GENERAL PROVISIONS – CONTRACT SPECIFIC

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1. BRIEF SCOPE OF WORK:

Rhode Island Contract No. 2024-CB-045, Federal Aid Project No. BRO-017C(002) for Bridge Group 17C - Newell and Sneech in the town of Cumberland will consist of erosion control, replacement of Newell Bridge No. 204 using Accelerated Bridge Construction (ABC) methods, pavement reconstruction, micro milling and overlay, utility adjustments, pavement marking installation, field office, mobilization, and maintenance and protection of traffic.

2. LIST OF CONTRACT DOCUMENTS:

The Contract Documents include the following contents:

- February 2024 Edition of the Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction
- Required Contract Provisions for Federal-Aid Construction Contracts
- RIDOA Division of Purchases Procurement Regulations
- Rhode Island Standard Details
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3. UTILITY AND MUNICIPAL NOTIFICATION AND COORDINATION

The following utility and municipal contacts are provided:

Verizon
Peter DeCosta
Verizon State Highway Coordinator
Verizon Communications, Inc.
85 High Street
Pawtucket, RI 02860
508-944-6701
peter.x.decosta@verizon.com

CoxCom, LLC
Shawn Murphy
Right-of-Way Agent II
Cox Communications / Northeast Region
401-430-5599
Shawn.Murphy@cox.com

Rhode Island Energy – Electric
Patrick Ventre
Rhode Island Energy/Project Manager
RI Energy - Electric
280 Melrose Street
Providence, RI 02907
732-672-3359
pventre@rienergy.com

Rhode Island Energy – Gas
James Paulette
Principal Engineer
Rhode Island Energy - Gas
642 George Washington Highway
Lincoln, RI 02865
401-465-8580
JMPaulette@rienergy.com

Crown Castle - Fiber
Chris Stevens
Fiber Construction Manager
1800 West Park Drive Suite 250
Westborough, MA 01581
508-621-1874
Christopher.Stevens@crowncastle.com

Cumberland Sewer Department
David Carr
Superintendent
Cumberland Sewer Department
45 Broad Street
Cumberland, RI 02864
401-728-2400 ext. 122
dcarr@cumberlandri.org

Cumberland Department of Public Works
Joseph Duarte
Director
Cumberland DPW
45 Broad Street
Cumberland, RI 02864
401-728-2400 ext. 143
jduarte@cumberlandri.org

Cumberland Water Department
Romeo N. Mendes, PE
Superintendent
Cumberland Water Department
98 Nate Whipple Highway
Cumberland, RI 02864
401-658-0666
rmendes@cumberlandri.org

Upon award, the Contractor shall notify all applicable utility companies relative to their anticipated construction start date. Immediately following the Pre-Construction Conference, the Contractor shall initiate all required utility notifications.

The following is the anticipated notification periods and construction durations for the Contractor to coordinate with utility companies:

Utility Company Name	Notification Period	Construction Duration
Rhode Island Energy - Electric	4 weeks (min)	6 weeks
Crown Castle	2 weeks (min)	3-4 days
Cox Communications	4 weeks (min)	1 week
Verizon Business/MCI Metro	2 weeks (min)	1 week
Rhode Island Energy - Gas	2 weeks (min)	1 week
Verizon (Underground)	4 weeks (min)	8 weeks

The locations of existing utilities have been shown on the Plans using the best available information and are approximate only. The Contractor shall verify the exact locations of all existing utilities and service connections both underground and overhead in accordance with DIG SAFE prior to commencing any work that may impact the utilities in the area. Any damage to the utilities, which are detailed by DIG SAFE or shown on the Plans, shall be the Contractor's responsibility. The cost to repair such damage shall be borne by the Contractor.

The Contractor shall contact DIG SAFE (1-888-344-7233) prior to commencing with construction.

Contractor shall coordinate with all underground and overhead utility companies for permanent relocations.

<u>Verizon Underground</u>

Coordinate with Verizon to maintain uninterrupted cable service during construction. The Verizon telephone cable relocations shall be completed by a Verizon appointed contractor. Cables shall temporarily be supported across the river and across excavations by a temporary bridge and or supports. Once the new bridge is constructed, the Contractor shall continue to coordinate with Verizon so their appointed contractor can furnish and install utility supports on the new bridge, furnish and install the cables in new conduits, and remove the temporary bridge and or supports after the relocation is complete.

<u>Rhode Island Energy – Gas</u>

Regulations

a. Contractor shall follow the guidelines listed in RI Energy's "Guidelines for Working Around Gas Utilities", document attached in Appendix "A".
b. Depth of gas facilities are unknown and could be shallow, use caution when working in the vicinity of any gas facility, hand digging only.
c. RI Energy requires a minimum of one foot of separation between crossing utilities and existing gas facilities.
d. RI Energy requires a minimum of three feet of separation between the gas main and the parallel facility for steel and plastic gas mains. **For cast iron gas main see line item for encroachment guidelines.**
e. At a proposed utility and **critical** gas main crossing, a RI Energy gas damage prevention inspector must be on site when crossing. Call Ed Souza at 401-283-9159 or Jeff Cassel at 508-468-7217.
f. If a **gas main is** exposed or **going to be exposed** call RI Energy dispatch at 877-304-1203 for an inspector to be dispatched to the site to inspect the line before backfill.
g. If a **gas main or gas main coating is** damaged call RI Energy dispatch office at 877-304-1203 for an inspector to be dispatched to the site for repair before backfill.
h. For any exposed gas facility, provide backfill materials and compact the backfill materials in accordance with RI Energy's "Guidelines for Backfill and Compaction Around Gas Pipes", document attached.
i. When crossing or exposing a steel or plastic gas facility support may be required. Follow the guidelines listed and illustrated in RI Energy's "Support Requirements for Exposed & Undermined Steel or Plastic Gas Facilities", document (dwg no. CNST-6045) attached.
j. All gas valve boxes shall be adjusted to the new road/sidewalk surface. Valve boxes, if required for replacement, can be obtained at Rhode Island Energy's Providence location, 477 Dexter Street,

Providence, RI or Lincoln location, 642 George Washington Highway (quantities 5 or less). Gas valve boxes need to be accessible at all times to be operated by RI Energy in the event of an emergency.

k. All cathodic protection boxes (boxes that contain wires that go down to the gas main) shall be adjusted to the new road/sidewalk surface. Care shall be exercised when adjusting so as not to damage the wires. If the wires are damaged or if assistance is needed, contact RI Energy corrosion engineer to visit the site. Contact Rick LePage 508-948-8432. New boxes, if required, can be obtained at RI Energy's Providence facility, 477 Dexter Street, Providence, RI or RI Energy's Lincoln facility, 642 George Washington Highway, Lincoln, RI (quantities 5 or less). Contractor shall follow the guidelines listed in RI Energy's "Guidelines for Working Around Corrosion Control System Components", document attached.

l. Due to system reliability and public safety concerns, it is RI Energy's practice to restrict all construction work on or near gas facilities between November 15th and April 15th. All scheduled work should be completed between April 15th and November 15th. As gas usage peak during the months of December to March driven by heating needs, RI Energy's priority is to provide our customers with safe and reliable gas service. Any work on or near the gas facility will expose our customers to unnecessary risk. Exceptions will be considered on a case-by-case basis. Approvals from gas control, operational engineering, and project engineering will be required for these cases.

m. For a gas leak call 800-640-1595.

n. For a damaged gas facility call 800-870-1664.

o. RI Energy will purge our old gas main of gas, wipe test sample the inside of the pipe, cap the ends and abandon in place. Pipe four inches and less in diameter can't be sampled; this pipe will be assumed to be contaminated. If the wipe test results show PCB contamination and a section or sections need to be removed by the contractor then the contractor will need to transport the removed sections with sealed ends to either our Allens Ave facility at 642 Allens Ave in Providence or our Dexter St facility at 477 Dexter St in Providence or our Lincoln facility at 642 George Washington Hwy in Lincoln and place them in our red open top "Pipe to be Cleaned" container on site. RI Energy would then handle the cleaning and proper disposal. RI Energy also requires that the open pipe ends of the abandoned pipe remaining in the ground be capped or sealed with expanding foam. If the wipe test shows that the pipe has no PCB contamination then removed sections can just be disposed of by the contractor as scrap metal.

Cast Iron Involvement

p. If excavating parallel to or crossing a cast iron gas facility then encroachment of the cast iron line is a possibility and a concern where replacement may be required. Whenever an excavation is in the vicinity of a cast iron gas main contact RI Energy encroachment engineer to be on site, call Ed Souza at 401-283-9159 or Jeff Cassel at 508-468-7217. Guidelines in avoiding an encroachment are listed in RI Energy's "Cast Iron Gas Main Encroachment Prevention", document attached.

q. If excavating parallel to or crossing a cast iron facility that is greater than 8", this line is not covered under the encroachment guidelines and law. RI Energy does not allow more than 10' of gas main to be exposed and only allows (1) bell & spigot joint to be exposed. If a bell & spigot joint is exposed said joint must be leak clamped before backfill unless a clamp is already in place. Provide backfill materials and compact the backfill materials in accordance with RI Energy's "Guidelines for Backfill and Compaction Around Gas Pipes", document attached. Minimum 95% compaction of the soil below a cast iron is always required. Always call RI Energy damage prevention department for an inspector to be dispatched to site. Call Ed Souza at 401-283-9159 or Jeff Cassel at 508-468-7217.

Regulator Station

r. RI Energy requires notification of construction work within 200 ft of a gas regulator station for safety monitoring during construction. Please call RI Energy I & R Supervisor Mike Romano at 617-910-7854 or George Maerkle at 401-595-8276 or Jay Costa at 781-290-3515 when digging within 200 ft of regulator station. After hours, please call 877-304-1209.

Conduit Installs

s. Rhode Island Energy requires a one-foot separation between proposed conduit and any gas facility.
t. Rhode Island Energy does not allow the use of grinding wheel type trenchers over any gas facility, hand digging only in these areas.
u. If it is necessary to go under our facility and our facility is 4”, 6” or 8” cast iron, then encroachment becomes an issue. In order to avoid an encroachment and avoid the main section being replaced keep the trench width for 4” cast iron to less than 3’ wide and for 6” cast iron to less than 4’ wide and for 8” cast iron to less than 5’6” wide. 95% compaction of the soil below a cast iron is always required and proper backfill in accordance with our backfill and compaction around gas mains document. If an encroachment is suspected please call Ed Souza at 401-283-9159 or Jeff Cassel at 508-468-7217.

See Appendix “A” – RI Energy Guidelines for Working Around Gas, for the above referenced attachments. Also included in Appendix “A” are additional guidance through Rhode Island Energy Installation Specifications, Section 100 Main Installation Across Bridge and Code Reconciliation Section 200 Installation of Steel Gas Main and Standard Details that shall be used, provided by the Rhode Island Energy.

Rhode Island Energy Approved Gas Piping Contractors in Rhode Island (Last Updated 8/15/23)

The Contractor will need to use a RI Energy approved gas contractor to do the proposed gas work. The Contractor must use one of the following approved Contractors for this work:

AGI Construction Inc.
34 Appian Way
Smithfield, RI 02917
Michael Smith
401-233-0021
msmith@agiconstruction.com

GPL Construction Inc.
2180 Mendon Road, Suite 31
Cumberland, RI 02864
Mike Gaudette II
401-639-6282
Mgaudette2@gpl-construction.com

Ferreria Construction Co Inc.
1598 South County Trail
East Greenwich, RI 02818
Al Marsocci
401-400-4891
amarsocci@ferreriaconstruction.com

4. COORDINATION WITH OTHER CONTRACTS

It shall be the Contractor's responsibility to coordinate, cooperate and schedule his work and all segments thereof with the Engineer, other contractors, utility owners, and applicable local authorities, so as to minimize impacts to the construction schedule.

The Contractor is hereby notified that the construction projects listed below will be ongoing simultaneously with their contract and they shall be responsible to coordinate their work efforts with those Contractors:

- TIP ID 3181 – Bridge Group 17A – I-295 Cumberland
- TIP ID 3070 – Bridge Group 48_H – Arnold Mills Bridge IDs 030101 & 069101
- TIP ID 3016 – Bridge Group 14 – Route 99

There may also be work occurring at Culvert No. 124501 (Sneech Pond Road over Long Brook) during the duration of this project.

5. SPECIALTY ITEMS

Specialty Items in this Contract are as follows:

- Directional, Regulatory, Warning, Delineators, and Street Signs (Except temporary construction signs)
- Striping
- Seeding Items
- Guardrail
- Structures
- Interpretive Sign and Foundation
- Storm Water Treatment Device - 1

6. NOTICE TO CONTRACTORS

A. Standard Specifications

The reference "Standard Specifications" as written in the General Provisions – Contract Specific and the Job Specific Specifications shall mean the February 2024 Edition of the Rhode Island Department of Transportation Standard Specifications for Road and Bridge Construction.

B. Contract Submittal List (CSL)
The Contract Submittal List (CSL) shall be a table listing shop drawings and submittals required for the Contract, some of which are critical to the commencement of construction. A preliminary CSL is included in Appendix “B”. Shop drawings and submittals are required for, but not limited to, the items included in the CSL.

C. Plans and Shop Drawings
The Contractor shall note specification “105.02 Plans and Shop Drawings”. The Contractor shall submit Shop Drawings electronically directly to the Consulting Engineer Andrew Prezioso, P.E. (aprezioso@vhb.com) – VHB, to the RIDOT Project Manager, and to the Resident Engineer.

D. Use of Explosives
The Contractor is NOT allowed to use explosives on this project.

E. Unit Bid Item and Lump sum Bid Item Payments
For requirements and work described in the Contract Documents but not expressly identified to be measured separately for payment, the costs thereof shall be included in the contract bid prices of the items of work to which they pertain as listed in the Proposal.

F. Dust Control
The Contractor is prohibited from using calcium chloride as dust control. The Contractor shall only use water to control dust.

G. Storage of Construction Material and/or Equipment

The Contractor shall place all equipment and material in their field yard or on site in a location approved by the Engineer.

Storage of materials shall be coordinated with and approved by the Engineer. Storage of construction material and/or equipment shall be a minimum distance of 30 feet from the roadway.

Stockpiles shall be covered and must be located outside any areas of RIDEM jurisdiction including but not limited to wetlands and their associated buffers. Any storage or stockpile of construction material and/or equipment on private property will be the Contractor’s responsibility.

There shall be no storage of construction equipment and/or parking of vehicles under the drip lines of any trees.

H. Disposal of Surplus Material

All existing or other material not required or needed for use on the project, and not required to be removed and stockpiled, shall become the property of the Contractor and shall be removed from the site during the construction period and legally disposed of. No separate payment will be made for this work, but all costs in connection therewith shall be included in the unit bid prices for this Contract.

I. Project Coordination Meetings
When a field meeting or in-person meeting is required, all personnel shall have the appropriate personal protective equipment (PPE) devices.

J. Road/Lane Closures

The Contractor shall notify the Department 3 weeks in advance of a bridge or roadway closure/split/shift/travel lane width reductions on any roads within the State.

All full closures, splits, or shifts shall be scheduled to begin on ***Friday or Saturday night***, as determined by the TMP, to allow motoring public time to adjust to new travel patterns while allowing RIDOT the opportunity to evaluate its success. Construction work can commence on the Monday following the evaluation period.

Any exceptions to this must be approved by the Senior Management of Department.

K. Construction Signage

The Contractor shall be responsible for maintaining appropriate construction related signing at all times. All temporary construction signs not appropriate for the construction activity taking place shall be removed, covered, or otherwise concealed. This includes the period between erecting the signs, and the start of construction, as well as when a construction phase is completed, or suspended. All signs not appropriate for lane closures, speed limits or construction activity taking place at any given time shall be removed or covered to the satisfaction of the Engineer.

L. Right-of-Way

There are no ROW impacts for this project.

M. Tree Trimming/Clearing

RIDOT will utilize the State-Wide tree trimming program in advance of the overhead utility relocations on Diamond Hill Road. Any tree trimming or clearing activities by the Contractor shall only be completed between November 1 and March 31.

7. SEQUENCE OF CONSTRUCTION AND SCHEDULE

General Stipulations: The Contractor shall adhere to the following requirements:

a) The Contractor shall coordinate, cooperate and schedule his work and all segments thereof with the Engineer, other contractors, utility owners, and applicable local authorities, so as to minimize impacts to the construction schedule.

b) Included as an appendix (See Appendix “C”) to these Contract Specific General Provisions is the Transportation Management Plan (TMP) for this project. The TMP lays out the set of coordinated transportation management strategies that will be used to manage the work zone safety and mobility impacts of this project. In the event of a discrepancy between information in the TMP and information elsewhere in the Contract Documents, the former shall govern.

c) All work shall be completed in accordance with the Traffic-Related Work Restrictions indicated in the Transportation Management Plan.

d) The Department's latest Training Guidelines for Personnel Responsible for Work Zone Safety & Mobility are available under the "Contractors & Consultants" section at http://www.dot.ri.gov/business/contractorsandconsultants.php

e) The Contractor is advised that the signs and other traffic control devices shown on the Traffic Control Plans and Details are minimum requirements. The Contractor shall be responsible to supplement these as required to ensure the public's safety. All traffic control set-ups shall conform to the latest edition of the Manual on Uniform Traffic Control Devices, with latest revisions.

f) Before starting construction activities that require traffic control, the Contractor shall furnish and install all construction signing and traffic control devices. All temporary construction signs shall be removed, covered or otherwise concealed when they are not needed to properly warn drivers and/or pedestrians. The Contractor shall be compensated for this under Item Code 937.0100, "Furnish, Install, Maintain, and Move Temporary Traffic Protection".

g) The Contractor shall coordinate requirements for Uniformed Traffic Control Persons with the Engineer who will coordinate with the local police department.

h) In cases of emergency and/or as directed by the Engineer, the Contractor shall move equipment to allow for the passage of emergency vehicles and/or open closed lanes to maintain traffic flow.

i) The Contractor shall not commence work that impacts vehicular and pedestrian traffic until fabrication of materials required to complete such work is finished and on site.

j) The Contractor will be permitted to work during both daytime and nighttime hours provided that the minimum number of lanes and shoulders listed in TMP are maintained and access to and egress from all side streets, driveways, buildings, and other pedestrian pathways are maintained. To minimize impacts to traffic and local businesses, all pavement marking installation shall be performed at night.

8. SMALL-SITE STORMWATER POLLUTION PREVENTION PLAN

The Small-Site Stormwater Pollution Prevention Plan (SWPPP) for this project is included as Appendix "D." The SWPPP provides guidance for complying with the terms and conditions required under the General Permit, however, this document does not negate or eliminate the need to understand and adhere to all applicable RIPDES regulations.

The Small-Site Stormwater Pollution Prevention Plan details the anticipated erosion & sediment controls required for this project. The Contractor must designate a SWPPP contact person, experienced in storm water management on construction sites, who is available on site throughout the life of the project, and who has the authority to direct contractor's personnel and/or subcontractor's personnel in carrying out corrective actions requested by RIDOT's Qualified Plan Inspector and/or Resident Engineer. The Contractor's designated SWPPP contact person must be available to oversee all SWPPP related activities and to accompany the RIDOT's Qualified Inspector, as requested, when inspections are performed. The Contractor shall identify the SWPPP contact person at the Pre-Construction Meeting. The SWPPP contact person should be at the Pre-Construction Meeting if possible.

9. ENVIRONMENTAL PERMITS

The Bridge Group 17C - Newell and Sneech project will require a RIDEM Freshwater Wetlands Permit. See Appendix “E” – Freshwater Wetlands Permit, for the above referenced attachments.

PROTECTION UNDER THE MIGRATORY BIRD TREATY ACT

Under the Migratory Bird Treaty Act (MBTA), it is unlawful to intentionally or unintentionally take, capture or kill any migratory bird unless a Migratory Bird Permit is first obtained from the U.S. Fish and Wildlife Service. The USFWS's rules define “take” for MBTA purposes to mean to “pursue, hunt, shoot, wound, kill, trap, capture, or collect.” Each violation of the MBTA can result in a fine of $15,000, imprisonment for six months, or both.

There are few bird species that are not protected under the MBTA; they are Rock Doves (domestic pigeons), House Sparrows, and European Starlings. Although these species are not protected, they must be treated in a humane manner. The Contractor is encouraged to relocate active nests of unprotected species into nearby trees after approval from the RIDOT Natural Resources Unit (401-479-1327).
Bird species that are protected under the MBTA include all waterfowl, herons, eagles, hawks, falcons, owls and songbirds (including swallows, eastern phoebes and American robins). Nests typically may be found empty, with eggs, or chicks from March 1st to August 31st in trees, brush, open fields, and bridge structures. Raptors (hawks, falcon, owls, and eagles) nest as early as January 22nd through August 31st in or on trees, on telephone poles, open fields, or bridge structures.

Clearing and Grubbing, Tree Removal, and Land Disturbing Activities

A variety of bird species nest in trees, shrubs and grass areas within the highway ROW. If clearing and grubbing, tree removal, staging areas or other land disturbing activities will occur during the migratory bird breeding season (March 1st- August 31st), the Contractor shall avoid any active bird nests. During the breeding season (March 1st - August 31st), the Contractor should inspect the affected right-of-way for bird nests before commencing work. The Contractor shall not disturb any active nests (completed or partially completed nests that contain eggs or nestlings).

The Contractor shall not disturb any active nests (completed or partially completed nests that contain eggs or nestlings). If any active nest is discovered and the nest cannot be avoided, work shall stop and the RIDOT Natural Resources Unit shall be contacted to evaluate the potential for disturbance of nests. The project will avoid the removal and destruction of active bird nests except through federal and state approved options.

