
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		
LOS		C		A	A			C	B		C		
Approach Delay		26.7			6.9			15.6			31.0		
Approach LOS		C			A			B			C		
Queue Length 50th (ft)		81		46	26			14	19		2		
Queue Length 95th (ft)		220		212	122			62	102		18		
Internal Link Dist (ft)		1524			803			758			102		
Turn Bay Length (ft)				200					200				
Base Capacity (vph)		907		1027	1660			216	975		244		
Starvation Cap Reductn		0		0	0			0	0		0		
Spillback Cap Reductn		0		0	0			0	0		0		
Storage Cap Reductn		0		0	0			0	0		0		
Reduced v/c Ratio		0.31		0.47	0.19			0.22	0.16		0.03		

Intersection Summary
Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 56.3
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 12.8 — Intersection LOS: B
Intersection Capacity Utilization 53.8% — ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 101: Route 128 SB Ramps/Asheville Road & Grove Street



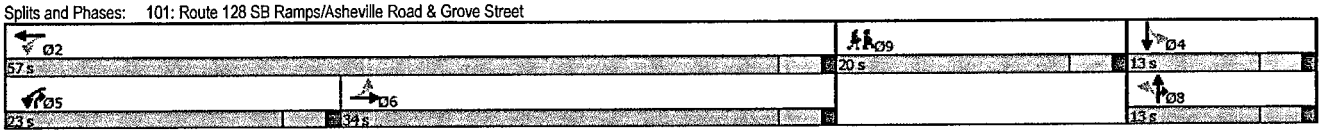
Riverside Station Development :: 10865.03
101: Route 128 SB Ramps/Asheville Road & Grove Street

2031 Build Conditions with Mitigation - Signal at SB Ramps - Concept 1
Timing Plan: Saturday Midday

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	5	150	65	230	115	5	35	5	240	10	5	1	
Future Volume (vph)	5	150	65	230	115	5	35	5	240	10	5	1	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	200		0	0		200	0		0	
Storage Lanes	0		0	1		0	0		1	0		0	
Taper Length (ft)	25			25			25			25			
Satd. Flow (prot)	0	1804	0	1787	1868	0	0	1802	1599	0	1826	0	
Flt Permitted		0.995		0.398				0.767			0.849		
Satd. Flow (perm)	0	1797	0	749	1868	0	0	1443	1599	0	1600	0	
Right Turn on Red			No			No			No			No	
Satd. Flow (RTOR)													
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		1604			883			759			182		
Travel Time (s)		36.5			20.1			17.3			4.1		
Confl. Peds. (#/hr)	4					4							
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 (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	0%	0%	0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	239	0	250	130	0	0	43	261	0	17	0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	pt+ov	Perm	NA		
Protected Phases		6		5	2			8	5 8		4		9
Permitted Phases	6			2			8			4			
Detector Phase	6	6		5	2		8	8	5 8	4	4		
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
Total Split (s)	34.0	34.0		23.0	57.0		13.0	13.0		13.0	13.0		20.0
Total Split (%)	37.8%	37.8%		25.6%	63.3%		14.4%	14.4%		14.4%	14.4%		22%
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	1.0		1.0
Lost Time Adjust (s)		0.0		0.0	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									
Lead-Lag Optimize?													
Recall Mode	Min	Min		None	Min		None	None		None	None		None
Act Effct Green (s)		12.9		29.4	29.4			9.0	25.5		6.9		
Actuated g/C Ratio		0.26		0.59	0.59			0.18	0.52		0.14		
v/c Ratio		0.51		0.36	0.12			0.16	0.32		0.08		
Control Delay		22.5		7.4	5.9			25.0	10.8		25.9		
Queue Delay		0.0		0.0	0.0			0.0	0.0		0.0		
Total Delay		22.5		7.4	5.9			25.0	10.8		25.9		
LOS		C		A	A			C	B		C		
Approach Delay		22.5			6.9			12.8			25.9		
Approach LOS		C			A			B			C		
Queue Length 50th (ft)		51		22	11			9	28		4		
Queue Length 95th (ft)		173		104	56			52	157		27		
Internal Link Dist (ft)		1524			803			679			102		
Turn Bay Length (ft)				200					200				
Base Capacity (vph)		1179		876	1738			283	1052		315		
Starvation Cap Reductn		0		0	0			0	0		0		
Spillback Cap Reductn		0		0	0			0	0		0		
Storage Cap Reductn		0		0	0			0	0		0		
Reduced v/c Ratio		0.20		0.29	0.07			0.15	0.25		0.05		