At no time should large nests of ospreys, hawks, falcons or eagles be destroyed, as these species return to the same nest site year after year and reuse the same nest. If a raptor nest must be removed for work to take place, it can be moved in cooperation with the USFWS.

All questions relating to migratory birds and nesting should be directed to the RIDOT Natural Resources Unit (401-479-1327).

Birds Nesting On or Under Bridges

A variety of bird species nest on or under bridges. Before commencing any bridge-related construction activities during the breeding season (March 1st-August 31st), the Contractor shall inspect the bridge(s) for bird nests. If any active nest is discovered, work shall stop and the RIDOT Natural Resources Unit shall be contacted.

The Contractor shall not disturb any active nests (completed or partially completed nests that contain eggs or nestlings). If any active nest is discovered and the nest cannot be avoided, work shall stop and the RIDOT Natural Resources Unit shall be contacted to evaluate the potential for disturbance of nests. The project will avoid the removal and destruction of active bird nests except through federal and state approved options.

At no time should large nests of ospreys, hawks, falcons or eagles be destroyed, as these species return to the same nest site year after year and reuse the same nest. If a raptor nest must be removed for work to take place, it can be moved in cooperation with the USFWS.

All questions relating to migratory birds and nesting should be directed to the RIDOT Natural Resources Unit (401-479-1327).

Taking of a Migratory Bird

The taking of a migratory bird shall be reported to the RIDOT Natural Resources Unit (401-479-1327). The Contractor shall be responsible for all penalties levied by the USFWS for the taking of a migratory bird. The USFWS's rules define “take” for MBTA purposes to mean to “pursue, hunt, shoot, wound, kill, trap, capture, or collect.”

All questions relating to migratory birds and nesting should be directed to the RIDOT Natural Resources Unit (401-479-1327).

NORTHERN LONG-EARED BAT & TRICOLORED BAT PROTECTION

(To be used with FHWA Programmatic Consultation) The U.S. Fish and Wildlife Service has listed the Northern Long-Eared Bat and Tricolored Bat as endangered under the Endangered Species Act (ESA) and the following requirements exist to protect the bats and their habitat. This project has been reviewed in accordance with the provisions of the Range-Wide Programmatic Consultation for Indiana Bat, Northern Long-Eared Bat and Tricolored Bat coordinated among the Federal Highway Administration, Federal Railroad Administration, Federal Transit Administration and the U.S. Fish and Wildlife Service; compliance with the requirements below are necessary to ensure compliance with the ESA.

The Contractor shall ensure all personnel working on the project site are made aware of the potential presence and protected status of the Northern Long-Eared Bat and Tricolored Bat. The Contractor shall ensure all personnel working on the project site are aware of all environmental commitments related to the Northern Long-Eared Bat and Tricolored Bat. The Northern Long-Eared Bat and Tricolored Bat flyer shall be made available to all personnel and posted on project bulletin boards (see Appendix “I”).

Contact the RIDOT Natural Resources Unit (401-479-1327) for questions about project limits, restrictions, or conservation measures.

Tree Cutting and Clearing Restriction:
All phases/aspects of the project (e.g., temporary work areas, alignments) will be modified, to the extent practicable, to avoid tree removal* in excess of what is required to implement the project safely.

All tree removal of trees **equal to or greater than 3 inch diameter at breast height** shall be completed between *November 1st and March 31st*. The Contractor shall ensure tree removal is limited to that specified in project plans. Prior to tree removal the Contractor shall layout the clearing limits in the field (e.g. with bright orange flagging/fencing or another marking method, subsidiary to the Work) to ensure all tree clearing work is within the tree clearing limits.

*"Tree removal" is defined by the USFWS as cutting down, harvesting, destroying, trimming, or manipulating in any other way the trees, saplings, snags, or any other form of woody vegetation likely to be used by northern long-eared bats.

10. ASBESTOS ABATEMENT

The project includes Asbestos Abatement protocols for certain locations and materials within the project. See Appendix "G" and Appendix "H" for additional information.

11. SURVEY LAYOUT NOTES

Field survey work was performed by Crossman Engineering. See Job Specific Plan Symbols, Legend & Notes plan in the contract plan set and signed Existing Conditions Survey plan in the Contract Plans for additional information.

The Engineer will not authorize construction activities to begin until they are satisfied that all appropriate ground control has been established, tied down, and duly recorded in standard field books. It is the Contractor's responsibility to ensure that construction layout is provided in sufficient detail, thereby enabling them to construct the project in conformity with the plans, details, and specifications.

There will be no separate payment for this type of survey work, as indicated in Section 934 of the Standard Specifications.

12. GEOTECHNICAL DATA REPORT & BORING LOGS

A Geotechnical Data Report for Bridge Group 17C including boring logs was prepared by GZA GeoEnvironmental, Inc. See Appendix "F" for a copy of the report.

Appendix A

Rhode Island Energy Guidelines for Working Around Gas

Rhode Island Energy - Gas Installation Specifications

10/01/12
Revised 2/6/2023

Guidelines for Working Around Gas Utilities

Notification of Construction

RI Energy requests at least six week advanced notification prior to the start of construction to perform scheduled work in the proposed project area. Be aware that some gas work cannot be performed during the normal heating season.

Support and Protect

Contractor must call Dig Safe to have the gas mains and services marked out before construction. Care must be exercised when saw cutting over any gas infrastructure, especially services, which are more shallow than the main. Depth of gas mains vary. Contractor shall dig test pits in order to ascertain exact locations, cover and invert elevations, clearances, alignment and operating status of existing gas facilities. Contractor shall exercise extreme caution when excavating in the vicinity of any gas facility. Hand excavation shall be performed to locate all gas facilities and whenever digging within 24" of gas facilities. If cover over gas piping is removed the required cover must be replaced, or if not feasible, RI Energy must be notified for review of the issue. Undermined gas pipe must be adequately supported and protected from damage. Contact RI Energy engineer for guidelines regarding proper pipe support. Significant vibration from pile driving and such may negatively impact gas facilities, particularly cast iron mains and regulator station vaults. Contact RI Energy engineer prior to performing such activities as well as operations which may undermine gas facilities such as micro-tunneling, jacking, directional drilling, etc.

Gas Leaks

For any gas leak please call 800-640-1595 immediately.

Types of Gas Facilities

Gas mains and services are made of several different materials and contain a wide range of pressures. Typical materials used for buried gas pipe includes bare steel, coated steel, plastic, cast iron, wrought iron, ductile iron, and copper. Never assume that a pipe is not gas. At times gas lines are inserted into older lines to save excavation cost.

Exposure of Gas Facilities

If any gas mains or services become exposed, RI Energy must be notified to inspect the line before backfilling. Also any damage that may have been made to the pipe or pipe coating will need to be repaired by RI Energy before backfilling. Contact our Dispatch office at (877) 304-1203 for inspection. It is important that even minor damage or scrapes be reported to RI Energy. Backfill shall be 6" of sand around the gas line and clean compacted fill above.

Regulator Stations
Gas regulator stations are particularly critical facilities and RI Energy must be notified whenever work is to take place within 200 feet of a station. Regulator stations are typically in buried vaults accessed through either manhole covers or aluminum doors. ONLY AUTHORIZED RI ENERGY EMPLOYEES SHALL OPEN A REGULATOR STATION VAULT. Be aware that a complex nest of piping and valves often exists in the vicinity outside the vaults.

Blasting
RI Energy must be notified of any blasting that will take place within 200 feet of a gas utility. RI Energy must be supplied with a detailed blast plan for blasting in the vicinity of gas facilities. The evaluation of the blast plan by a RI Energy engineer may take some time, therefore, blast plan data should be submitted at least two weeks prior to the planned blasting. As a general rule blasting will not be permitted within 10 feet of a gas line and PPV at the nearest gas pipe shall not exceed 5 in/sec. PPV at the nearest gas main shall be monitored.

Valves
Access to gas valves must be maintained throughout construction and left at grade at the end of construction. Should valve boxes be damaged and need to be replaced RI Energy will supply replacements upon request. NEVER OPERATE A GAS VALVE. ONLY RI ENERGY SHALL OPERATE GAS VALVES.

Clearance
Adequate clearance must be provided when installing other utilities, foundations, structures, etc. Contact RI Energy engineer for guidance.

Rhode Island Energy

RIDOT BRIDGE GROUP 17C
REPLACEMENT OF
NEWELL BRIDGE NO. 204
OVER EAST SNEECH BROOK
DIAMOND HILL RD @ NATE WHIPPLE HIGHWAY
CUMBERLAND, RI

MAIN INSTALLATION ACROSS BRIDGE

SECTION 100

JOB DESCRIPTION
AND
DESIGN SPECIFICS

July 19, 2024

101 **JOB DESCRIPTION**

101.1 Work within this project by the RIDOT appointed bridge contractor consists of:

101.11 Installation of (2) 8-in galvanized steel sleeves approx. 4 feet long in each of the backwall areas for the gas main carrier to pass through.

101.2 Work within this project by the bridge contractor's appointed Rhode Island Energy approved gas contractor consists of:

101.21 Installation of approx. 50 feet of 4-in steel pipe across the new bridge including (3) double roller supports with 220/240 casing insulators through the 8-inch steel backwall sleeves, including poly spacers, link seals and casing end seals, and ending with a 4-in weld cap.

101.22 Removal of each of the 4-in weld caps and continuing soil side installation with a weld elbowed installation into the ground for anchorage and depth to tie into the existing gas main.

101.23 Soil side install continues with 20 total feet of 4-inch steel till the approach slab end then transitions to plastic with the installation of approx. 95 total feet of 6-inch plastic buried pipe in the roadway elbowed over on the ends and transitioned to steel and welded to the existing 4-in steel 60psig main with a 3-way tee.

101.24 Installation of (2) 2-in shortstop fittings adjacent to the 3-way tee's.

101.25 Pressure testing the buried plastic and steel bridge piping together to 90 psig for a minimum of 1 hour in accordance with Section 106 and document CNST04003.

101.26 Installation of cathodic protection consisting of (4) bonding wire test stations with no anodes and approx. 95 ft of bonding wire installed along the plastic … install in accordance with document 030026-CS.

101.27 Development of "as-built" drawings based upon the Rhode Island Energy Location Plans.

101.3 All work included in this section shall be performed by the state appointed Rhode Island Energy approved gas piping contractor.

101.4 Live gas tie-ins and cut-offs will be done exclusively by Rhode Island Energy.

101.5 Rhode Island Energy reserves the right to make inspections of the work during the progress of installation and, where required, have all installation sequences performed in the presence of its inspector or authorized agent.

102 **MATERIAL AVAILABILITY**

102.1 All piping materials, including pipe, valves, fittings and appurtenances shall be provided by Rhode Island Energy and shall not include padding sand and special backfill. Material shall be available at a designated Rhode Island Energy location during normal working hours. Transportation to the job site, including loading and unloading, shall be performed by the contractor.

103 **MATERIAL – SPECIFICATIONS – PIPE**

103.1 **<u>Eight-Inch Steel Pipe: (Gas Sleeve in each Backwall)</u>**

103.11 Length Required: Approximately 4 feet each, Total 8 feet

103.12 Specifications: API-5L, Grade B, PSL-2, HFW, bevel ends, double random lengths.

103.13 Wall Thickness – std wall (t): 0.322"

103.14 Longitudinal Joint Factor (E): 1.0

103.15 Minimum Specific Yield Strength (S); 35,000 psi

103.16 Pipe Coating: Galvanized

103.1 **<u>Four-Inch Steel Pipe: (Gas Main Across Bridge & Buried)</u>**

103.11 Length Required: Approximately 70 feet

103.12 Specifications: API-5L, Grade B, PSL-1, HFW, bevel ends, double random lengths.

103.13 Wall Thickness – std wall(t): 0.237”

103.14 Longitudinal Joint Factor (E): 1.0

103.15 Minimum Specific Yield Strength (S); 35,000 psi

103.16 Design Hoop Stress @ psig =

$$\frac{(100)(P)(D)}{2(t)(E)(S)} = \frac{(100)(35)(6.625)}{(2)(0.280)(1.0)(35,000)} = 3.4\% \text{ of SMYS}$$

103.17 Pipe Coating: Pritec 15/50

103.2 **<u>Six-Inch Plastic Pipe: (Gas Main Buried)</u>**

103.21 Length Required: Approximately 95 feet

103.22 Specifications: Performance Pipe Yellowstripe 8300, PE 4710/PE100, Polyethylene Pipe, 40-foot lengths.

103.23 Wall Thickness (t): 0.602” (DR 11.0)

103.24 Long Term Hydrostatic Strength (S): 1600 psi @ 73.4 degrees F

103.25 Maximum Operating Pressure $\frac{(2xSxtx0.32)}{(D-t)} = \frac{(2x1600x0.602x0.32)}{(6.625-0.602)} =$ 102 psig*

- These values are limited to a maximum of 100 psig by DOT Code of Federal Regulations, Part 192, Title 49, Subpart C, Section 192.123.

104 **OTHER MATERIAL**

104.1 **<u>Weld Valves</u>**

104.11 None

104.2 **<u>Plastic Valves</u>**

104.21 (2) 6” Full Bore

104.3 **Weld Fittings:**

104.31 Elbow: (4) 4"x 45 degree
104.32 Transition Fitting: (4) 4"
104.33 TDW Shortstop Fitting: (2) 4"
104.34 TDW 3-Way Tee: (2) 4"
104.35 Weld Cap: (2) 4"

104.4 **Plastic Fittings**

104.41 Reducer: (4) 4"x 6"
104.42 Elbow: (2) 6"x 90 degree
104.43 Transition Fitting: See Weld Fittings

104.5 **Other:**

105.51 (6) Road Box
(3) 4" LB&A Double Roller Supports w/ Non-Conduc Rollers 304SS (w 4 extra nuts ea & 24" long threaded rods)
(3) 4" Glasmesh FRP 220/240 Casing Insulators
(6) 4"x 8" Plastic Casing Spacers
(2) 4"x 8" Rubber Casing End Seals
(28) LS-475-S Link Seals
95' of Tracing Wire
95' of 6" Marking Tape
95' of Bonding Cable

105 INSTALLATION OF MAIN

105.1 All plastic pipe installation work shall conform to the requirements of Rhode Island Energy's Installation Specifications and Code Reconciliation: Section 200A, Installation of Polyethylene Gas Mains, Revised January 18, 1988.

105.2 All steel pipe installation work shall conform to the requirements of Rhode Island Energy's Installation and Code Reconciliation: Section 200, Installation of Steel Gas Mains, Revised March 26, 1992 and Installation of Steel Distribution Mains CNST04005 and the RIDOT project plans.

105.3 The installation of the gas main across the bridge and within the roadway shall conform to the RIDOT Newell Bridge Installation Plans and Details and to the Rhode Island Energy Newell Bridge Installation Plans and Details.

105.4 Installations will terminate as close to the tie-in points as practical. All tie-in locations must be aligned with the existing pipe when installed.

105.5 Any damage to the pipe or pipe coating should be immediately brought to the attention of Rhode Island Energy construction department or the on-site inspector for inspection and, if necessary, repair or replacement.

106 **PRESSURE TEST**

106.1 Pressure test the buried plastic and steel bridge piping together both to 90 psig for a minimum of 1 hour in accordance with Rhode Island Energy document CNST04003—Pressure Testing Mains Operating Below 125psig.

106.2 Test Media: Compressed air, inert gas, or any combination thereof. The contractor shall provide the air compressor and/or inert gas for all required pressure testing.

INSTALLATION SPECIFICATIONS
AND CODE RECONCILIATION
SECTION 200
INSTALLATION OF STEEL GAS MAIN
MARCH 21, 1975

Revised 2/6/2023

201 CONSTRUCTION SPECIFICS (FR 192.5, .303; ANSI 841.21)

All construction work performed by the Contractor shall be in accordance with the primary and supplemental publications of 49CFR 1921/; the ANSI Standard2/, B31.8-1968 Code; and RI Energy Construction Specifications and Drawings. The Contractor shall also abide by the Terms and Conditions for General Construction. Any variation with, deletion from, or additions to the named references and the Project Drawings due to local conditions must originate from sound and specific reason. Arbitrary changes are not permitted. Remedial work required for noncompliance, unacceptable changes or additions, or acceptable changes or additions, where neither have received proper Company approval, will be at the Contractor's expense.

In the event specifics are detailed by both 49CFR 192 and ANSI B31.8, the more rigorous requirement shall control, unless specifically stated otherwise by the Company specifications.

All construction must meet the requirements of a Class 4 installation as defined by 49CFR 192 and as provided for by these specifications. All piping shall be designed for Design Hoop Stress levels of less than 20% of SMYS.

As used in this section "may" means "is permitted to" or "is authorized to," "may not" means "is not permitted to" or "is not authorized to," and "shall" is used in the mandatory and imperative sense.

202 GENERAL REQUIREMENTS (FR 192.305, .307; ANSI 841.221, .223, .271)

202.01 The Company has authority to enforce construction in accordance with Subsection 201, including the removal and replacement of any section of main that fails to meet the described standards.

1) The Federal Register, Volume 35, Number 161, Title 49 Part 192 (Under OPS, DOT) dated August 19, 1970 and effective November 1970, is designated as 49CFR 192. Specific paragraph references are preceded by FR to indicate source.

2) The ANSI Standard B31.8-1968 is designated as ANSI B31.8. Specific paragraph references are preceded by ANSI as to indicate source.

3) RI Energy and its agents are designated as the Company.

202.02 Material Handling

202.02.1 Materials issued to the Contractor by the Company become his responsibility. The Contractor shall assume the responsibility of inventory and inspection before acceptance of materials. Methods of material transfer, handling, and storage are subject to the approval of the Company. Any material determined, by the sole determination of the Company, to be unsatisfactory for construction after acceptance by the Contractor, shall be repaired to the complete satisfaction of the Company, or replaced at the Contractor's expense. Any damage discovered previous to the Contractor's acceptance shall be replaced by the Company or repaired by the Contractor at a predetermined expense to the Company.

202.02.2 The hauling and stringing of pipe or other materials shall be performed in such manner as to prevent damage and to cause the least interference with the normal use of roadways or driveways. Gaps shall be left at intervals to permit passage of vehicles and pedestrians. In the event transportation by rail or flatcar is involved, the provisions of API Standard RP5L1 shall apply.

202.02.3 Should it become necessary for the Contractor to store material, the Contractor shall do so at his expense and in a manner that will prevent damage from weather, vandalism, or other causes.

202.03 Primary material shall be provided by the Company. The Contractor shall provide all equipment necessary for installation of the facility as designated in Table 200-1, unless otherwise specified.

202.04 The Contractor shall provide all equipment necessary to test for gas tightness, structure integrity, and pigging as designated in Table 200-2, unless otherwise specified.

202.05 Permits for installation shall be provided by the Company. All permits for the transportation of pipe and other materials, and for construction procedures such as blasting shall be secured by the Contractor.

203 TRENCHING (FR 192.327; ANSI 841.16)

203.01 The route of the main shall be as shown on the plans. The specifications and drawings unless otherwise required by field conditions and specifically agreed to by the Company. The Contractor shall conduct his operations so that paving, driveway, and sidewalk cuts are bridged immediately after the trenching operation. Work shall be executed by the Contractor so that all fire hydrants and hydrant valves adjacent to the work area shall be readily accessible to fire-fighting apparatus. Under no conditions shall any materials or obstacles be placed within 15 feet of any fire hydrant or control valve unless by permit secured by the Contractor from the proper authorities.

203.02 All trenching operations shall conform to local Township, Town, City, State, or Federal specifications as required with regard to the overall length, width, and depth of the operation.

203.03 Trenching includes all excavation whether by trenching machine, power shovel, hand or other methods, which may be necessary for preparation of the pipe bed. The Company Specifications require a normal minimum cover of 44 inches. In no event shall depths less than 24 inches be allowed.

203.04 Payment for ledge removal by blasting or other means is limited to the specified dimensions of the trench plus an additional six inches (6") below the pipe for padding. Any ledge removal in excess, without the written approval of the Company, will be at the expense of the Contractor.

203.05 The normal width of the trench shall be the diameter of the pipe plus 14" unless otherwise required to meet minimum trench requirements, or as specified or agreed on in order to facilitate or expedite installation, or to improve the efficiency of construction so as to attain minimum cost of overall installation. Opening width may be increased as necessary for the installation of valves, fittings and appurtenances.

203.06 The minimum width of the trench shall be that which is necessary for the proper fabrication, installation, and padding or other protection of the pipeline and all materials and appurtenances associated with the system installation, unless otherwise specified by the Company.

203.07 A minimum clearance of three feet (3') shall be maintained between parallel runs, and a minimum clearance of six inches (6") shall be maintained at crossings of the Company main and a foreign structure, or shall be otherwise protected as specifically indicated by design detail. Where in-field conditions require variations with the above, the Design Engineer shall be consulted and methods of appropriate protection shall be inaccordance with his specifications.

203.08 Pavement Cuts

203.08.1 Pavement shall be cut to the full trench width prior to excavation to provide a neat patch joint.

203.08.2 Where required by local governmental agencies, paving shall be cut six inches (6") wider than the trench in order to provide for a neat joint overlap on both sides unless one edge is adjacent to the curbing.

203.08.3 No payment for paving excavations wider than specified will be allowed unless specifically agreed to by the Company.

203.09 Surface materials must be kept separate from potential backfill material. The term "surface materials" includes asphalt, oiled sand, concrete, brick, paving stones, loam, and other surface substance which is dissimilar to the substrata materials of the trench excavation. Trenching includes removal and appropriate disposition of this material as the work progresses.