Intersection Summary
Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 49.5
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.51
Intersection Signal Delay: 13.1 Intersection LOS: B
Intersection Capacity Utilization 42.4% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 101: Route 128 SB Ramps/Asheville Road & Grove Street



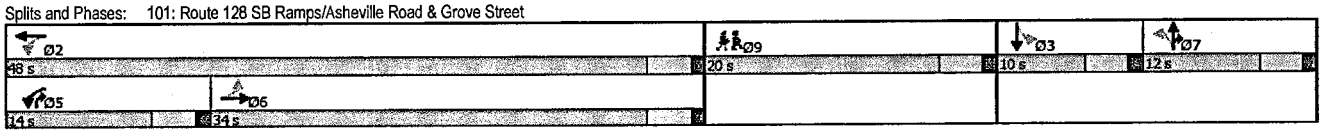
Riverside Station Development :: 10865.03
101: Route 128 SB Ramps/Asheville Road & Grove Street

2031 Build Conditions with Mitigation - Signal at SB Ramps - Concept 2
Timing Plan: Weekday Morning

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	1	520	55	240	135	5	5	1	370	10	5	0	
Future Volume (vph)	1	520	55	240	135	5	5	1	370	10	5	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	200		0	0		200	0		0	
Storage Lanes	0		0	1		0	0		1	0		0	
Taper Length (ft)	25			25			25			25			
Satd. Flow (prot)	0	1835	0	1752	1834	0	0	1788	1583	0	1717	0	
Flt Permitted				0.253				0.832					
Satd. Flow (perm)	0	1835	0	467	1834	0	0	1550	1583	0	1776	0	
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)	7					7							
Confl. Bikes (#/hr)			1			1							
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 (%)	2%	2%	2%	3%	3%	3%	2%	2%	2%	7%	7%	7%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	626	0	261	152	0	0	6	402	0	16	0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	pt+ov	Perm	NA		
Protected Phases		6		5	2			7	5 7		3		9
Permitted Phases	6			2			7			3			
Detector Phase	6	6		5	2		7	7	5 7	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
Total Split (s)	34.0	34.0		14.0	48.0		12.0	12.0		10.0	10.0		20.0
Total Split (%)	37.8%	37.8%		15.6%	53.3%		13.3%	13.3%		11.1%	11.1%		22%
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	1.0		1.0
Lost Time Adjust (s)		0.0		0.0	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	22.6		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	6.4			31.3	32.4		33.6		
LOS		C		B	A			C	C		C		
Approach Delay		23.8			9.3			32.4			33.6		
Approach LOS		C			A			C			C		
Queue Length 50th (ft)		158		22	12			2	120		5		
Queue Length 95th (ft)		#587		#148	81			15	#426		29		
Internal Link Dist (ft)		1524			840			758			102		
Turn Bay Length (ft)				200					200				
Base Capacity (vph)		856		519	1254			192	541		165		
Starvation Cap Reductn		0		0	0			0	0		0		
Spillback Cap Reductn		0		0	0			0	0		0		
Storage Cap Reductn		0		0	0			0	0		0		
Reduced v/c Ratio		0.73		0.50	0.12			0.03	0.74		0.10		

Intersection Summary
Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 66
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 22.2 Intersection LOS: C
Intersection Capacity Utilization 68.7% ICU Level of Service C
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