203.10 Care shall be taken in placing excavated material so that lawns and shrubs are not covered or damaged, and, if possible, streets and gutters are left unobstructed.

203.11 Excess excavated material that is acceptable for backfill shall be removed to a site satisfactory to the Company at the Contractor's expense.

203.12 Precautions shall be taken to avoid damage to any existing utilities. Proper support shall be provided before excavating below any utility line. However, when a utility line is accidentally damaged or broken, the Contractor shall immediately notify the authorities of the utility involve Contractor shall then cooperate and assist with immediate repair of damaged line, and in no case shall the trench be backfilled before approval by authorities of the involved utility is obtained.

203.13 Shoring will be provided in accordance with OSHA requirements, or where soil conditions are such that excessive widening of the trench occurs due to caving.

204 INSTALLATION

Welding or other joining procedure must be continuous from the point of origin to terminus and intermittent installations along the route of traverse is not permitted without special approval of the Design Engineer.

Due to difficulties encountered in support and alignment of "double joined" sections of double random lengths of pipe, the practice of double joining is not allowed.

All connecting points with the existing main must be aligned and spaced for connection to the existing main when installed in order that connecting segments may be true and continuous.

Adequate methods shall be employed to prevent the entrance of dirt or debris into the pipe during stringing and installation.

All pipe and associated equipment shall be inspected prior to installation but after stringing to insure that damage has not occurred to the hardware or protective coating during handling. The provisions of Subsection 202.02 apply to any damages discovered.

205 WELDING OF STEEL (FR 192.223, .225, .227, .229, 231, .235, .241,.243, .245; ANSI 821.3, 823.1, 824.1, 825.1, .2, 828.1, 841.22)

205.01 General

205.01.1 Welds and welding procedures must be qualified under API Standard 1104 and Subpart E of 49CFR 192.

205.01.2 All welders must be qualified under RI Energy Safety Department Standards and FR 192.227.

205.01.3 The quality of field welds will be checked by either destructive or nondestructive inspection.

205.01.3.1 Nondestructive inspection shall consist of radiographic examination over the entire weld circumference, unless otherwise specified.

205.01.3.2 Destructive testing requires a field weld to be cut from the pipe as a cylinder and tested according to the requirements of API standard 1104.

205.01.4 The Contractor will cooperate with the Company during inspection of welded joints. The welds inspected will be selected at random by the Company. Inspected weld shall be identified and noted on the Foreman's Work Order. If a weld is nondestructively tested, the testing company will examine the welds and classify approval or rejection.

205.01.5 If there is any reason to believe that a field weld is defective after nondestructive testing and it cannot be repaired in accordance with FR 192.245, it shall be removed from the line with the cost for cutting and rewelding borne by the Contractor. The welder may be disqualified for further construction if deemed appropriate by the Company.

205.02 Testing and Inspection

205.02.1 Initial weld inspection for steel main

205.02.1.1 A testing company shall be employed by the Company, at its expense, unless otherwise specified, to nondestructively test by techniques described in Sub-section 205.01.3.1 all welds done by each welder during his first day on the job. A minimum of five (5) welds shall be tested during the testing period. Results of the test must be satisfactory and shall be reported to the project inspector and the Company Safety Department before proceeding with further construction.

205.02.1.2 The radiographic contractor must provide documentary evidence that the radiographer who interprets the film is a certified SNT-TC-1A Level 11 or Level 111 radiographer.

205.02.2 In addition to Subsection 205.02.1, the Company will inspect, at its expense, 10% of the project's welds. The specifications of Subsections 205.01.4 and 205.01.5 will apply.

205.03 Welding Specifics

205.03.1 A firm and positive grounding electrical connection must be established. Connecting apparatus equal to or exceeding the requirements of the Pipetron Quick-Bond Clamp is required, and jury-rig attachments such as homemade spring bars, etc., are disallowed.

205.03.2 Arc burns have been found to cause serious stress concentrations in pipe. The metallurgical notch caused by arc burns shall be prevented or eliminated in all mains. Arc burns resulting from faulty grounds and connections are not allowed and must be removed by cutting out the damaged portion of the pipe as a cylinder and replaced at the Contractor's expense. (See Subsection 209.)

205.03.3 It is suggested that grinding be given consideration after both the root and hot pass of welds in order to assure a clean field for subsequent welding. This practice may obviate an area of potential weld test failure.

205.03.4 The different wall thickness between pipe and fittings requires that the thicker wall be ground or the weld joint backwelded to avoid stress concentrations.

206 BENDS, ELBOWS, AND FITTINGS (FR 192.147, .149, .155, .313, .315; ANSI 831.21, .22, .23, .3, .4, .5, 841.23)

206.01 Flanges, Gaskets and Bolting

206.01.1 Steel pipeline flanges shall be manufactured in accordance with MSS Standard SP-44.

206.01.2 Flange connections between 150 psi steel and Class 125 cast iron flanges will be made with flat faced flanges, full faced gaskets, and allow steel bolts conforming to ASTM Specification A-193.

206.01.3 Flange connections between steel flanges will be made with raised face flanges, flat ring gaskets, and alloy steel bolts conforming to ASTM Specification A-193.

206.01.4 PSI products flange insulating gasket kits shall be used wherever points of isolation are specified in Section 900. Gasket kit specification is as follows: PSI Gasket Seal Type E with Phenolic Retainer and Nitrile (Buna N) Seal equipped with one piece sleeve and washers and steel washers. Alloy-steel bolts conforming to ASTM Specification A-193 with A-194 nuts shall be used in conjunction with raised face flanges when both are steel and with flat face flanges when one is steel and the other Class 125 cast iron.

206.02 Elbows and Bends

206.02.1 Miter bends shall be disallowed.

206.02.2 Elbows, reducers, tees, laterals, and other fittings shall be standard wall conforming with ASTM Speciation A-234, Grade WPB.

206.02.3 Field formed cold bends may be used for changes of direction less than 1-1/2 degrees per diameter length. They must be free from buckling, cracks, or other evidence of mechanical damage, and shall be formed with an appropriate die or shoe such that the deformation does not produce a difference between the maximum and minimum diameters in excess of 2.5% of the nominal diameter.

206.02.4 For greater changes in direction than that provided for in Subsection 206.02.3, factory-made wrought-steel welding elbows or transverse segments, cut there from shall be used. For tranverse segments, the arc length measured along the crotch shall be at least on inch (1") on pipe sizes two inches (2") and larger.

206.03 Branch Connections

206.03.1 Tees and branches for branch connections with d/D ratios greater than 1/3 and operating at less than 20% of SMYS, shall be fabricated with factory manufactured fittings having smooth configuration and manufactured in accordance with applicable codes. Where the complete fitting cannot be used, full encirclement fittings shall be provided in accordance with Figure 831-D of the ANSI B31.8.

206.03.2 Tees or laterals for branch connections or manifolds, with d/D ratios of less than 1/3 and operating at less than 20% of SMYS, may be field- or shop fabricated from pipe, if approved by the Design Engineer.

206.03.3 Thread-o-let and weld-o-let penetrations shall be clean cut holes for the full diameter of the connection.

207 SURFACE DAMAGE AND IMPERFECTIONS (FR 192.309)

207.01 Inspection for the detection of dents, gouges, and grooves shall be made prior to the pipe section being welded into the line, or just ahead of the backfilling operation. A dent is a depression which produces a gross disturbance in the curvature of the pipe wall without reducing the pipe wall thickness. A gouge or groove results where the metal of the pipe has been disrupted producing minor changes in wall thickness and resulting points of stress concentrators.

207.02 A dent shall be removed where: it contains a stress concentrator such as a gouge, groove, or scratch; or if the dent results in a depression of more than 2% of the nominal pipe diameter, enclosed in an area of less than one pipe diameter in any direction. Gouges and grooves shall always be removed.

207.03 Dents requiring removal shall be removed by cutting out the damaged portion of the pipe as a cylinder, or shall be repaired by installing full encirclement reinforcing segments to completely lap the damaged area. Patching or coupon replacement is not permissible.

207.04 A gouge or groove shall be removed by smoothly grinding or sanding, provided that the remaining wall thickness is not less than that required by the pipe specification tolerances. Where the remaining wall thickness becomes less than the pipe specification tolerances, repair must be made by cutting out the damaged portion of the pipe as a cylinder. Patching or coupon replacement is not permitted.

208 INTERNAL CLEANING

208.01 Prior to the pressure test, each section of completed construction shall be "pigged" to remove any scale, dirt, or debris which may have been inadvertently entrained. Pigging shall be repeated until the exit air is free of traces of dust and dirt. The Contractor shall be responsible, at his expense, for locating and removing a trapped pig, and shall repair the main as may be necessary. It is recommended that a signaling device be incorporated in the pig for easy location. The pig used by the Contractor must be approved by the Company.

208.02 Care must be exercised during the pigging operation to prevent the pressure from exceeding the design pressure of the main.

208.03 The Contractor shall install a device to restrain and retain the pig upon exit from the main such that injury or damage to persons or property will be prevented. Any device judged unsuitable by the Company may be rejected.

209 PIPE TESTING (FR 192.507, .509, .619; ANSI 841.3, .42, .43, .44, .5, 845.22)

209.01 New mains shall be tested after construction and before being placed in operation to demonstrate gas tightness and structural integrity.

209.02 All steel welded main shall have a design operating pressure of 75 psig, be qualified for a Class 4 location as defined by the Register, and be tested to a minimum pressure of 150 psig, unless otherwise specified.

209.03 Testing procedure shall be by either standup static test or by direct inspection methods as designated in the Job Specifications.

209.03.1 Standup static testing prodecure shall require a minimum of 24 hours, after compression, for stabilization, and a static period of an additional 24 hours. The temperature and pressure shall be recorded immediately after the initial compression, after the 24-hour stabilization period, and after the 24-hour static test period. Pressures adjusted for temperature differential must remain static over the test period.

209.03.2 Direct inspection testing procedure shall require that all welds and mechanical connections be soap tested by thoroughly soaping the area and determining that no leaks are evident. During the test, the soaped area must be thoroughly shielded from wind or other disturbances. A standup period, at the required test pressure, must be maintained for a minimum of one hour prior to initiation of the test.

209.03.3 The pipe should be open and free to the test when possible.

209.04 The test medium shall be air, inert gas (N2 or CO2), or any combination thereof, unless otherwise specified.

209.05 Costs shall be borne by the Contractor for repair of defects disclosed by testing, and any further testing necessitated thereby, except that the Company shall assume responsibility for defects which are shown to be solely attributable to materials which the Company has supplied.

209.06 All temporary connections to the line shall be repaired to the satisfaction of the Company.

210 PADDING AND BACKFILL (FR 192.319; ANSI 841.273)

210.01 Backfill must be performed in a manner to provide firm support under the pipe. Care shall be used to prevent damage to the coating, by such means as the use of rock-shield material, or by making the initial fill with rock-free material to a sufficient depth over the main to prevent rock damage. (See Subsection 210.08)

210.02 Where it is indicated that soil conditions will be unstable, a clean backfill material must be provided around the pipe to provide continuous support along the section. (Clay soils can undergo severe volume changes resulting in soil plasticity with corresponding shifting and heaving producing increased secondary stresses on the pipeline.)

210.03 The Contractor shall provide all equipment necessary to place padding and backfill. Padding material shall be uniform natural bank sand, graded from all particles sizes smaller than the No. 10 sieve and coarser than a No. 200. Backfill material shall consist of natural bank gravel having durable particles graded from fine (greater than No. 200) to coarse (2-inch) in a reasonable uniform combination with no boulders or stones larger than 2-inch in size. Padding and backfill material must be free of lumps, frozen material, cinders, ash rubbish, paving material, clay, loam, rocks and any other material which might subject pipe, associated equipment, or coating, to injury. All padding and backfilled material must meet the approval of the Company. All wood used for blocking or shoring must be removed from the trench prior to the backfill operation.

210.04 Where suitable material, approved by the Company, for either padding or backfill is available along the line of traverse, the Contractor shall haul and place such fill under the contract price without extra cost. Where suitable fill is not available from excavated materials, by the sole determination of the Company, the Contractor shall procure, haul, and place suitable gravel to the satisfaction of the Company.

210.05 The Contractor shall submit a unit price for gravel fill, purchased, hauled, and placed, and shall be entitled to payment determined as the product of said price quotation and placed quantities only when such quantities are appropriately measured or otherwise accounted for at delivery and approved by the Company as correctly received. Gravel needed to replace fill which has been excavated from the trench and made unusable, in the opinion of the Company, due to failure by the Contractor to exercise reasonable care to save such otherwise usable fill in accordance with these specifications, and gravel to fill that portion of a trench opening which exceeds the width of the nominal run of the trench or the maximum trench width otherwise specified, whichever is the lesser, will be provided by the Contractor without extra cost, unless previously and specifically agreed to by the Company.

210.06 Where the Contractor fails to specify a unit price for gravel fill as an extra in his original quotation, no payment will be allowed.

210.07 Where padding is necessary in the opinion of the Company, it shall be placed in the trench bottom to a minimum depth of four inches (4") and to a minimum dimension of six inches (6") elsewhere around the pipe so as to completely encase and protect the pipe, piping materials, and coating from injury.

210.08 Wherever, in the opinion of the Company, the conditions of trench and surroundings is such that damage to any coating used would result from using machine methods of placing backfill to a depth of six inches (6") above pipe, Contractor shall place same by hand shoveling. This backfill, to a depth of six inches (6") above the top of appurtenances along the top of the main, shall be placed as soon as possible after the pipe has been lowered in the trench.

210.09 Backfill shall be carefully placed under the main and any appurtenances, and compaction of the backfill to the original density is required by wetting and/or tamping by six-inch (6") layers to a level six inches (6") above the top of appurtenances along the top of the main. Similar compaction of the remainder of the trench shall be performed if required by local governmental authorities.

210.10 Whenever crossing under an existing Cast Iron or Ductile Iron main is required, the backfill material below the Cast Iron or Ductile Iron main shall be compacted to its original density by wetting and tamping in four-inch (4") layers to a level six inches (6") above the top of appurtenances along the top of the main.

210.11 The trench shall be backfilled to a point of within ten feet (10') of the end of the completed main installed each day. The trench may be left open overnight, to the extent necessary to permit testing by direct inspection methods, provided the amount is not in excess of that allowed by local governmental authorities.

211 RESURFACING

211.01 All roadway paving, sidewalk resurfacing, backfilling and compaction shall conform to local Township, Town, City, State or Federal specifications as required.

211.02 All resurfacing shall be kept in repair by the Contractor for two years. If settling or any other defect is evident, the Contractor shall make repairs at his expense until the resurfacing is determined acceptable by all governmental bodies concerned.

212 PURGING (FR 192.629, .751; ANSI 841.28)

212.01 A minimum of two (2) tested gascopes are required for each test when purging. Continuous sampling with two (2) gascopes at each location is required during each purge and all welding and cutting operations.

212.02 Purging During Welding and Cutting Operations

212.02.1 If no gas is detected on the L.E.L. scale of either of two (2) gascopes, or the reading is below 10% L.E.L., it is safe to proceed without adding nitrogen.

212.02.2 If gas is detected and complete shut-off is impossible or impractical, nitrogen must be added either upstream or downstream of the welding or cutting operation until the combustible gas concentration of the mixture is decreased to a point where the admixture of any additional amount of air will not result in a flammable mixture.

212.02.2.1 If nitrogen is added downstream of the welding or cutting operation, it is safe to proceed only when sufficient nitrogen has been added to reduce the L.E.L. readings taken upstream of the welding or cutting operation with two (2) gascopes, to below 30% L.E.L. in nitrogen

212.02.2.2 Although it is normally preferred that nitrogen be added downstream of the welding or cutting operation, specific conditions may require that nitrogen be added at an upstream location. If nitrogen is added upstream of the welding or cutting operation, it is safe to preceed only when sufficient nitrogen has been added to reduce the L.E.L. readings taken downstream of the welding or cutting operation with two (2) gascopes, to below 20% L.E.L. in nitrogen.

INSTALLATION SPECIFICATIONS
AND CODE RECONCILIATION
SECTION 200A
INSTALLATION OF POLYETHYLENE GAS MAIN
AUGUST 6, 1976
(REVISED JANUARY 24, 1979)
(REVISED JANUARY 18, 1988)

201A CONSTRUCTION SPECIFICS

201.01A These specifications set forth standards to which the installation of piping shall adhere to.

201.02A The specifications cover the installation and handling procedures for polyethylene pipe, tubing, and associated fittings when used for mains and service piping.

201.03A Piping material is manufactured as outlined by the Department of Transportation Title 49, Part 192, TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE - MINIMUM SAFETY REGULATIONS and the ANSI B 31.8 Code for GAS TRANSMISSION AND DISTRIBUTION PIPING SYSTEM based on ASTM D-2513 SPECIFICATION FOR THERMOPLASTIC GAS PRESSURE PIPE TUBING FITTINGS.

202A GENERAL REQUIREMENTS

202.02A The Company has the authority to enforce these specifications in accordance with Section 200 (Installation of Steel Gas Main, 3/21/75) and Section 200A (Installation of Polyethylene Gas Main, 8/6/76), (Revised January 24, 1979). This includes the stipulation that: "Any variation with, deletion from, or additions to the named references and the Project Drawings due to local conditions must originate from sound and specific reason. Arbitrary changes are not permitted. Remedial work required for noncompliance, unacceptable changes or additions, or acceptable changes or additions, where neither have received prior Company approval, will be at the Contractor's expense."

203A MATERIAL STORAGE AND HANDLING

203.01A For periods of storage in excess of two weeks, the piping material shall be stored indoors, or shall be covered so as to shield it from direct sunlight. It shall be stacked so that no out-of-round flattening, or "egging" results. Exposure to excessive heat or harmful chemicals shall be avoided.

203.02A When the polyethylene material must be transported, the pipe, tubing and fittings shall be handled carefully. Proper support so as to minimize movement between the pipe and its support to avoid kinking, cutting, gouging, or abrading the surface will be maintained.

203.03A Prior to actual installation, polyethylene piping shall be stored on the job site in a cool dry place protected from direct sunlight.

203.04A Polyethylene pipe shall not be left exposed in the work area during the absence of the installation crew, because of possible damage by vehicular or foot traffic, construction equipment and miscellaneous foreign objects.

204A INSTALLATION PROCEDURES

204.01A The polyethylene pipe must be carefully inspected for cuts, gouges, deep scratches and other imperfections before use. Defective pipe will be rejected.

204.02A Adequate attention must be given to polyethylene pipe during placement in the trench to prevent kinking, stretching or the striking of sharp objects. The pipe shall be snaked in the trench to permit contraction. The extra length installed shall amount to one foot per 100 feet of trench.

204.03A The bottom of the trench shall be as smooth and level as practical and free of rocks and other abrasive materials. Sand or soil, free of stones and other abrasive materials, shall be used as base to protect the polyethylene piping from damage. A minimum of six inches of padding sand will be installed at the bottom of
the trench.

204.04A Polyethylene mains require a normal minimum cover of 44 inches. Depths less than 24 inches will not be allowed.

204.05A Polyethylene service pipe shall be installed at least 30 inches below grade between the curb and the property line. The cover at the foundation wall will be 24 inches below finished grade. Depths less than 18 inches cover on private property and 24 inches cover on public property will not be allowed.

204.06A A minimum clearance of three feet shall be maintained between parallel runs. A minimum clearance of twelve inches shall be maintained at crossings of a Company main and a foreign structure, or shall otherwise be protected as specifically indicated by design detail. Where in-field conditions require variations with the above, the Design Engineer shall be consulted and methods of appropriate protection shall be in accordance with his specifications.

204.07A Polyethylene pipe may be bent in conformity with the natural curve of a reel. Otherwise changes in direction must be made with suitable fittings. Miter bends are not permitted and neither are bends which exhibit buckles, cracks, or other evidence of damage. There shall be a minimum of 3 feet straight run out of a branching tee, coupling, service tee, meter riser or any rigid filling before the initiation of a bend.

204.08A Polyethylene pipe or tubing will be cut utilizing special cutters designed for plastic pipe to insure square cut ends.

204.09A Adequate pipe anchorage will be properly installed as noted on design specifications.

205A PIPELINE SUPPORTS

205.01A When polyethylene pipe or tubing is used and soil conditions are indicated to be unstable, additional support shall be provided by installing a protective polyethylene sleeve.

205.02A A protective polyethylene sleeve will be installed at metal-to-plastic transition fittings, at services with a saddle and tapping tee, and at those locations where forces on the pipe may result in bending and shear stresses.

205.03A The protective polyethylene sleeve will be installed in such a way that it fits securely around the pipe being protected. It will be backfilled and compacted as soon as possible to provide ground support across the span. The installation of a protective polyethylene sleeve does not eliminate the need for proper backfilling and compaction around and under the sleeve. Care must be exercised to insure that the protective polyethylene sleeve does not move from its intended position during backfilling and tamping.

206A POLYETHYLENE FUSION AND MECHANICAL JOINTS

206.01A When field joints are required, the polyethylene pipe shall be cut several inches too long and the extra length distributed as slack as near as possible to the joint. This will provide for contraction of the polyethylene pipe due to temperature changes and should be in proportion of 12 inches per 100 feet of pipe.

206.02A Heat-fusion joints. Each heat-fusion joint on polyethylene pipe must comply with the following:

(1) A butt heat-fusion joint must be joined by a device that holds the heater element square to the ends of the piping, compresses the heated ends together, and holds the pipe in proper alignment while the polyethylene hardens.