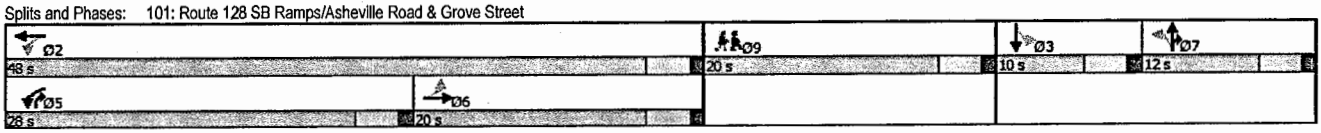
Riverside Station Development :: 10865.03
101: Route 128 SB Ramps/Asheville Road & Grove Street

2031 Build Conditions w/ Mitigation - Signal at SB Ramps - Concept 2
Timing Plan: Weekday Evening

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	1	215	45	445	275	10	40	5	145	5	2	1	
Future Volume (vph)	1	215	45	445	275	10	40	5	145	5	2	1	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	200		0	0		200	0		0	
Storage Lanes	0		0	1		0	0		1	0		0	
Taper Length (ft)	25			25			25			25			
Satd. Flow (prot)	0	1802	0	1770	1851	0	0	1732	1538	0	1812	0	
Flt Permitted		0.999		0.283				0.743					
Satd. Flow (perm)	0	1800	0	527	1851	0	0	1344	1538	0	1868	0	
Right Turn on Red			No			No			No			No	
Satd. Flow (RTOR)													
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		1604			883			838			182		
Travel Time (s)		36.5			20.1			19.0			4.1		
Confl. Peds. (#/hr)	16					16							
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 (%)	3%	3%	3%	2%	2%	2%	5%	5%	5%	0%	0%	0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	284	0	484	310	0	0	48	158	0	8	0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	pt+ov	Perm	NA		
Protected Phases		6		5	2			7	5 7		3		9
Permitted Phases	6			2			7			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
Total Split (s)	20.0	20.0		28.0	48.0		12.0	12.0		10.0	10.0		20.0
Total Split (%)	22.2%	22.2%		31.1%	53.3%		13.3%	13.3%		11.1%	11.1%		22%
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	1.0		1.0
Lost Time Adjust (s)		0.0		0.0	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	None		None	None		None	None		None
Act Effct Green (s)		15.2		40.9	40.9			7.8	33.5		6.3		
Actuated g/C Ratio		0.25		0.67	0.67			0.13	0.55		0.10		
v/c Ratio		0.64		0.61	0.25			0.28	0.19		0.04		
Control Delay		32.4		12.7	7.0			34.4	10.8		32.9		
Queue Delay		0.0		0.0	0.0			0.0	0.0		0.0		
Total Delay		32.4		12.7	7.0			34.4	10.8		32.9		
LOS		C		B	A			C	B		C		
Approach Delay		32.4			10.5			16.3			32.9		
Approach LOS		C			B			B			C		
Queue Length 50th (ft)		86		47	26			15	22		3		
Queue Length 95th (ft)		#302		#344	162			62	104		18		
Internal Link Dist (ft)		1524			803			758			102		
Turn Bay Length (ft)				200					200				
Base Capacity (vph)		497		866	1405			185	904		193		
Starvation Cap Reductn		0		0	0			0	0		0		
Spillback Cap Reductn		0		0	0			0	0		0		
Storage Cap Reductn		0		0	0			0	0		0		
Reduced v/c Ratio		0.57		0.56	0.22			0.26	0.17		0.04		

Intersection Summary
Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 61.2
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.64
Intersection Signal Delay: 16.4 Intersection LOS: B
Intersection Capacity Utilization 53.8% ICU Level of Service A
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