(2) A socket heat-fusion joint must be joined by a device that heats the mating surfaces of the joint uniformly and simultaneously to essentially the same temperature

(3) Heat may not be applied with a torch or other open flame.

206.03A Heat-fusion joint will not be disturbed until it has properly set for 10 minutes. Cooling time for "rough handling" will be 20 minutes after the last joint has set.

206.04A Any fused joint of questionable integrity will be removed and repaired at contractor expense.

206.05A Mechanical joints - each compression-type mechanical joint on polyethylene pipe must comply with the following:-

(1) The gasket material in the compression coupling must be compatible with the polyethylene.

(2) A metal insert stiffener must be used in conjunction with the coupling.

(3) They must effectively resist pull-out forces caused by thermal contraction or by external loading forces.

207A VALVES AND METER RISERS

207.01A Valves installed in polyethylene systems must be properly anchored to prevent rotational stresses when operated.

207.02A Meter risers shall be installed to permit easy installation of the meter at the foundation wall.

207.03A Curb boxes or other enclosures shall not be supported by the polyethylene pipe, or in any way impose stress on the pipe.

208A PRESSURE TESTING PROCEDURES

208.01A Pressure testing will not be initiated until 20 minutes after the final heat fused joint has set.

208.02A In accordance with the rating of polyethylene pipe and tubing, installations shall be tested to a pressure of at least 1.5 times the maximum operating pressure or 90 psig, whichever is greater. The test pressure, however, must not exceed three times the design pressure of the pipe or 100 psig, whichever is the least. All joints will be soap tested at this pressure before being backfilled.

208.03A Temperature of the polyethylene pipe shall not exceed 100°F during test.

209A PIPE LOCATOR AND MARKING TAPE

209.01A To facilitate location of directly buried pipe, No. 12 AWG THW coated copper wire will be strung along the full length of the pipe. The locator wire will be secured to the steel meter riser at the building wall. If the polyethylene service is connected to a polyethylene main, the locator wires for both the service and the main must be connected by stripping sufficient insulation to twist the bare copper end of the service wire onto a bare section of the main wire within six inches (6") of the service tee. This connection must be thoroughly coated with TAPECOAT MASTIC.

209.02A The locator wire and marking tape shall be installed after backfilling and tamping 12 inches above all direct burial polyethylene mains and stubs. The marking tape is high-visibility orange and is imprinted with the words, "CAUTION BURIED GAS LINE BELOW".

210A STATIC ELECTRICITY

210.01A Procedures to minimize the possibility of static electricity will include keeping the pipe wet (water spray, wet rag, wet rope), wetting down both the polyethylene pipe and excavation hole before attempting to work on the piping, and by performing squeeze-off operations in a separate excavation hole, removed from and upwind of any escaping gas.

211A INSPECTION AND REPAIR

211.01A If any section of polyethylene pipe or tubing is found to be kinked, flattened, or out-of-round, or if there is evidence of damage due to sunlight, excessive heat, or chemicals, the damaged section must be replaced.

211.02A All metal fittings and bare metallic surfaces used in conjunction with polyethylene pipe shall not be coated by any material which requires the application of heat. Fittings and surfaces requiring coating protection shall be protected by thorough application of Tapecoat Mastic.

211A PADDING AND BACKFILL

212.01A Padding sand will be installed in such a way that there will be a layer of 6 inches below and 12 inches above the pipe.

212.02A Care must be exercised when backfilling to insure that no sharp objects or rocks will be in contact with the pipe. Mechanical tamping shall not be used until 12 inches of cover has been placed over the pipe.

212.03A Special care shall be exercised to backfill and tamp the excess soil at the service tee and at all other joints of the polyethylene system.

212.04A The Contractor shall provide all equipment necessary to place padding and backfill. Padding material shall be uniform natural bank sand, graded from all particles sizes smaller than the No. 10 sieve and coarser than a No. 200. Backfill material shall consist of natural bank gravel having durable particles graded from fine (greater than No. 200) to coarse (2-inch) in a reasonably uniform combination with no boulders or stones larger than 2-inch in size. Padding and backfill material must be free of lumps, frozen material, cinders, ash, rubbish, paving material, clay, loam, rocks and any other material which might subject pipe, associated equipment, or coating, to injury. All padding and backfill material must meet the approval of the Company. All wood used for blocking or shoring must be removed from the trench prior to the backfill operation.

GUIDELINES FOR BACKFILL AND COMPACTION AROUND GAS PIPES

PERMANENT BACKFILL AND COMPACTION

DESCRIPTION

This work shall consist of backfilling and compacting all disturbed material at and around existing gas pipes and facilities. Size of pipe, material, length of exposed pipe, location of pipe, etc. will all follow the same set of Standards and Specifications stipulated by RI Energy. If design plans call for gas pipes to be exposed and supported (sheeting methods not used), then at the time of backfill, all disturbed material below the invert of the gas pipe shall be removed and replaced with suitable roadway or trench excavation material or bedding material. The contractor will not be allowed to replace this disturbed material with the same existing material if it has now been mixed with adjacent silty subsoil (clays) and fines. Well-graded gravel and sands will be used to replace the unsuitable material when no excess suitable material is available on site. Soils with high humus or mineral content should not be used to for backfill because they can promote electrolytic or bacterial attack.

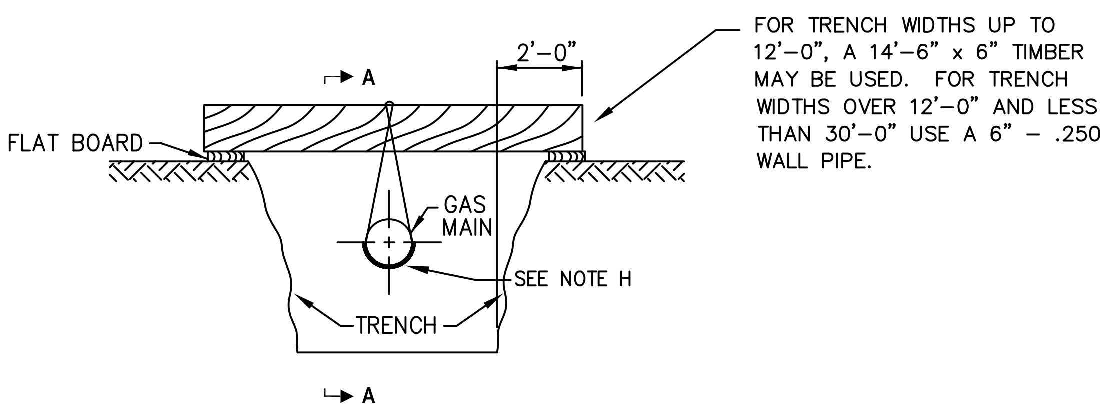
Backfilling the gas pipe should begin immediately after the work in that location is complete. The region within 6" alongside and on top of the gas pipe shall be backfilled with padding sand (free of cinders, ash, and rock). In no case shall the material used for backfilling in this region contain any stones. Backfill shall consist of suitable materials (medium to coarse sands with little or no silts) placed in layers of not more than 8" to 12" after compaction.

Trench spoil material shall be suitable for backfilling above the padding material as long as rocks with a diameter larger than 3" are removed. The layers shall be mechanically compacted to the industry standard of 95% or until a density comparable to the unexcavated material is achieved. In some instances, flooding with water is an acceptable method of compaction but only if the back-fill material is clean, coarse, and adequate drainage is existent. The above specified backfill material is essential in order to attain the degree of compaction necessary to avoid future settlement.

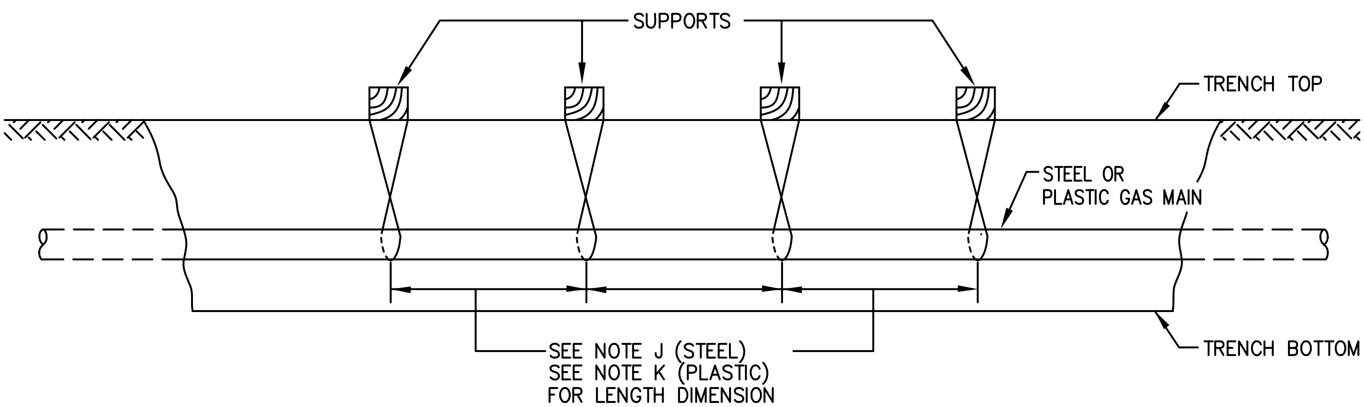
Tracing Wire, if necessary, shall be installed 2” to 6” below Plastic gas pipes.

Warning Tape shall be installed approximately 12” above the gas pipe.

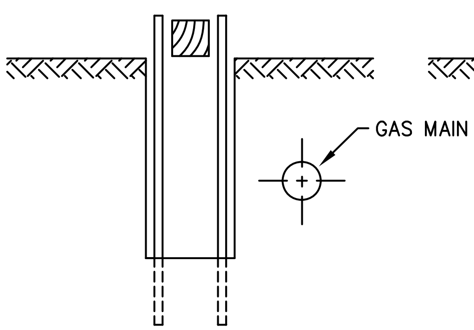
A minimum of 2" temporary pavement shall be applied over the trench as soon as possible.



EXPOSED SUPPORT



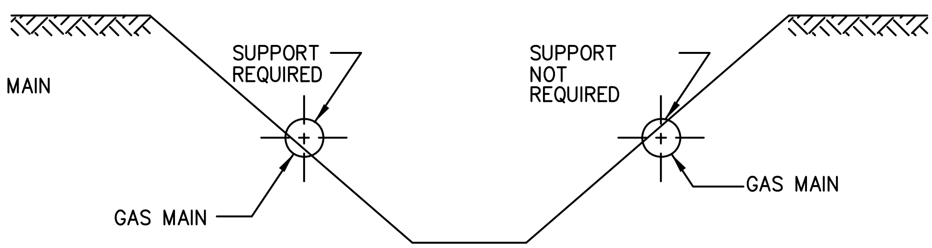
SUPPORTED LENGTH A-A



ADEQUATELY SHORED TRENCH

DETAIL A

SEE NOTE B



INADEQUATELY SHORED OR UNSHORED TRENCH

DETAIL B

SEE NOTE B

nationalgrid LI–MA–NH–NYC	**SUPPORT REQUIREMENTS FOR EXPOSED & UNDERMINED STEEL OR PLASTIC GAS FACILITIES**		
REVISIONS CLARIFIED NOTES B & C ADDED NOTE N.	DATE: 07/01/2003	EFFECTIVE DATE: 03/24/2006	
	DESIGN: A. GIULIANI	STD. DWG. NO.	**CNST-6045**
	DRAWN: P. DIMAIO		

NOTES:

A. THIS CONSTRUCTION STANDARD SHALL BE USED TO SUPPORT PLASTIC OR STEEL GAS FACILITIES WHICH ARE UNDERMINED AND EXPOSED BY CONSTRUCTION ACTIVITY.

B. IF AN EXCAVATION IS MADE AT ANY DISTANCE PARALLEL TO THE GAS FACILITY WITH ADEQUATE OSHA STRUCTURAL SHORING, AS SHOWN IN DETAIL "A", OR IF A STABLE SOIL CONDITION WITH SUFFICIENT COVER ABOVE THE PIPE'S CENTERLINE EXISTS, AS SHOWN IN DETAIL "B", THEN SUPPORTS ARE NOT REQUIRED. UNSTABLE SOIL IS DEFINED AS A SOIL WHICH CAN CAUSE "SOIL RUN OUT" FROM BENEATH THE PIPE (e.g., WASHOUT, SOFT CLAY, etc.,) OR CAN SHIFT DUE TO CONSTRUCTION ACTIVITY, VIBRATIONS, etc.; AND CAUSE A SOIL SCENARIO TO OCCUR AS SHOWN IN DETAIL "B" TO REQUIRE PIPE SUPPORT.

C. IF AN EXCAVATION CROSSES OR RUNS PARALLEL TO A GAS FACILITY, SUPPORTS MAY NOT BE REQUIRED IF THE EXPOSED SECTION OF PLASTIC PIPES IS 3' OR LESS AND STEEL PIPES 7' OR LESS.

D. ALL EXCAVATIONS SHALL BE PERFORMED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ONE CALL DIG SAFE PROGRAM USING THE APPROPRIATE MARK OUT, TEST HOLES AND EXCAVATION TO AVOID DAMAGE TO PIPE OR PIPE COATINGS:
- NEW YORK STATE CODE RULE 753
- MA CHAPTER 82 - SECTION 40, GENERAL LAWS, REGULATING NOTICE REQUIREMENTS FOR EXCAVATION IN PUBLIC WAYS
- NH DIG SAFE LAW, RSA 374 – REGULATING UNDERGROUND UTILITY DAMAGE PREVENTION SYSTEM

E. USE OF THIS CONSTRUCTION STANDARD DOES NOT RELIEVE THE CONSTRUCTION AGENCY OR AUTHORITY OR THEIR RESPECTIVE CONTRACTORS OF RESPONSIBILITY FOR DAMAGES. ALL DAMAGES WILL BE REPAIRED IN ACCORDANCE WITH EXISTING STANDARDS AND THE APPROPRIATE PARTY SHALL BE BILLED FOR ALL EXPENSES.

F. GAS FACILITIES SHOULD NOT BE UNDERMINED WITHOUT ADEQUATE SUPPORT (DETAIL A). ALL SUPPORT LINES SHALL BE TENSIONED SO THAT NO DEFLECTION WILL OCCUR WHEN THE FACILITY IS UNDERMINED. THIS TENSION SHALL BE CHECKED AT THE START AND END OF EACH DAY AND ADJUSTED AS NECESSARY.

G. WHERE A COUPLING, GAS SERVICE, CLAMP, VALVE, DRIP LINE OR OTHER APPURTENANCE EXISTS ON THE EXPOSED SECTION OF MAIN, AN ADDITIONAL SUPPORT SHALL BE INSTALLED AT THE LOCATION.

H. WHEN SUPPORTING AN EXPOSED FACILITY, THE PIPE COATING SHALL BE PROTECTED WITH ROCK SHIELD (ITEM ID 00301097), OR OTHER LIKE MATERIAL CUT TO A MINIMUM WIDTH OF ½ THE SUPPORTED PIPE DIAMETER. SUPPORT LINES SHALL BE A MINIMUM OF ¾" POLYPROPYLENE OR BETTER.

I. SUPPORTS FOR GAS TRANSMISSION FACILITIES SHALL BE REVIEWED WITH GAS ENGINEERING PRIOR TO INSTALLATION.

J. THE MAXIMUM SPACING BETWEEN SUPPORTS FOR STEEL FACILITIES SHALL BE AS FOLLOWS:
7' SPACING FOR ¾" AND 1 ¼" STEEL
10' SPACING FOR 2" STEEL
15' SPACING FOR 3" AND 4" STEEL
20' SPACING FOR 6" AND LARGER STEEL

K. THE MAXIMUM SPACING BETWEEN SUPPORTS FOR PLASTIC FACILITIES SHALL BE AS FOLLOWS :
3 ' SPACING FOR 2" AND SMALLER PLASTIC
6' SPACING FOR 4" AND LARGER PLASTIC

L. VIBRATING MACHINES ARE ALLOWED OVER STEEL OR PLASTIC FACILITIES WITH 24" OR GREATER COVER. HAND HELD MECHANICAL. TAMPER IS ACCEPTABLE OVER ANY FACILITY WITH 12" OR GREATER COVER.

M. WHEN CONSTRUCTION ACTIVITY IS COMPLETED, CLEAN FILL SHALL BE COMPACTED AROUND AND UNDER THE GAS FACILITY BEFORE REMOVING SUPPORTS.

N. SEE REGIONAL PBWK5010 PROCEDURES FOR **REPLACEMENT** REQUIREMENTS OF CAST IRON PIPE.

No.	**ITEM**	**CODE No.**

BILL OF MATERIAL

GUIDELINES FOR WORKING AROUND CORROSION CONTROL SYSTEM COMPONENTS

DESCRIPTION

This guideline shall control work around existing Corrosion Control components. Replacement of test stations, anodes and test wire leads shall comply with Standards and Specifications stipulated by RI Energy. If design plans call for work in the area of Corrosion Control components, care must be taken to prevent damage to such components.

GENERAL NATIONALGRID CONSIDERATIONS

The contractor shall perform replacement of damaged corrosion control test boxes, resetting of disturbed test boxes, and ensure a minimum of 12" of excess wire above the rim of the test box after set to finished grade. Wires shall not be pulled taught to achieve the 12" above the box, as this will cause stress on the wire connection at the main. Wires needing to be lengthened, damaged corrosion control components i.e. wires, or wire coating, shall require notification to the Corrosion Control Department (508-948-8432) to initiate inspection/repair or replacement of the damaged components.

Backfilling exposed Corrosion Control wire components should begin immediately after the work in that location is complete. The region within 6" alongside and on top of the connector wires shall be backfilled with padding sand (free of cinders, ash, and rock). Test wire leads must be kept with enough slack to prevent stress on the points where the wires connect to the gas main. Trench spoil material shall be suitable for backfilling above the padding material as long as rocks with a diameter larger than 3" are removed. The 8" to 12" backfill layers shall be mechanically compacted to the industry standard of 95%.

Cast Iron Gas Main Encroachment Prevention

nationalgrid

Chris Ferranti
Lead Engineer
Gas Operations & Construction
Rhode Island
Cell: 401-465-9064
chris.ferranti@nationalgrid.com

477 Dexter Street
Providence, RI 02863

<u>CI Encroachments</u>

- CI Encroachments can occur when excavating under or next to CI gas mains

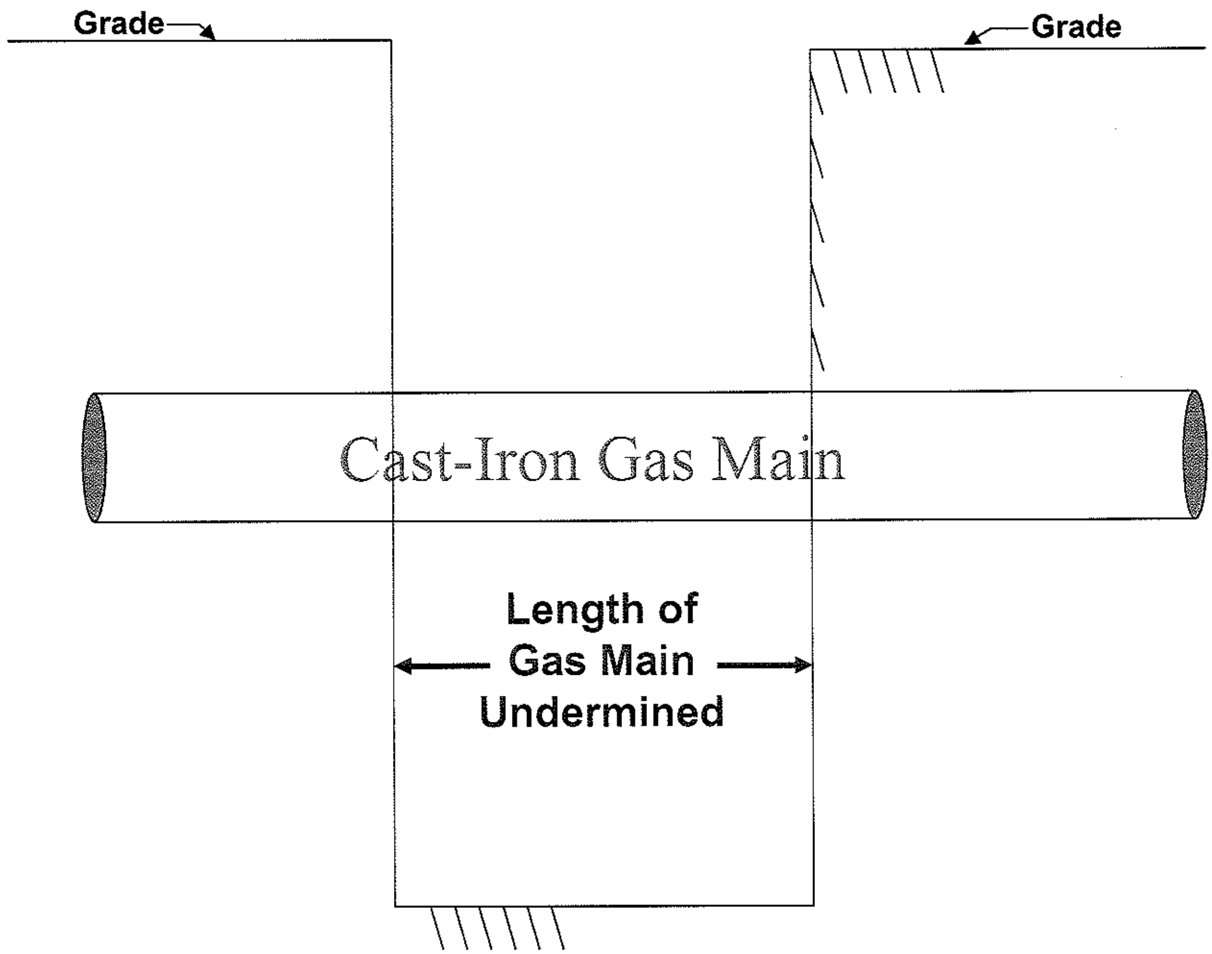
- CI Encroachments can occur **<u>Even when a gas main is not exposed</u>**

- Two types of Encroachments: Undermine and Parallel

  - **Undermine Encroachments (Cross Trench)**

  - **Parallel Encroachments**

Cross Trench

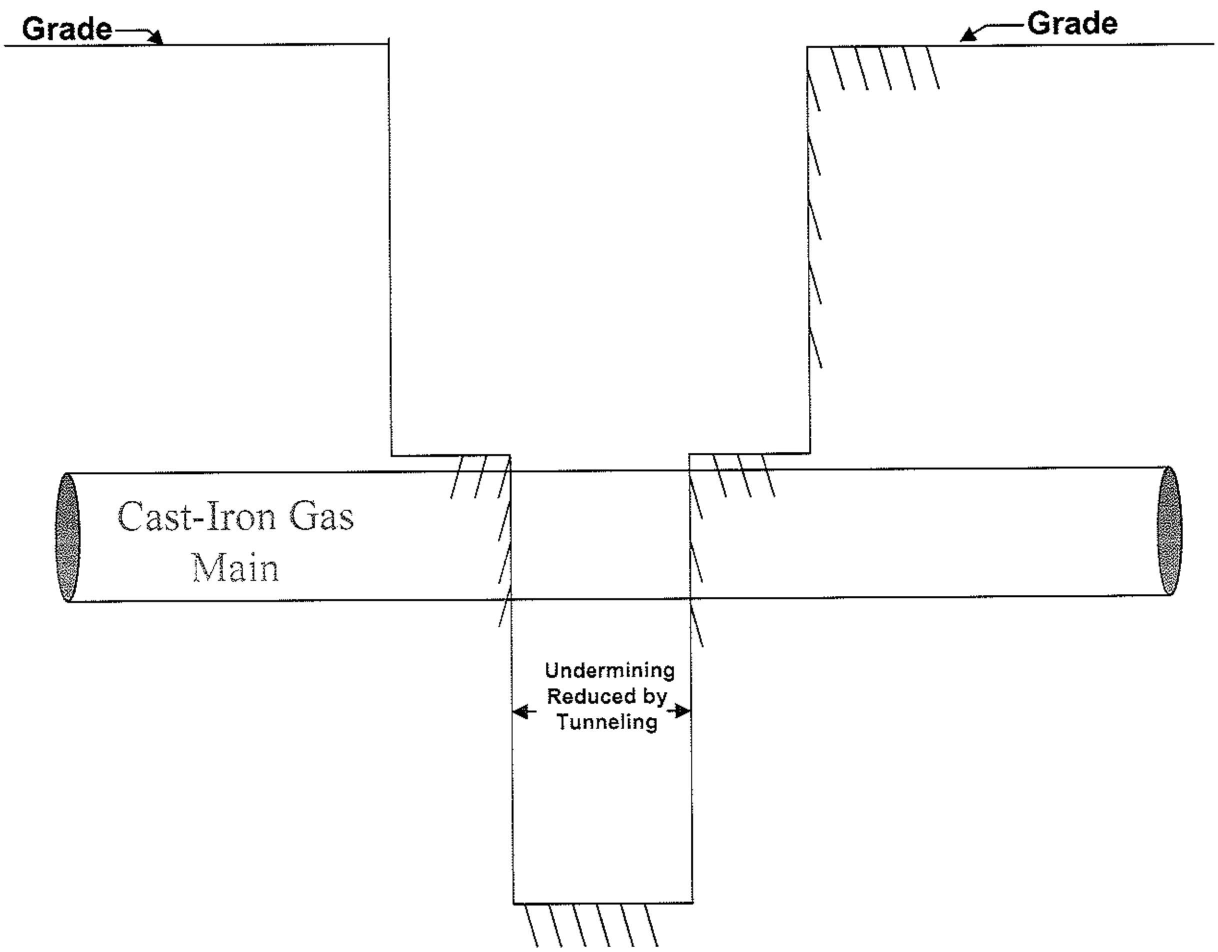


Elevation View

Cross Trench - Rules of Thumb:

- The shorter the undermine, the better
- Limiting the length of the undermine to 30" or less will always avoid an encroachment

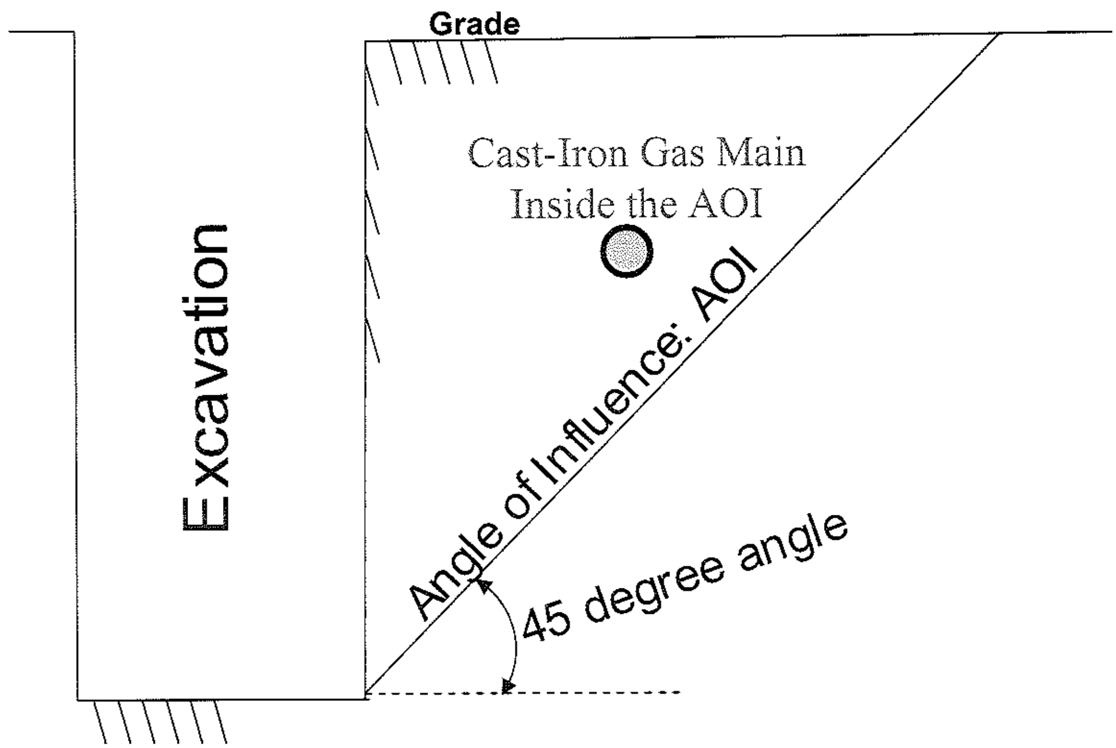
Cross Trench with Tunneling



Elevation View

Tunneling is an Effective Way of Preventing Encroachments

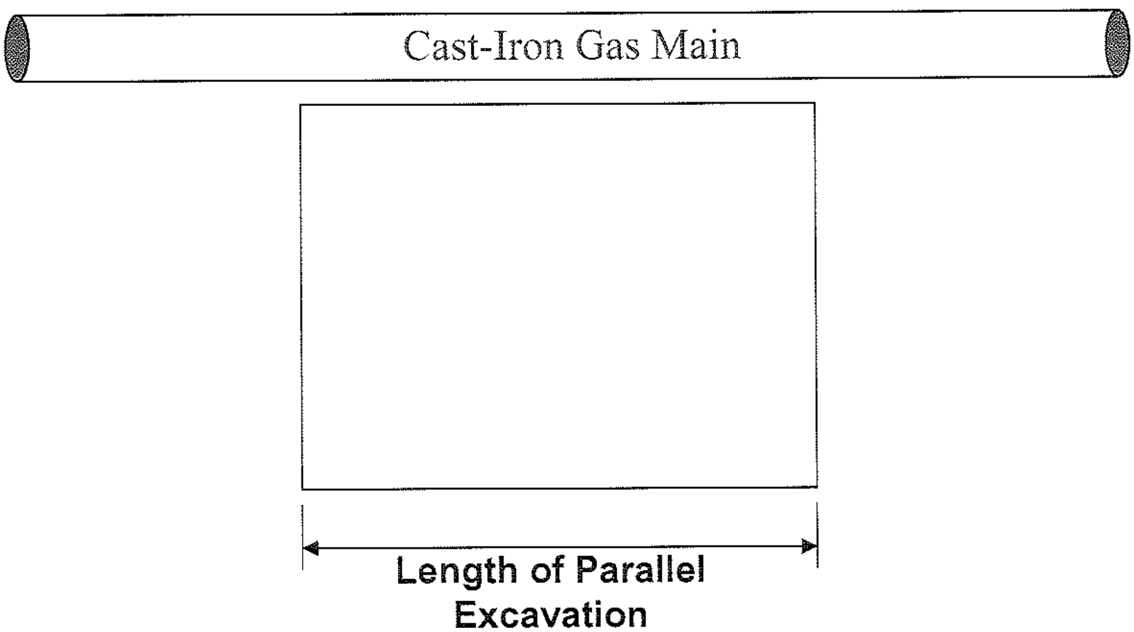
Cast Iron Encroachments
can occur even when the
Gas Main is not Exposed



Angle of Influence:

- The AOI extends up from the bottom of the excavation at a 45 degree angle
- The AOI can affect cast iron gas mains even if the gas main is not exposed

Excavation Next to Gas Main
(view from above looking down)

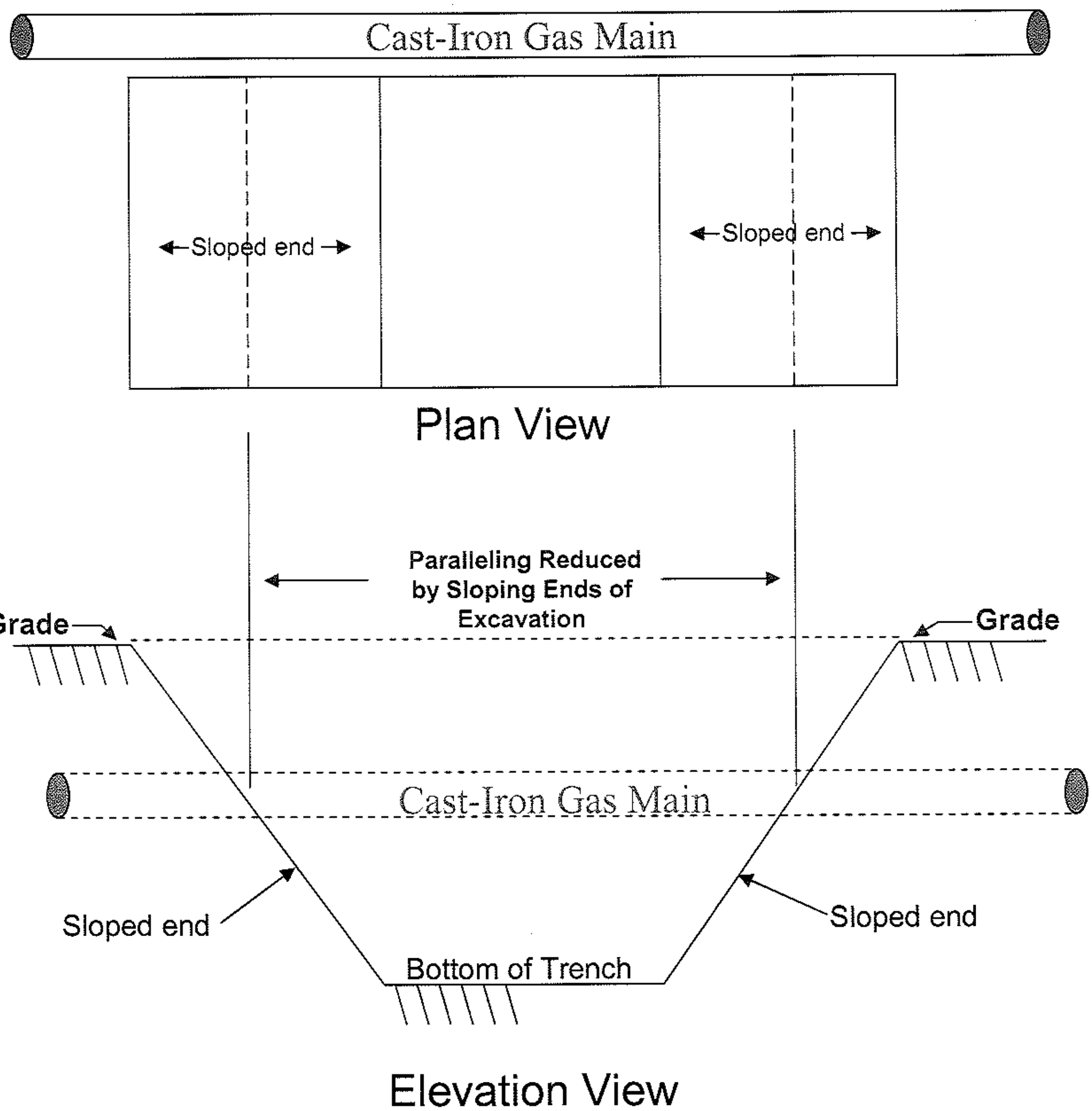


Plan View

Parallel Excavation Rule of Thumb:

- **Limiting the length of the parallel to 7'-6" or less will always avoid an encroachment**

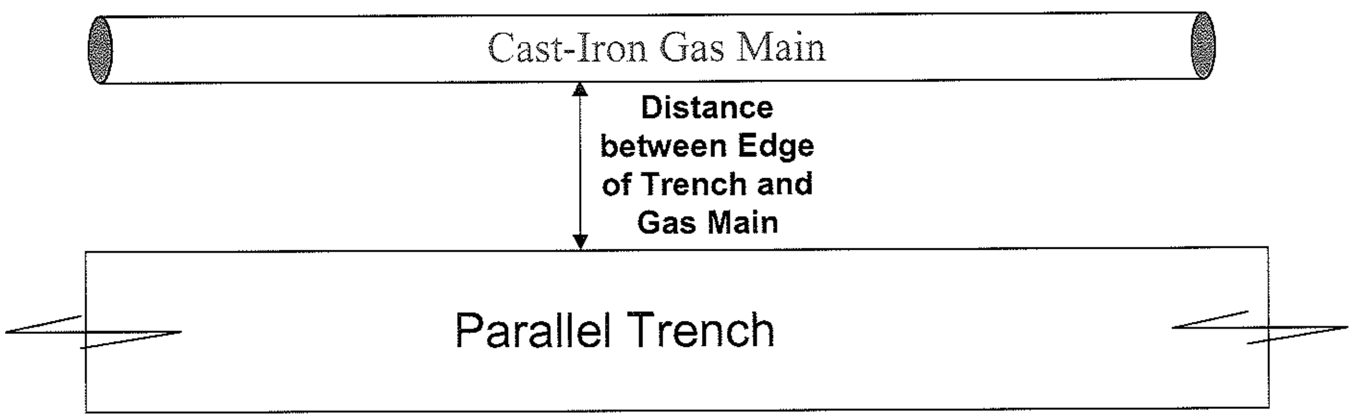
Parallel Excavation with Sloped Ends



Sloping the ends of an Excavation can be an Effective Way of Preventing Encroachments

Trenching Next to Gas Main

(view from above looking down)



Plan View

Parallel Trenching Rules of Thumb:

- **The greater the separation between the gas main and the trench, the better**
- **Keeping the distance between the excavation and the gas main greater than the (depth of the trench - 2') will in most cases avoid an encroachment**

CI Encroachments

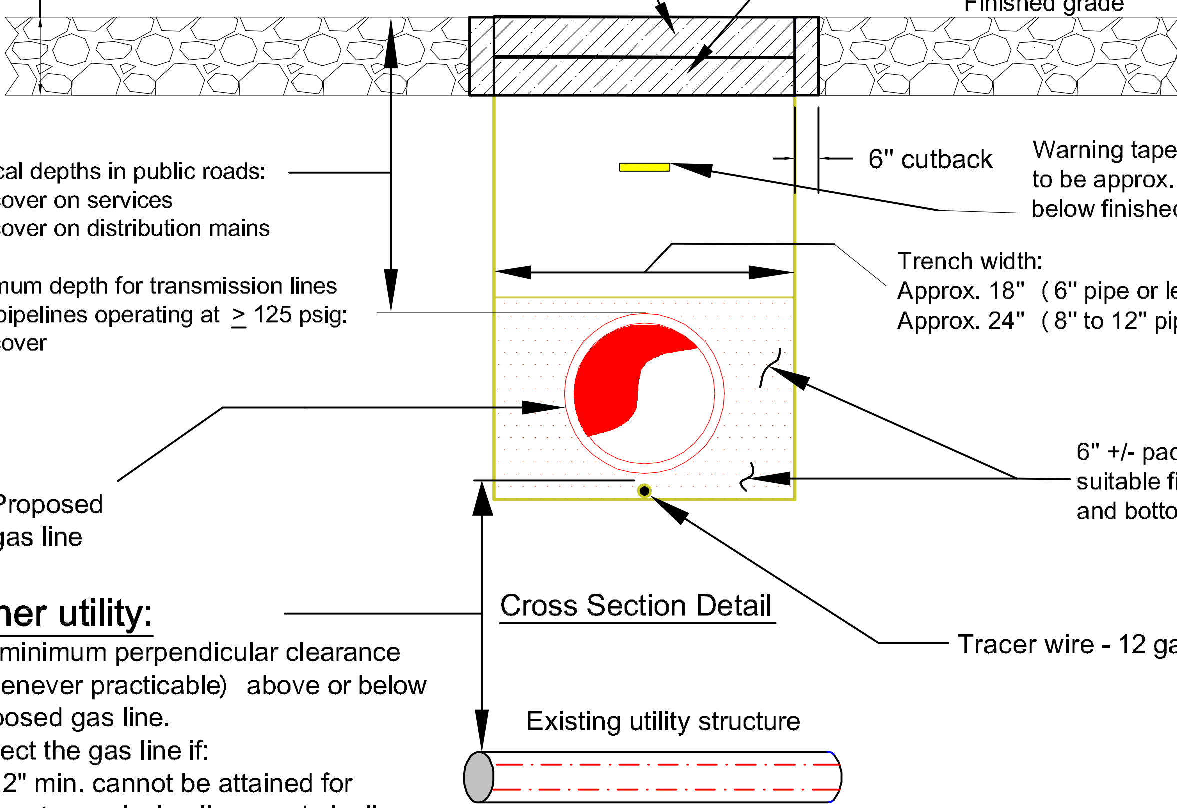
- CI Encroachments can occur when excavating under or next to CI gas mains

- CI Encroachments can occur **Even when a gas main is not exposed**

- Two types of Encroachments: Undermine and Parallel
  - **Undermine Encroachments (Cross Trench)**
    - In all cases, the shorter the length of gas main undermined the better
    - Limiting undermining to less than 30" in length will always avoid an encroachment
    - Tunneling under the gas main can be an effective method for avoiding encroachments

  - **Parallel Encroachments**
    - Parallel Encroachments can occur even if the gas main is not exposed
    - In all cases, the greater the separation between the gas main and the parallel excavation, the better
    - Limiting excavations adjacent to gas main to less than 7'-6" in length will always avoid an encroachment
    - Keeping parallel excavations more than the (depth of the trench – 2') from gas main in most cases will prevent an encroachment

Typical Utility Crossing and Trench Guidelines



Other utility:

12" minimum perpendicular clearance (whenever practicable) above or below proposed gas line.

Protect the gas line if:

1. 12" min. cannot be attained for gas transmission lines and pipelines operating at ≥ 125 psig.
2. 6" min. cannot be attained for distribution mains.
3. 4" min. cannot be attained for services.

Minimum clearance when protection is provided against damage is 2" for all gas lines.

Pipeline backfill will consist of suitable materials (medium to coarse sands with little or no silts) placed in layers of no more than 8" to 12" after compaction. Trench spoil materials suitable for backfilling will be mechanically compacted to the industry standards of 95% (as measured by Drop-Cone Penetrometer method) or until a density comparable to the unexcavated material is achieved.

nationalgrid RI	**TYPICAL UTILITY CROSSING AND TRENCH GUIDELINES**
Key Changes:	DATE: 09/15/2014 · EFFECTIVE DATE: 09/15/2014
	DESIGN: N. COSTANZO · STD. DWG. NO. **CS-CNST002**
	DRAWN: N. COSTANZO

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Installing Steel Distribution Mains CNST04005

1. Purpose

This document describes the requirements for installing steel distribution mains that will have maximum allowable operating pressures (MAOPs) below 125 psig and less than 20% SMYS. If the pipeline will exceed either of these parameters, then the pipeline shall be installed in accordance with Installing Transmission Lines and Pipelines Operating at 125 psig or Greater [CNST04006].

2. Responsibilities

Construct & Maintain or Designee shall be responsible for:

- Installing steel distribution mains in accordance with this procedure

3. Personal & Process Safety

All required PPE shall be worn and utilized in accordance with the Rhode Island Energy Safety Policy.