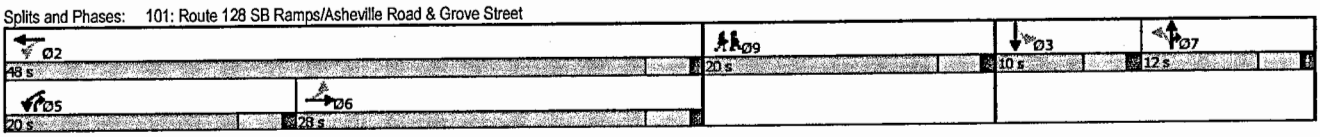
Riverside Station Development :: 10865.03
101: Route 128 SB Ramps/Asheville Road & Grove Street

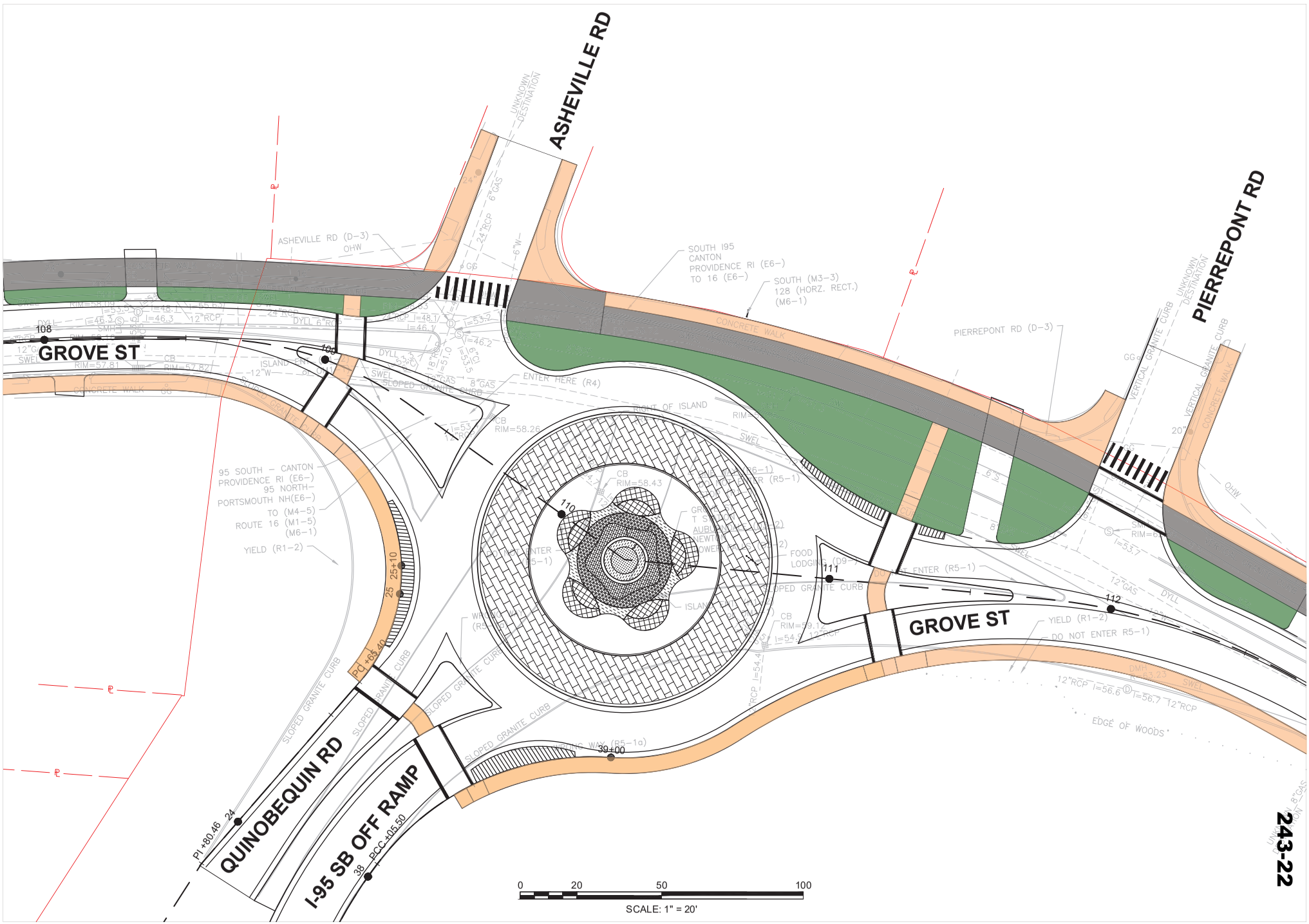
2031 Build Conditions with Mitigation - Signal at SB Ramps - Concept 2
Timing Plan: Saturday Midday