4. Operator Qualification Required Tasks [Qualified or Directed & Observed]

- Task 31 – Installation of Pipe
- Task 49 – Mechanical Joining of Pipe Other Than Plastic
- Task 53 – Non-Destructive Testing of Welds
- Task 54 – Welding on a Pipeline
- Task 70 – Abnormal Operating Conditions and Properties of Natural Gas

Not all personnel shall be required to perform all tasks associated with this document. Therefore, Operations personnel shall only be required to qualify on those tasks associated with the tasks they will perform.

5. Content

	General
	Mains shall be installed in accordance with the line and grade specified on the drawings for the job. Where no grade is specified, mains shall be installed in accordance with the cover requirements in the section below titled, “Steel Pipe Installation.”
	The trench width shall be as described in the specifications or as directed by the Rhode Island Energy representative. There shall be no undercutting of the pavement.
	All underground facilities shall be marked prior to construction. Test holes may be required to verify and determine the depth, size, and exact location of all subsurface facilities that cross or lay parallel (within the affected work area) to any excavation for the proposed installation of the gas main prior to excavating the line trench.
	Where drawings or field conditions indicate the presence of other substructures and facilities notification, mark-out, and excavation shall be in accordance with regional damage prevention procedures.

	Pipeline welding shall be performed in accordance with Welding policy [CNST05002] and Pipe Welding Safety [CNST05003].
	All excavations shall be performed in accordance with Standards for Working in Excavations M-1301.
	The finished pipe shall be clean, dry, and free of foreign material.
	Install cathodic protection in accordance with Rhode Island Energy's specifications including, Corrosion Design Criteria [COR01100]. Steel mains including welds, valves, and fittings shall be properly coated in accordance with the Facility Coating Guide [030031-CS].
	Anodes and test stations shall be installed as designated on the drawings. In the absence of specific guidance on the drawings or from Corrosion Engineering, refer to Installation of Magnesium Anodes [COR04001] and Installation of Test Stations for Cathodic Protection [COR04003].
	Insulating joints shall be installed as designated on the drawings. Install and electrically-test each insulated joint in accordance with Installation of Insulating Joints for Cathodic Protection [COR04005].
	Pipeline markers shall be installed at locations indicated on the installation drawings and as per, Pipeline Markers for Main and Transmission Lines [DAM01020].
	If supplemental odorization is required prior to placing the pipeline in service, it shall be performed in accordance with Supplemental Odorization for New Piping [INR06002].
	Prior to and after the pressure test, the pipeline shall be cleaned to the satisfaction of Rhode Island Energy. Brush pigs shall be used to clean the pipe before testing. After a hydrostatic test, foam pigs shall be used to remove all water and to dry the pipeline. Sufficient "pig" runs shall be made to ensure a clean, dry pipeline prior to introducing natural gas into the pipeline. This is determined by measuring dust penetration into the pig. Generally, dust penetration of less than 1 inch is acceptable.
	For pressure testing mains, refer to Pressure Testing Mains Operating Below 125 psig [CNST04003].
	If there is a plan to uprate the pipeline in the future to operate at pressures of 125 psig or greater, or operate at 20% SMYS or greater, then the pipeline shall be installed and repaired in accordance with the more stringent requirements described in Installing Transmission Lines and Pipelines Operating at 125 psig or Greater [CNST04006].
	For situations where pipelines are exposed to the public (such as aboveground piping) and where the pipeline may be used by the public for unintended purposes, signs should be posted to warn the public to keep away from these facilities.

	Inspections
	Perform a thorough field inspection to prevent damaged/gouged, grooved pipe, or coating from being installed in the completed pipeline. The inspection shall be performed by someone other

	than a person who participated in the construction (49 CFR §192.305).
	When an applied-coating holiday test is required, perform the test in accordance with Testing of Pipe Coating [COR03001].
	Inspect the bottom of the excavation just before the pipe is lowered in and remove any object that could harm the piping.
	Inspect the fit of the pipe to the ditch prior to backfilling to prevent unnecessary strain on the pipe.
⚠	All exposed existing piping shall be inspected for hazardous liquids in accordance with Handling Contaminated Materials and Piping [SHE02001] prior to working on the pipe.
	Examine all exposed existing piping for external corrosion and the condition of the coating in accordance with Inspection of Exposed Steel Pipe for Corrosion [COR02020]. In addition, existing piping, whenever accessible or removed such as at tie-ins, shall be internally examined for signs of corrosion in accordance with Inspection of Exposed Steel Pipe for Corrosion [COR02020].

	Supporting Existing Structures and Utilities
	Exposed gas facilities shall be properly supported
	Gas facilities that will be crossed or exposed shall be excavated in accordance with regional damage prevention procedures.
⚠	If an in-service unrestrained coupling is unearthed on a high-pressure (pressures above low pressure) pipeline while excavating, then precautions shall be taken to prevent pipe pullout. Unrestrained couplings located near pipeline offsets or bends present a higher risk than couplings on straight segments of pipe due to the longitudinal force applied to the offset or bend from the pressure in the pipe. Prior to fully exposing the unrestrained coupling, in order to prevent pipe pullout, ensure that the pipe on each side of the coupling is embedded in the earth before fully exposing the coupling. If an unrestrained coupling is unearthed after a pipeline offset or bend is unearthed, then further excavation work shall stop until the pipeline is adequately braced horizontally and vertically.
	If Gas Control and Gas Systems Engineering provide permission for the operating pressure of the in-service pipeline to be lowered or for the pipeline to be shut down, then the risk of pipe pullout will be reduced.
	An unrestrained coupling that is unearthed shall be restrained using anchorage lugs and threaded rods. Provide plastic insulators for the reinforcing lugs as necessary (refer to Construction standard, Supplemental Restraining of Non-Restraining Mechanical Compression Couplings and Caps on Steel Pipe [MAIN-6220]). Following the installation of an insulating coupling, contact Corrosion for testing.
	If visual inspection is not conclusive about whether an exposed coupling is self-restraining or unrestrained, refer to the markings on the coupling to determine its status. Contact Engineering if guidance is needed.
	The Installer shall notify the Rhode Island Energy field representative when cast iron mains, eight (8) inches and less in diameter, are exposed. Prior to undermining any cast iron, refer to the regional cast iron encroachment policy.

	Adequately support all other subsurface facilities to ensure protection from damage. Any damage shall be promptly reported to Supervision.
	Maintain the integrity of fences, poles, and other structures adjacent to the trench, pits, and work area.
	Exercise care to prevent damage to transverse and parallel curbs, sidewalks, driveways, and property monuments.

	Materials
	Steel pipes shall comply with the material specifications contained in Steel Pipe API 5L Grade B, X42 and Greater [120020-MS]. Factory-coated steel pipes shall comply with External Coating of Steel Pipe with Pritec [MS-017] or Coating and Inspection of Steel Pipe with Fusion Bonded Epoxy (FBE) and Powercrete Abrasion Resistant Epoxy Overlay [MS-018].
	Steel fittings such as flanges, ells, tees, reducers, and caps shall be forged welded fittings in accordance with Rhode Island Energy specifications. Prior to the start of construction, material certifications and material grades/markings shall be verified to ensure that they meet the design requirements.

	Steel Pipe Installation
	The pipe shall be laid without causing unnecessary strain on the pipe. The pipe shall be laid with as few vertical and horizontal changes in direction as possible.
	The bottom of the trench shall be relatively smooth and free of any objects which may damage the pipe coating. The backfill material to be used around the main and for a minimum of 6 inches over the piping shall be free of any material that could be harmful to the pipe surface (see Backfill and Restoration [CNST01003]).
	In areas where it is not practicable to pad the trench with sand prior to lowering the pipe into the trench, sandbags shall be placed in the trench to act as a bed for the pipe. These bags shall generally be placed at intervals of 10 feet or as directed. After the pipe has been positioned and welded in the trench, sand backfill acceptable to the Rhode Island Energy field representative shall be placed. The sandbags shall then be broken in a manner acceptable to the Rhode Island Energy field representative.
	The amount of cover from the top of the pipeline (e.g., tees, couplings, and other appurtenances) to finished grade shall be as shown on the project drawings and as described in the project specifications. If not specified, the pipeline shall be installed with the covers shown in Table 1 below. The cover may be varied at the discretion of the Rhode Island Energy Project Engineer in order to avoid interference with existing structures or high ground water conditions. Where an underground structure prevents the installation of the pipeline with the minimum cover, obtain permission from the appropriate agency, where required, and protect the pipeline (such as with steel plates). For highway and railroad crossings, refer to Design Requirements for Installation of Casings [ENG04010] for casing cover requirements when casings are required and Design of Distribution Mains [ENG04001].

Table 1: Cover Requirements

Region	**Streets and Roads Not Controlled by the State or the DOT**		**State Right-of-Way**	
	Recommended	Minimum	Below the Roadway Minimum	Outside the Roadway but within the Right-of-Way Minimum
RI	30”	24”	36”	36”
All	48 inches of cover in soil below navigable river, stream, or harbor or 24 inches in consolidated rock between the top of the pipe and the underwater natural bottom.			

Each pipe segment shall be thoroughly cleaned to remove all dirt or foreign matter from the ends of the pipe before the joints are aligned for welding.

In order to keep the inside of the pipe free of foreign material, a suitable tamp plug or cap shall be installed on the open ends of the pipeline at the end of each day. Any foreign matter which may enter the pipe after laying and joining operations have been completed shall be removed by suitable means before the final test.

If pigging is to be performed to clean the pipe and the need arises to cap the laterals, then only full-restraint or welded end caps shall be used to resist the pressure from the pigging operations.

⚠ It is imperative that the inside of the pipe be kept free and clean of all obstructions, and it shall be the Installer’s responsibility to protect the pipe from any hazard. In the event that a storm, broken water main, or other condition should allow water and muck into the line, the Installer shall be required to clean the pipe in a manner that is acceptable to Rhode Island Energy.

At the end of each day’s work, the pipe shall be capped, made watertight, and anchored to prevent movement in the event the trench becomes flooded.

The preferred clearance for distribution piping when crossing other underground structures is 12 inches. However, distribution piping shall have a minimum clearance of 6 inches from other underground facilities or structures not used in conjunction with the installation of the gas pipeline, except as follows. Where this distance cannot be achieved, a field representative shall notify Gas Systems Engineering for guidance on how to protect the gas distribution facility. The minimum clearance, provided the main is suitably protected from other underground structures, is 2 inches (4 inches minimum preferred for LI).

Note: 6 inches of clearance from water lines should be maintained, whenever practicable.

Consideration should be given regarding protection for the coating on steel pipes located in close proximity to steam lines.

Changes in direction of piping should be made with welded fittings such as ells, whenever possible. If field cold bending is necessary for line pipe, it shall be performed in accordance with, Field Cold Bending of Line Pipe [CNST04007] to ensure that pipe ovality limits and minimum radii requirements are met. Upon completion of the bending, check the coating for defects in accordance with Testing of Pipe Coating [COR03001] and repair it in accordance with,

	Application of Coating Systems [COR02001].
	The preferred method of joining steel pipe is by welding. The cut end of the pipe shall be beveled in accordance with Welding Policy [CNST05002]. Welding elbows furnished by Rhode Island Energy should be either 90 degrees or 45 degrees long radius with a wall thickness that at least matches the pipe thickness.
⚠	When welded sections of pipe are lowered into the trench, care shall be taken to prevent a permanent bend or distortion to the pipe.

	Repairing Steel Pipe
	Each imperfection or damage that impairs the serviceability of the pipe shall be repaired or removed. If repair is made by grinding, the remaining wall thickness shall at least be equal to either (49 CFR §192.309(a)): • The minimum thickness required by the tolerances in the specification to which the pipe was manufactured; or • The nominal wall thickness required for the design pressure of the pipeline.
STOP	A gouge, groove, arc burn, or dent shall not be repaired by insert patching or pounding out.
	Each gouge, groove, arc burn, or dent that is removed from a length of pipe shall be removed by cutting out the damaged portion as a cylinder. The cylinder shall be replaced with a new pipe that meets the design specification.
	Notches and laminations on pipe ends shall not be repaired; the damaged portion shall be removed as a cylinder and the pipe ends re-beveled.

	Pipe Joining
	Unless otherwise noted, joints between pipe sections, valves, and fittings shall be welded. All welding, inspections, and nondestructive testing shall be performed in accordance with Welding Policy [CNST05002] and Pipe Welding Safety [CNST05003].
	Whenever practicable, joints shall not be located under active tracks or any other substructures.
	The welder and inspector or foreman shall visually examine the quality of all the welds.
	All steel distribution mains shall have at least 10% of all welds nondestructively examined in accordance with Welding Policy [CNST05002]. A Main Field Record (weld map) should be created with the welds numbered along the length of the pipeline.
	Compression couplings and caps may only be used under extenuating circumstances, such as for tie-ins, where welding is not practicable. If non-restraining mechanical couplings or caps are used, then they shall be restrained in the field using anchorage lugs and threaded rods in accordance with Supplemental Restraining of Non-Restraining Mechanical Compression Couplings and Caps on Steel Pipe [MAIN-6220]. Approved self-restraining couplings and caps require no further supplemental restraining when installed in accordance with the manufacturer's

	specifications.
	Threaded joints shall not be used, unless specifically approved by the Rhode Island Energy VP of Gas Systems Engineering or the VP of Asset Management for a particular project or condition.

	Valves
	Valves shall be furnished as specified in the particular project specifications and they shall be of the appropriate pressure class to meet or exceed the MAOP of the pipeline.
	All valves should be below grade and shall have roadway boxes which provide access to the operating mechanism.
	At Rhode Island Energy's option, valves may be pressure tested prior to installation as specified in the particular project specification.
	The Installer shall use extreme care when making a valve weld.
	If the valve leaks during a pressure test Rhode Island Energy, at its option, may arrange to contact the manufacturer's representative for assistance, and if Rhode Island Energy determines it necessary, a replacement valve will be ordered.
	The Installer shall leave line valves in an open position and purge valves in a closed position. The Installer shall not open and close valves after installation unless directed by the Field representative.
	System Interconnection Valves – A minimum of two valves placed in series that are used for manual pressure control between two mains operating at different MAOPs may be installed provided they are approved by Gas Control and Long-Term Planning. The valves shall be installed in accordance with current standards or special designs as specified by Project Engineering & Design, but as a minimum shall be of the appropriate pressure class for the system with the highest MAOP and shall be installed with pressure taps upstream, downstream, and between both valves. Lock high-pressure valves to prevent unauthorized operation.

	Application and Testing of Protective Coating
	Field-Applied Coating: The external surfaces of bare steel pipe, pipe welded joints, anode and test lead connections, valves, fittings, and pipe coating damage, etc., shall be cleaned and coated in accordance with, Application of Coating Systems [COR02001].
	Tests and Inspection of Coating: • Standards of Acceptance: It is the intent of this procedure to require protective coating completely free from holidays and other faults. Work not satisfying these requirements shall be repaired in accordance with Application of Coating Systems [COR02001]. Care shall be exercised during all phases of the application of protective coating to prevent cleaning, priming, or coating materials from damaging or adhering to any internal surfaces. Prior to backfilling, holiday testing should be performed by jeep testing the pipe in accordance with

Testing of Pipe Coating [COR03001].

- Rhode Island Energy Acceptance Test: Rhode Island Energy or its representative will perform a pipe-to-earth electrical potential test, as it deems necessary, to ensure adequate cathodic protection and coating integrity in accordance with Measuring Pipe-to-Soil Potential [COR03002].

Recordkeeping

Main field records shall be required for all pipe installations per Preparation of Gas Facility Historical Records [CNST01005].

The Installer shall keep a historical record and update all related drawings of work performed and facilities encountered in performing the work. The location of all welds shall be indicated and numbered in sequence on the project historical drawings. These historical records and drawings shall include the following:

- The locations of pipes, valves, directional drills, welds, mechanical couplings, and casings by stations and offsets relative to the baseline. Cover or elevations relative to the bench run shall be taken at every weld and sleeve end.
- The locations of insulating joints and valves by stations and offsets relative to baseline and take-offs from physical structures such as houses, poles, etc.
- The locations of cathodic protection test stations and attachment to pipe by station, offset, and elevation.
- The locations of subsurface obstructions, listing the type of obstruction by station, offset, and elevation.

The final completed historical package shall be presented to the Rhode Island Energy Project Engineer prior to placing the pipeline in service. Refer to Processing Gas Main and New Services Work Packages [GEN03002].

6. Knowledge Base & References

Code	Section	Description
49 CFR	192.309	Repair of steel pipe
49 CFR	192.309	Repair of steel pipe
220 CMR	101.6	Additional Rules or Modifications
220 CMR	101.6	Additional Rules or Modifications

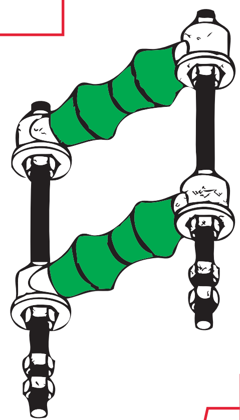
7. Attachments

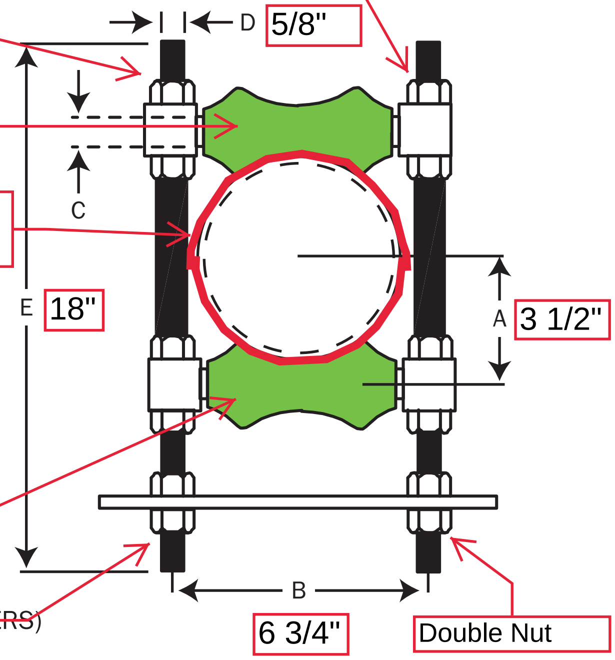
No Attachments.

ADJUSTABLE ROLL GUIDE

3B

Material: Hot Dipped Galvanized





ADJUSTABLE ROLL GUIDE INCLUDES:

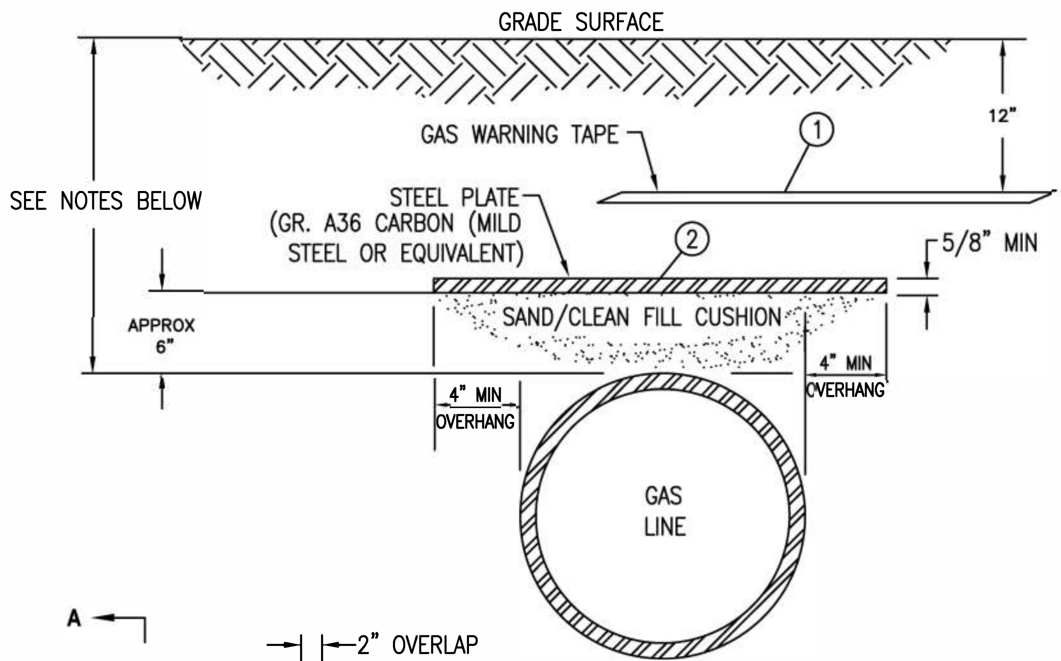
4 ADJUSTABLE SOCKETS
2 ROLL AXLES
2 VERTICAL THREADED RODS
12 HEX NUTS
2 CAST IRON ROLLS (OMIT WHEN ORDERING NON-CO ERS)

SPECIFICATIONS MAY VARY - All Dimensions in inches

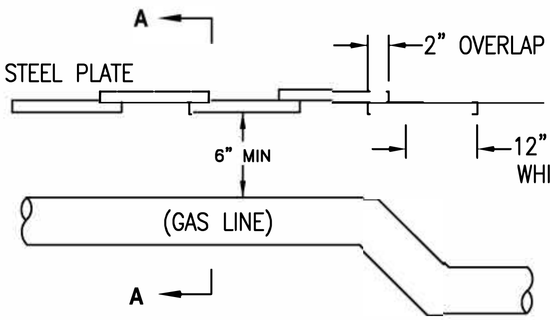
Pipe Size	A	*B	C	Rod Size D	E	Socket No.	Max. Load lbs.	Wt. lbs/ea.
2	1 9/16	4 1/8	3/8	3/8	12	#1-3/8	600	2.15
3	2 3/16	5 1/2	1/2	1/2	14	#2-1/2	700	4.34
4	2 3/4	6 3/4	1/2	5/8	18	#3-1/2	750	6.73
5	3 7/16	8 1/16	5/8	5/8	18	#3-5/8	750	8.95
6	4	9 9/16	3/4	3/4	24	#4-3/4	1070	14.59
8	5 1/4	11 15/16	7/8	7/8	24	#5-7/8	1350	24.33
10	6 1/4	14 1/16	7/8	7/8	30	#5-7/8	1730	27.7
12	7 7/16	15 13/16	1	7/8	30	#5-1	2400	39.62
14	8 5/16	17 3/4	1 1/8	1	36	#6-1 1/8	3130	57.61
16	9 3/8	19 3/4	1 1/4	1	36	#6-1 1/4	3970	87.57
18	10 3/8	21 7/8	1 1/4	1	42	#6-1 1/4	4200	99.54
20	11 1/2	24 1/4	1 1/4	1 1/4	42	#8-1 1/4	4550	131.82
24	13 13/16	28 5/8	1 1/2	1 1/2	42	#9-1 1/2	6160	219.74

*Axle lengths may affect B dimension. Contact supplier before pre drilling holes.

LB&A, INC
LINN BROWN & ASSOCIATES
A UTILITY SERVICE COMPANY



SECTION A-A



METHOD OF LAYING PLATES
ELEVATION

ITEM #	DESCRIPTION	ITEM ID
1	YELLOW BURIAL MARKER TAPE LI.MA/NYC	9341904
	YELLOW BURIAL MARKER TAPE R.I.	9310333
2	STEEL PLATE 5/8" X 24" X 24"	9325829
	STEEL PLATE 5/8" X 48" X 18"	9325830

PROTECTIVE PLATES ARE REQUIRED:

1. FOR ANY GAS TRANSMISSION LINE OPERATING IN EXCESS OF 125 PSIG AND HAVING LESS THAN THREE FEET (3') OF COVER.
2. FOR ANY GAS MAINS OPERATING AT LESS THAN 125 PSIG HAVING LESS THAN THREE FEET (3') OF COVER IN A STATE ROAD.
3. FOR ANY GAS MAINS OPERATING AT LESS THAN 125 PSIG HAVING LESS THAN TWO FEET (2') OF COVER IN A NON STATE ROAD.
4. FOR ANY SERVICE LOCATED IN THE PUBLIC RIGHT-OF-WAY HAVING LESS THAN EIGHTEEN INCHES (18") OF COVER.
5. FOR ANY SERVICE LOCATED IN PRIVATE PROPERTY HAVING LESS THAN TWELVE INCHES (12") OF COVER.

NOTES:

1. REFER TO RHODE ISLAND ENERGY DOCUMENT CNST-5010 FOR REGULATORY COMPLIANCE REQUIREMENTS FOR SHALLOW MAIN AND SERVICE INSTALLATION (E.G. DTE WAIVER).
2. REFER TO ENG02001, ENG03001, & ENG04001 FOR ADDITIONAL DETAILS FOR GAS MAIN AND SERVICE INSTALLATIONS.
3. FIELD SUPERVISOR TO PROVIDE SKETCH (WHICH INCLUDES ALL DIMENSIONS AND TIES) OF THE NEWLY INSTALLED STEEL PLATE OVER GAS MAINS, TRANSMISSION LINES AND SERVICES.

Rhode Island Energy™

PROTECTIVE STEEL PLATING
FOR GAS MAINS AND SERVICES

REVISIONS: Rebranded and confirmed item ID's.

DATE: 03/15/2019	EFFECTIVE DATE: 08/15/2022
DESIGN: W. FROMM	STD. DWG. NO. **CNST-6030**
DRAWN: G. HURLEY / P.D.	

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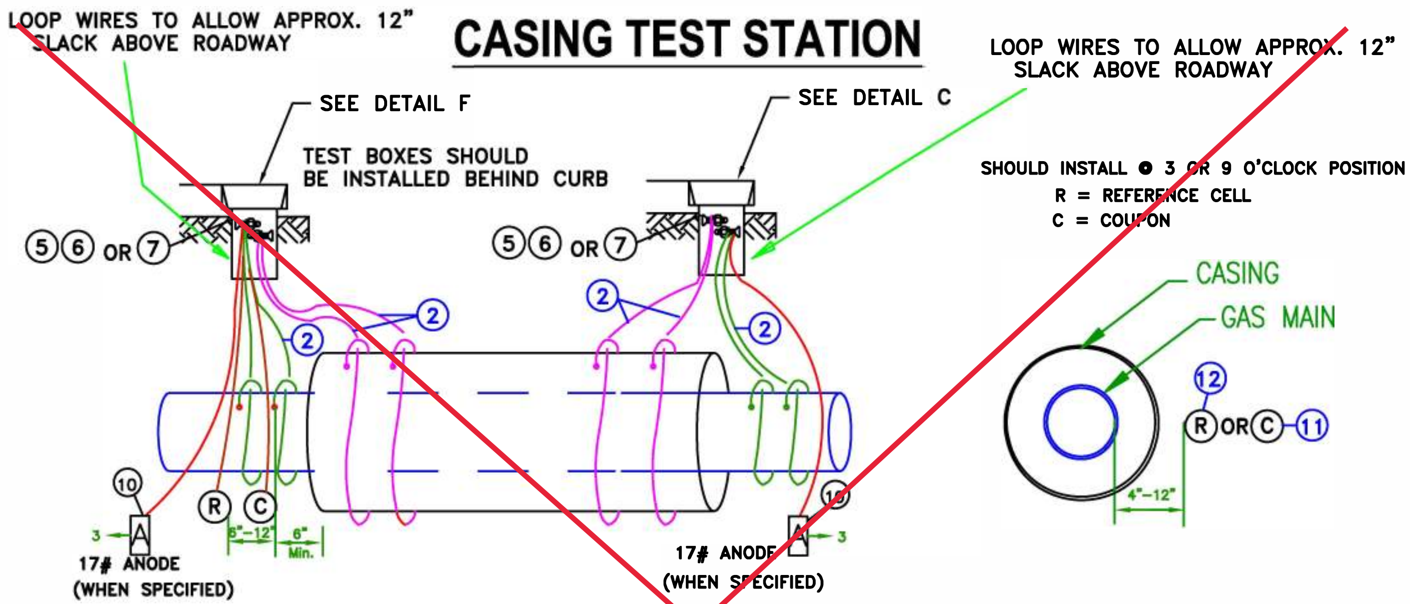
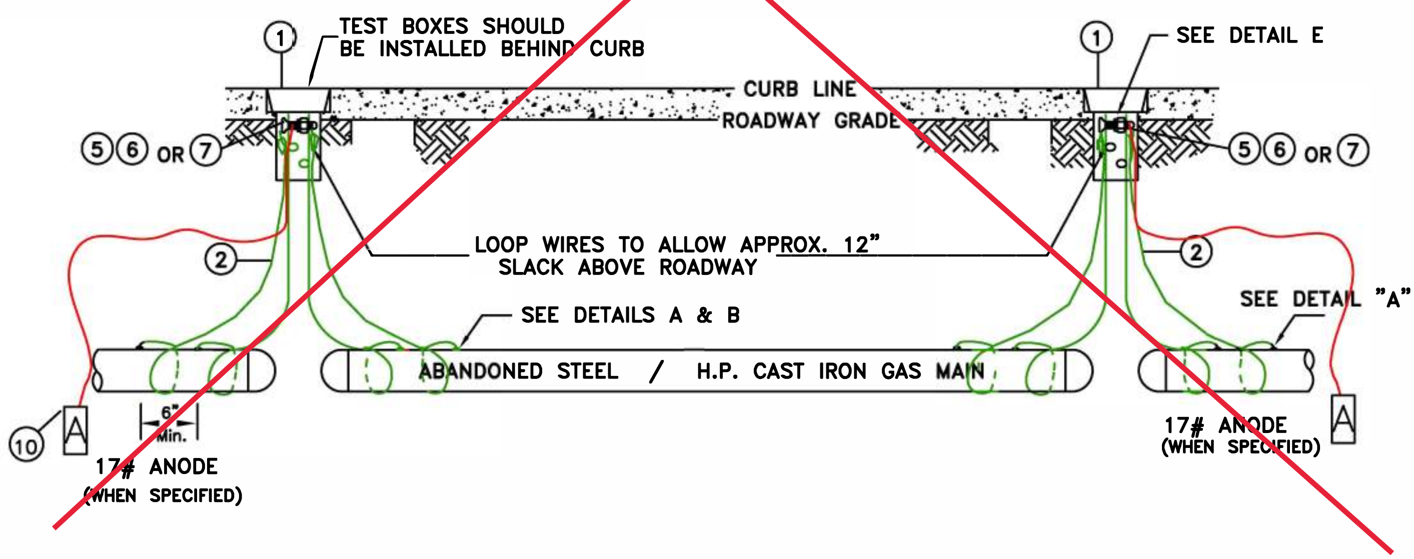
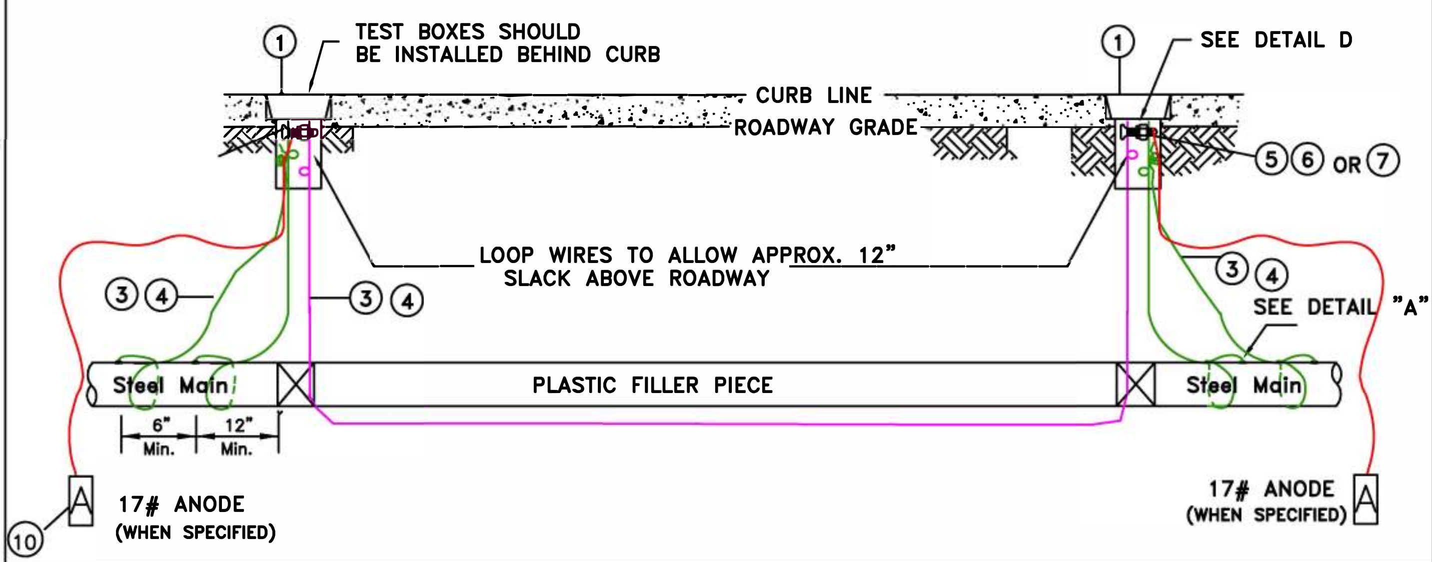
CASING TEST STATION



ABANDONED MAIN IN STRAY CURRENT AREAS



BOND WIRE TEST STATION



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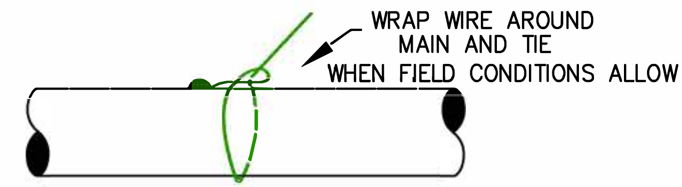
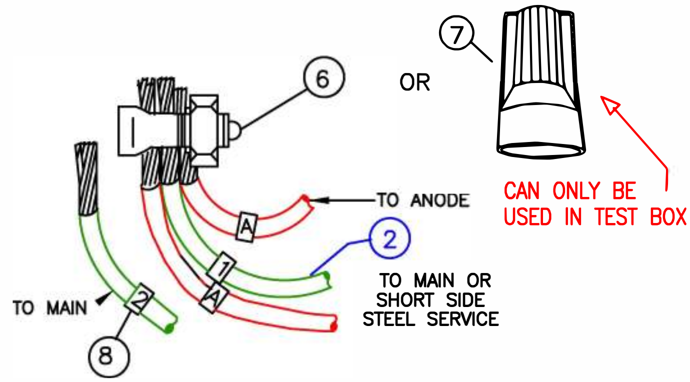
ATTACH WIRE IN ACCORDANCE
WITH APPROVED THERMOWELD PROCEDURE



DETAIL "A"

Two wire test station

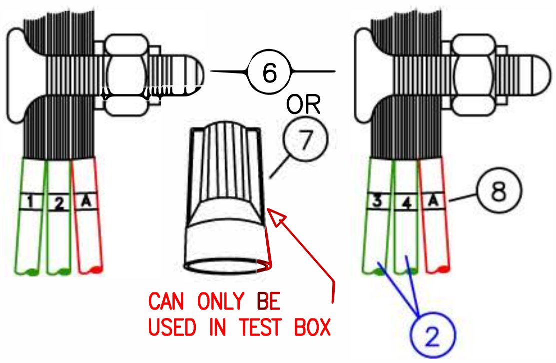
Shown with 2 anodes



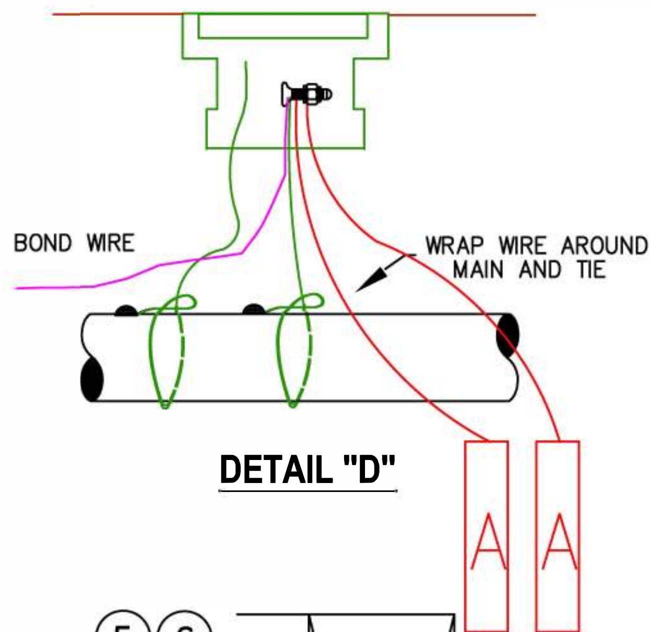
DETAIL "B"

Four wire test station

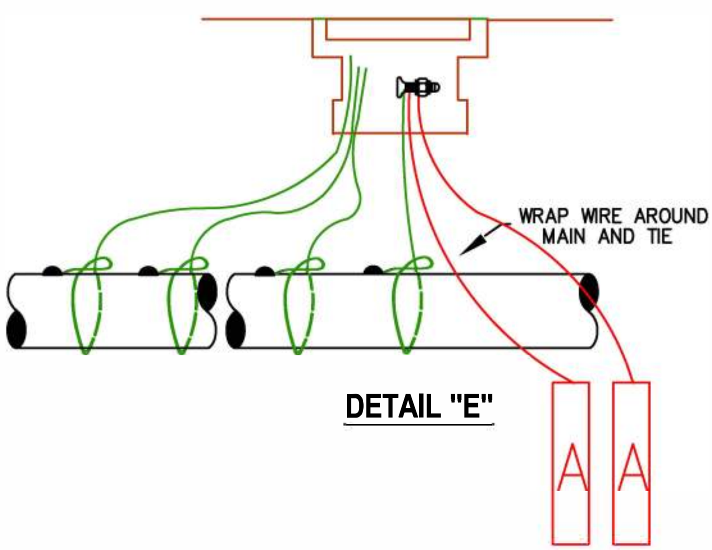
CONNECT ALL WIRES AS NEEDED



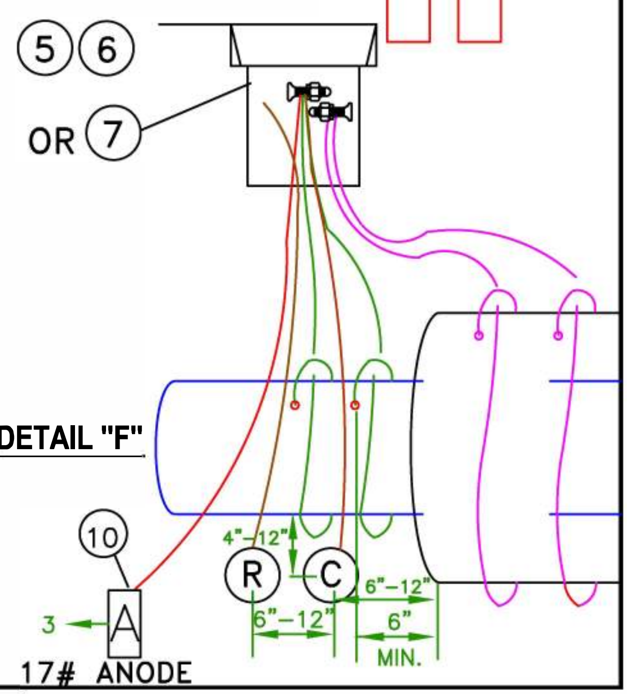
DETAIL "C" (typ)



DETAIL "D"



DETAIL "E"



DETAIL "F"

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MATERIAL LIST

	Description	Item ID	MATERIAL NOTES
1	TEST BOX WITH COVER or TEST BOX 9" SQUARE HEAVY DUTY COVER FOR 9" SQUARE BOX	(Sm - 445) 9311209 or (Lg - 556) in Prov. 9311208	NON-LOCKING COVER. DISCARD FOOT PIECE. (PREFERRED USAGE FOR GRASS AND DIRT AREAS) WEIGHS 95 LBS, STREET USE, WITHOUT COVER PREFERRED USAGE FOR ROADWAY INSTALLATIONS NON-LOCKING COVER
2	WIRE, NO. 8, 7 STRAND	9307539	TEST WIRE ONLY, NOT FOR GROUND BEDS, UPSTATE AND RI WIRE HAS 19 STRANDS.
3	WIRE, NO. 6, 7 STRAND	9311795	BOND WIRE ONLY, NOT FOR GROUND BEDS
4	WIRE 1/0 – 19 STRAND 600 V –1/C	NON STOCK	USE IN STRAY CURRENT AREAS
5	TAPE, PVC - ¾" WIDE	9316070	NOT FOR PIPE COATING.
6	CONNECTOR, SPLIT BOLT, TYPE 6 CONNECTOR, SPLIT BOLT FOR #8 WIRE	NON STOCK 9331641	USE WITH NO. 6 CABLE
7	CONNECTOR, SPLIT BOLT, TYPE 1/01 CONNECTOR, TWIST-ON WIRE NUT	- 9314631	USE WITH 1/0 CABLE
8	TAG, ADHESIVE NUMBER 1 NUMBER 2 NUMBER 3 NUMBER 4 LETTER A	 9307918 9307896 9307895 9307894 9307893	LABEL WITH #1 (N) OR (E), CONSECUTIVELY TO (S) OR (W) SEE DETAILS "B" AND "C" USE TO LABEL ANODES
9	GROUNDING CELL	NON-STOCK	AS SPECIFIED BY CORROSION ENGINEERING
10	ANODE, MAGNESIUM 17LBS	9311183	SATURATE WITH WATER BEFORE BACKFILL. ANODE MAY BE INSTALLED VERTICALLY OR HORIZONTALLY.
11	COUPON	By Corrosion	MC MILLER OR EQUAL
12	REFERENCE CELL	By Corrosion	BORIN MFGR INC OR EQUAL

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Appendix B

Preliminary Contract Submittal List

APPENDIX B

PRELIMINARY CONTRACT SUBMITTAL LIST

Submittal No.	Description	Spec No.	Date Submitted to RIDOT	Date Returned to Contractor	Date Returned to RIDOT	Comments
CSL-001	Interpretive Sign & Foundations					
CSL-002	Storm Water Treatment Device 1 (4’ Diameter)					
CSL-003	Sequence of Construction					
CSL-004	Crane Submittals					
CSL-005	Concrete, Grout and Mortar: Mix Designs, Placing and Methods, Equipment, Curing Plan and Methods, Personnel Resources					
CSL-006	Reinforcing Steel, Splices, Headed Rebar and Inserts					
CSL-007	Bridge Bearing Assembly					
CSL-008	Bridge Name/Seal Tablets					
CSL-009	Expansion Joint Assemblies					
CSL-010	Concrete Subcontractor’s Qualifications and Experience					
CSL-011	Structural Computations					
CSL-012	Bridge Demolition; Equipment, Detailed Sequence of Work					
CSL-013	Earth Support Systems/Cofferdams (Sheeting, etc.)					
CSL-014	Temporary Protection Shields for Demolition and Construction					
CSL-015	Architectural Treatments (Special Forms/Liners, Granite Veneer, etc.)					
CSL-016	Concrete Forms; Stay-in Place, Specialty Formwork					
CSL-017	Erection Procedures; Equipment (Type/Size and Placement), Detailed Sequence of Work					
CSL-018	Bridge Barriers					
CSL-019	Pre Construction Survey, Pre/Post Construction Summary of Surrounding Structures and Waterway (By Geotechnical Design Firm)					
CSL-020	Fence Details					
CSL-021	Welding Procedures					
CSL-022	Precast Concrete Elements (NEXT Beams, Abutments, Bridge					

	Sidewalks, Median Barriers, Parapets with Historic Appearance, Approach Slabs, etc.)					
CSL-023	Joint Fillers					
CSL-024	Waterproofing Membrane					
CSL-025	Non-shrink Grout					
CSL-026	Utility Supports					
CSL-027	Filter Fabric					
CSL-028	Steel Beam Guardrail Approach End Treatment					
CSL-029	Steel Beam Guardrail Transition to Rigid Barrier					
CSL-030	Micropiles					

Appendix C

Transportation Management Plan

LEVEL 3 TRANSPORTATION MANAGEMENT PLAN

Project Name:	**Bridge Group 17C - Newell and Sneech**
RI Design Contract No(s):	**2023-EB-028B**
RI Construction Contract No(s):	**2024-CB-045**
PTSID #	**2602D**

Submission: **ADV** Date: **8/5/2024**

PROJECT INFORMATION

Brief Project Description: Rhode Island Contract No. 2024-CB-045, Federal Aid Project No. BRO-017C(002) for Bridge Group 17C - Newell and Sneech in the town of Cumberland will consist of erosion control, replacement of Newell Bridge No. 204 using Accelerated Bridge Construction (ABC) methods, pavement reconstruction, micro milling and overlay, utility adjustments, pavement marking installation, field office, mobilization, and maintenance and protection of traffic.