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø9
Lane Configurations													
Traffic Volume (vph)	5	150	65	230	115	5	35	5	240	10	5	1	
Future Volume (vph)	5	150	65	230	115	5	35	5	240	10	5	1	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0		0	200		0	0		200	0		0	
Storage Lanes	0		0	1		0	0		1	0		0	
Taper Length (ft)	25			25			25			25			
Satd. Flow (prot)	0	1804	0	1787	1868	0	0	1802	1599	0	1826	0	
Flt Permitted		0.995		0.380				0.756					
Satd. Flow (perm)	0	1797	0	715	1868	0	0	1422	1599	0	1885	0	
Right Turn on Red			No			No			No			No	
Satd. Flow (RTOR)													
Link Speed (mph)		30			30			30			30		
Link Distance (ft)		1604			883			759			182		
Travel Time (s)		36.5			20.1			17.3			4.1		
Confl. Peds. (#/hr)	4					4							
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 (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	0%	0%	0%	
Shared Lane Traffic (%)													
Lane Group Flow (vph)	0	239	0	250	130	0	0	43	261	0	17	0	
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	pt+ov	Perm	NA		
Protected Phases		6		5	2			7	5 7		3		9
Permitted Phases	6			2			7			3			
Detector Phase	6	6		5	2		7	7	5 7	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
Total Split (s)	28.0	28.0		20.0	48.0		12.0	12.0		10.0	10.0		20.0
Total Split (%)	31.1%	31.1%		22.2%	53.3%		13.3%	13.3%		11.1%	11.1%		22%
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	1.0		1.0
Lost Time Adjust (s)		0.0		0.0	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)		13.7		30.7	30.7			8.6	25.6		6.6		
Actuated g/C Ratio		0.27		0.59	0.59			0.17	0.50		0.13		
v/c Ratio		0.50		0.36	0.12			0.18	0.33		0.07		
Control Delay		23.0		8.6	7.1			28.4	13.6		29.6		
Queue Delay		0.0		0.0	0.0			0.0	0.0		0.0		
Total Delay		23.0		8.6	7.1			28.4	13.6		29.6		
LOS		C		A	A			C	B		C		
Approach Delay		23.0			8.1			15.7			29.6		
Approach LOS		C			A			B			C		
Queue Length 50th (ft)		49		20	10			9	28		4		
Queue Length 95th (ft)		188		131	71			56	194		30		
Internal Link Dist (ft)		1524			803			679			102		
Turn Bay Length (ft)				200					200				
Base Capacity (vph)		924		793	1633			244	924		242		
Starvation Cap Reductn		0		0	0			0	0		0		
Spillback Cap Reductn		0		0	0			0	0		0		
Storage Cap Reductn		0		0	0			0	0		0		
Reduced v/c Ratio		0.26		0.32	0.08			0.18	0.28		0.07		

Intersection Summary
Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 51.6
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.50
Intersection Signal Delay: 14.7 Intersection LOS: B
Intersection Capacity Utilization 42.4% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 101: Route 128 SB Ramps/Asheville Road & Grove Street





GROVE STREET ROUNDABOUT
ASHEVILLE ROAD RIGHT IN RIGHT OUT
03/24/2022