General Work Limits: The work zone will generally encompass the entire roadway segment or intersection including roadway, sidewalks, and shoulder areas.

WORK ZONE LOCATIONS

ROADWAY NAME or INTERSECTION	FROM	TO	APPROX. LENGTH
Diamond Hill Road (Route 114)	Nate Whipple Highway (Route 120)	3540 Diamond Hill Road	500'
Sneech Pond Road	Nate Whipple Highway (West Intersection)	Nate Whipple Highway (East Intersection)	0.75 mi

General Project Schedule*: Work is expected to commence in Fall 2024 and be completed in Summer 2026.

*The information in this section is not intended to and shall not supersede the approved schedule and milestone/completion dates for the project.

TRAFFIC-RELATED WORK RESTRICTIONS

General Restrictions:	**See Attachment A: General Restrictions Chart, Attachment B: Volume Analysis, and Attachment C: Hourly Volumes.** **A Trip Generation & Traffic Impact Study report was previously completed to assess the potential impacts of a full closure of Diamond Hill Road (Route 114) for the reconstruction of Newell Bridge No. 204 (see Attachment D).**
Holiday Restrictions:	**NOTE: IN CASE OF DISCREPENCY BETWEEN THESE HOLIDAY RESTRICTIONS AND THE GENERAL RESTRICTIONS (ATTACHMENT A), THESE HOLIDAY RESTRICTIONS SHALL GOVERN.** **New Year's Day (if on weekend, the Holiday is recognized the Monday after) -- No lane closures on 13:00 New Year's Eve Day through 0:00 day after New Year's (or the Monday if on a weekend)** **Martin Luther King Day - No lane closures on the Holiday.** **Presidents Day - No lane closures on the Holiday.** **Easter Day - No lane closures on the Holiday.** **Memorial Day - No lane closures from 13:00 Friday Before to 00:00 Tuesday after the Holiday.** **Juneteenth National Freedom Day - No lane closures on the Holiday (if the Holiday falls on the weekend the holiday is recognized on the Monday following the Holiday.)** **Independence Day - No lane closures from 13:00 day before until 00:00 the day after the holiday.** **Victory Day - No lane closures on the Holiday.** **Labor Day - No lane closures from 13:00 day before until 00:00 the day after the holiday** **Columbus Day - No lane closures on the holiday.** **Veteran's Day - No lane closures on the holiday.** **Election Day (If its an Observed RI State Holiday) - No lane closures on the holiday.** **Thanksgiving Day - No lane closures shall be performed by the contractor on Wednesday through Sunday of Thanksgiving Week. Work can resume at 00:00 on Monday after the Holiday weekend.** **Christmas Day (if on weekend, the Holiday is recognized the Monday after) - No lane closures from 13:00 on Christmas Eve through 0:00 day after Christmas**

TEMPORARY TRAFFIC CONTROL PLANS

These RIDOT- and/or Designer-Developed TTC Plans will be used during the work on this project

RIDOT TYPICAL TTC PLANS	Included in: TMP	Plan Set
Mobile Operation		
Work Beyond the Shoulder		
Shoulder Closure - Two Lane Road		
Shoulder Closure - Limited Access		
1-Side Lane Shift - Two Lane Road		
2-Side Lane Shift - Two Lane Road		
Lane Shift - Limited Access		
Lane Closure - Two Lane Road		
Lane Closure - Four Lane Road		
Lane Closure - Limited Access		
Double Lane Closure - Limited Access		

DESIGNER-DEVELOPED TTC PLANS	Included in: TMP	Plan Set
Typical Work Beyond the Shoulder		X
Typical Shoulder Work with Minor Encroachment		X
Typical One-Lane Closure with Alternating Traffic		X
Detour Plan No. 1		X

PUBLIC INFORMATION PLAN

These strategies will be used to provide information concerning the project to road users and the community

SELECTED STRATEGIES	RESPONSIBILITIES / REQUIREMENTS / SPECIAL CONSIDERATIONS
RIDOT travel advisories news releases	RIDOT TMP Imp. Mngr. to send RIDOT notification form to Communications min. 48 hrs. in advance of restrictions.
RIDOT travel advisories web site	RIDOT TMP Imp. Mngr. to send RIDOT notification form to Communications min. 48 hrs. in advance of restrictions.
RIDOT 511 traveler information system	RIDOT TMP Imp. Mngr. to send RIDOT notification form to RIDOT TMC min. 48 hrs. in advance of restrictions.
Highway advisory radio (HAR)	Permanent (existing) RIDOT HAR systems to be updated by RIDOT TMC as applicable based on submitted CMG Restriction Forms.

TRANSPORTATION OPERATIONS PLAN

These strategies will be used to provide improved transportation operations/safety within project work zones

SELECTED STRATEGIES	RESPONSIBILITIES / REQUIREMENTS / SPECIAL CONSIDERATIONS

PERFORMANCE MONITORING, CHANGES TO TMP, & CONTINGENCIES

The Contractor's TMP Implementation Manager is responsible for keeping the portion of the project being used by public traffic in a condition that (1) safely and adequately accommodates such traffic and (2) is in accordance with the Traffic-Related Work Restrictions, the Temporary Traffic Control Plans, and where appropriate, the other transportation management strategies identified above.

The RIDOT TMP Implementation Manager or his/her responsible designee should (1) inspect the project work zones for conformance with the Temporary Traffic Control Plans, the ATSSA Quality Guidelines for Temporary Traffic Control Devices and Features, and where applicable, the other transportation management strategies identified above and (2) document all work zone-related feedback and complaints that are received from the public.

If at any time (1) a deviation from any of the strategies included in the TMP (e.g., the use of an alternate construction sequence) is desired by one or more members of the project implementation team, (2) field observations and/or data suggest that impacts to road users are or will be unacceptable, or (3) one or more performance requirements established in the TMP are not being met in the field, the RIDOT TMP Implementation Manager and/or Project Manager shall report the situation to his/her supervisor. The Project Manager will coordinate with the Design Consultant of record and present the changes to the State Traffic Safety Engineer, Director of the Division of Project Management, the Chief Engineer of Infrastructure, and/or other interested parties as appropriate and/or necessary to consider and determine whether revised alternate strategies should be implemented in an effort to lessen the adverse safety and mobility impacts of the project. If any changes should be implemented, the changes shall be documented in a revised version of the TMP. Any changes implemented can be removed at any time, at RIDOTs discretion, if unexpected adverse impacts to traffic occur.

If a deviation from any of the strategies included in the TMP is requested by the Contractor, the Contractor is responsible for preparing and submitting to the RIDOT TMP Implementation Manager appropriate documentation (e.g., design calculations, analysis reports, Temporary Traffic Control Plans, etc.) showing that the requested change(s) are (1) feasible and (2) expected to result in safety and mobility impacts that are no more adverse than the impacts resulting from the strategies already included in the latest approved TMP. RIDOT will review and consider the submittal(s) as described in the preceding paragraph and will determine whether the changes should be implemented. The Contractor shall prepare and submit to the RIDOT TMP Implementation Manager a revised version of the latest approved TMP in both printed and electronic (Microsoft® Excel) format that documents all of the proposed changes. Work to implement the changes shall not begin until the revised TMP is approved.

When unexpected events (e.g., crashes, inclement weather, unforeseen traffic demands, etc.) occur in a project work zone where one or more lanes are closed, the RIDOT TMP Implementation Manager or his/her responsible designee should (1) determine whether or not the lane closure(s) can/should be removed in order to improve traffic operations and/or minimize delays and (2) if deemed appropriate, take action to remove the lane closure(s).

Other Requirements:

TMP APPROVALS

All approvals must be obtained prior to start of work

DIRECTOR, DIVISION OF PROJECT MANAGEMENT	STATE TRAFFIC SAFETY ENGINEER	CHIEF ENGINEER OF INFRASTRUCTURE
Signature: [signature] Lori Fisette	Signature [signature] Steven Pristawa, P.E.	Signature: [signature] Robert Rocchio, P.E.
Date: 7/29/24	Date 7/29/24	Date: 7-31/24

Revision #	Initials	Date	Revision #	Initials	Date	Revision #	Initials	Date

TMP IMPLEMENTATION MANAGERS

RIDOT Construction Manager	
Name:	
Title:	
Unit:	
Office Phone:	
Mobile Phone:	
E-Mail:	

CONTRACTOR	
Name:	
Title:	
Company/Unit:	
Office Phone:	
Mobile Phone:	
E-Mail:	

Location	Time of Day		MINIMUM NUMBER OF LANES & SHOULDERS TO REMAIN OPEN TO TRAFFIC[1,2,3,4]						
			Day of Week						
	From	To	SUN	MON	TUES	WED	THURS	FRI	SAT
Diamond Hill Road (Route 114) Sneech Pond Road[5]	0:00	6:00	ALL	1L - ALT	1L - ALT	1L - ALT	1L - ALT	1L - ALT	ALL
	6:00	9:00	ALL	ALL	ALL	ALL	ALL	ALL	ALL
	9:00	15:00	ALL	1L - ALT	1L - ALT	1L - ALT	1L - ALT	1L - ALT	ALL
	15:00	20:00	ALL	ALL	ALL	ALL	ALL	ALL	ALL
	20:00	0:00	1L - ALT	1L - ALT	1L - ALT	1L - ALT	1L - ALT	ALL	ALL
Diamond Hill Road (Route 114) (Super Weekend Bridge Construction)[6]	0:00	5:00	DETOUR	DETOUR	ALL	ALL	ALL	ALL	DETOUR
	5:00	22:00	DETOUR	ALL	ALL	ALL	ALL	ALL	DETOUR
	22:00	0:00	DETOUR	ALL	ALL	ALL	ALL	DETOUR	DETOUR

LEGEND:

1L - ALT	A minimum of one 11-foot wide travel lane shall remain open to alternating traffic
DETOUR	All traffic to be detoured
ALL	All travel lanes and shoulders shall remain open to traffic

NOTES

1 The set-up and break-down of temporary traffic control devices within a traveled way or shoulder shall be construed as a closure of that traveled way or shoulder.
2 The provisions noted herein shall not free the Contractor from his responsibility to conduct all work in such a manner that assures the least possible obstruction to traffic.
3 At locations with a sidewalk(s), a minimum of one sidewalk on one side of the roadway shall remain open to pedestrians at all times.
4 Access to and egress from all side streets, driveways, buildings, and other pedestrian pathways intersecting the Project work zones shall be maintained at all times unless otherwise noted or shown on Plans.
5 Based on discussion with the RIDOT Office of Safety, it was determined that traffic volumes on Sneech Pond Road are minimal and will result in no impacts to traffic during construction.
6 A maximum of (2) 55 Hour Super Weekend closures of Diamond Hill Road shall be allowed from Friday night to Monday morning unless otherwise directed by RIDOT.

WEEKDAY DELAY AND QUEUE ANALYSIS FOR THE CLOSURE OF 2 LANES TO 1 LANE ALT (DIAMOND HILL ROAD) NORTHBOUND & SOUTHBOUND

Hour Beginning "t"	Wednesday August 3, 2022 (Vt) vph	Capacity (Ct) vph	Queue at End of Hour (Qt)	Delay of Last Vehicle Entering (Dt) min.	Avg. Delay Per Vehicle (ADt) min.
0000	40	900	0	0.00	0.00
0100	23	900	0	0.00	0.00
0200	11	900	0	0.00	0.00
0300	19	900	0	0.00	0.00
0400	25	900	0	0.00	0.00
0500	110	900	0	0.00	0.00
0600	268	1800	0	0.00	0.00
0700	513	1800	0	0.00	0.00
0800	546	1800	0	0.00	0.00
0900	416	900	0	0.00	0.00
1000	371	900	0	0.00	0.00
1100	361	900	0	0.00	0.00
1200	414	900	0	0.00	0.00
1300	448	900	0	0.00	0.00
1400	472	900	0	0.00	0.00
1500	649	1800	0	0.00	0.00
1600	784	1800	0	0.00	0.00
1700	837	1800	0	0.00	0.00
1800	638	1800	0	0.00	0.00
1900	444	1800	0	0.00	0.00
2000	302	900	0	0.00	0.00
2100	232	900	0	0.00	0.00
2200	134	900	0	0.00	0.00
2300	92	900	0	0.00	0.00
	8,149				

Rhode Island Dept. of Transportation

080050_NB Weekly Volume Report - Mon 08/01/2022 - Sun 08/07/2022

Location ID:	080050_NB	**Type:**	SPOT
Located On:	RI-114	**:**	
Direction	NB		
Community:	Cumberland	**Period:**	Mon 08/01/2022 - Sun 08/07/2022
AADT:	3404		

Start Time	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Avg
12:00 AM	13	8	10	11	15	20	15	13
1:00 AM	3	2	5	3	7	9	13	6
2:00 AM	0	4	3	5	7	7	6	5
3:00 AM	2	2	8	3	6	4	3	4
4:00 AM	10	9	15	13	7	5	5	9
5:00 AM	99	51	61	56	37	13	5	46
6:00 AM	251	198	145	161	135	38	8	134
7:00 AM	290	237	252	202	187	54	23	178
8:00 AM	228	203	241	193	130	71	46	159
9:00 AM	132	120	148	97	119	116	63	114
10:00 AM	108	93	104	96	103	118	70	99
11:00 AM	118	99	99	109	88	134	144	113
12:00 PM	121	107	125	103	127	160	129	125
1:00 PM	118	114	120	105	120	136	125	120
2:00 PM	132	156	129	138	168	137	136	142
3:00 PM	119	123	131	140	173	143	126	136
4:00 PM	164	145	130	132	152	176	152	150
5:00 PM	158	171	179	163	300	175	173	188
6:00 PM	154	118	179	132	365	234	188	196
7:00 PM	96	120	112	112	214	295	229	168
8:00 PM	77	109	88	80	186	209	137	127
9:00 PM	68	64	82	49	116	136	118	90
10:00 PM	42	29	42	21	110	78	83	58
11:00 PM	28	17	23	21	51	55	34	33
Total	**2531**	**2299**	**2431**	**2145**	**2923**	**2523**	**2031**	
24HrTotal	2531	2299	2431	2145	2923	2523		2412
AM Pk Hr	7:00	7:00	7:00	7:00	7:00	11:00	11:00	
AM Peak	290	237	252	202	187	134	144	207
PM Pk Hr	4:00	5:00	5:00	5:00	6:00	7:00	7:00	
PM Peak	164	171	179	163	365	295	229	224
% Peak Hr	11.46%	10.31%	10.37%	9.42%	12.49%	11.69%	11.28%	10.71%
% Peak Hr	11.46%	10.31%	10.37%	9.42%	12.49%	11.69%		11.00%

Rhode Island Dept. of Transportation

080050_SB Weekly Volume Report - Mon 08/01/2022 - Sun 08/07/2022

Location ID:	080050_SB	**Type:**	SPOT
Located On:	RI-114	**:**	
Direction	SB		
Community:	Cumberland	**Period:**	Mon 08/01/2022 - Sun 08/07/2022
AADT:	5141		

Start Time	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Avg
12:00 AM	29	29	30	34	33	46	80	40
1:00 AM	13	15	18	18	18	31	28	20
2:00 AM	2	13	8	14	13	16	12	11
3:00 AM	7	7	11	6	3	8	15	8
4:00 AM	19	22	10	19	11	8	3	13
5:00 AM	36	44	49	55	54	19	16	39
6:00 AM	128	118	123	126	107	48	39	98
7:00 AM	228	269	261	242	220	113	79	202
8:00 AM	270	283	305	301	242	177	121	243
9:00 AM	239	228	268	255	228	240	172	233
10:00 AM	227	233	267	263	275	320	226	259
11:00 AM	247	250	262	258	305	355	295	282
12:00 PM	253	267	289	301	333	432	317	313
1:00 PM	266	344	328	299	369	382	326	331
2:00 PM	319	377	343	398	455	399	342	376
3:00 PM	464	598	518	544	594	394	346	494
4:00 PM	566	628	654	700	669	379	317	559
5:00 PM	617	700	658	648	652	401	398	582
6:00 PM	375	424	459	431	554	368	391	429
7:00 PM	251	311	332	290	360	511	370	346
8:00 PM	184	265	214	227	327	443	348	287
9:00 PM	128	136	150	186	294	418	318	233
10:00 PM	72	91	92	109	333	484	344	218
11:00 PM	57	64	69	72	267	333	76	134
Total	**4997**	**5716**	**5718**	**5796**	**6716**	**6325**	**4979**	
24HrTotal	4997	5716	5718	5796	6716	6325		5750
AM Pk Hr	8:00	8:00	8:00	8:00	11:00	11:00	11:00	
AM Peak	270	283	305	301	305	355	295	302
PM Pk Hr	5:00	5:00	5:00	4:00	4:00	7:00	5:00	
PM Peak	617	700	658	700	669	511	398	608
% Peak Hr	12.35%	12.25%	11.51%	12.08%	9.96%	8.08%	7.99%	10.57%
% Peak Hr	12.35%	12.25%	11.51%	12.08%	9.96%	8.08%		10.60%

TRIP GENERATION & TRAFFIC IMPACT STUDY
RIDOT – NEWELL BRIDGE NO 204 REPLACEMENT
CUMBERLAND, RI

Prepared by: Crossman Engineering
Engineers & Surveyors
151 Centerville Road
Warwick, RI 02886

MARCH 2020
REVISED MARCH 2023

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Traffic Counts
Capacity Analyses

INTRODUCTION

A Traffic Impact Study was performed to assess the potential traffic impacts of a full closure of the Newell Bridge No 204 while it is being reconstructed. The bridge is located on Diamond Hill Road (Route 114) just north of the signal at Diamond Hill Road / Nate Whipple Highway (Route 120). The local intersections to be analyzed as part of this study are located along possible proposed detour routes during construction and include the five locations listed below in Existing Conditions.

This traffic study examines existing conditions, describes three proposed traffic alternatives for bridge reconstruction, capacity analysis of existing conditions and proposed conditions for each traffic alternative and our subsequent conclusions/recommendations for the most feasible option. The existing conditions consist of geometric data gathered from field investigations and existing traffic volume data collected during peak hours. Our conclusions and recommendations are prepared following a comprehensive review of the capacity analysis.

EXISTING CONDITIONS

As stated, Newell Bridge No 204 is located on Diamond Hill Road (Route 114) just north of the signal at Diamond Hill Road / Nate Whipple Highway (Route 120). The local intersections to be analyzed as part of this study are located along possible proposed detour routes during construction and include the following:

- Diamond Hill Road at Nate Whipple Highway (signalized)
- Nate Whipple Highway at Mendon Road (signalized)
- Mendon Road at West Wrentham Road (signalized)
- West Wrentham Road at Pine Swamp Road (signalized)
- Pine Swamp Road at Diamond Hill Road / Wrentham Road (unsignalized)

The study area is shown on Figure 1.

A. Roadways

<u>Diamond Hill Road (Route 114)</u>

Diamond Hill Road generally runs north – south from Pine Swamp Road (Route 114) / Wrentham Road (Route 121) to High Street (Route 114). In the vicinity of the study area, the road consists of one lane in each direction. From the 2019 Rhode Island Highway Functional Classification map dated March 11, 2019, Diamond Hill Road is classified as an urban principal arterial. It is a major connection to Route I-295 south of the study area. The road has a posted speed of 30 mph in both directions north of Nate Whipple Highway. The speed is posted 35 mph on the northbound approach to Nate Whipple Highway. In the vicinity of the study area there are no existing

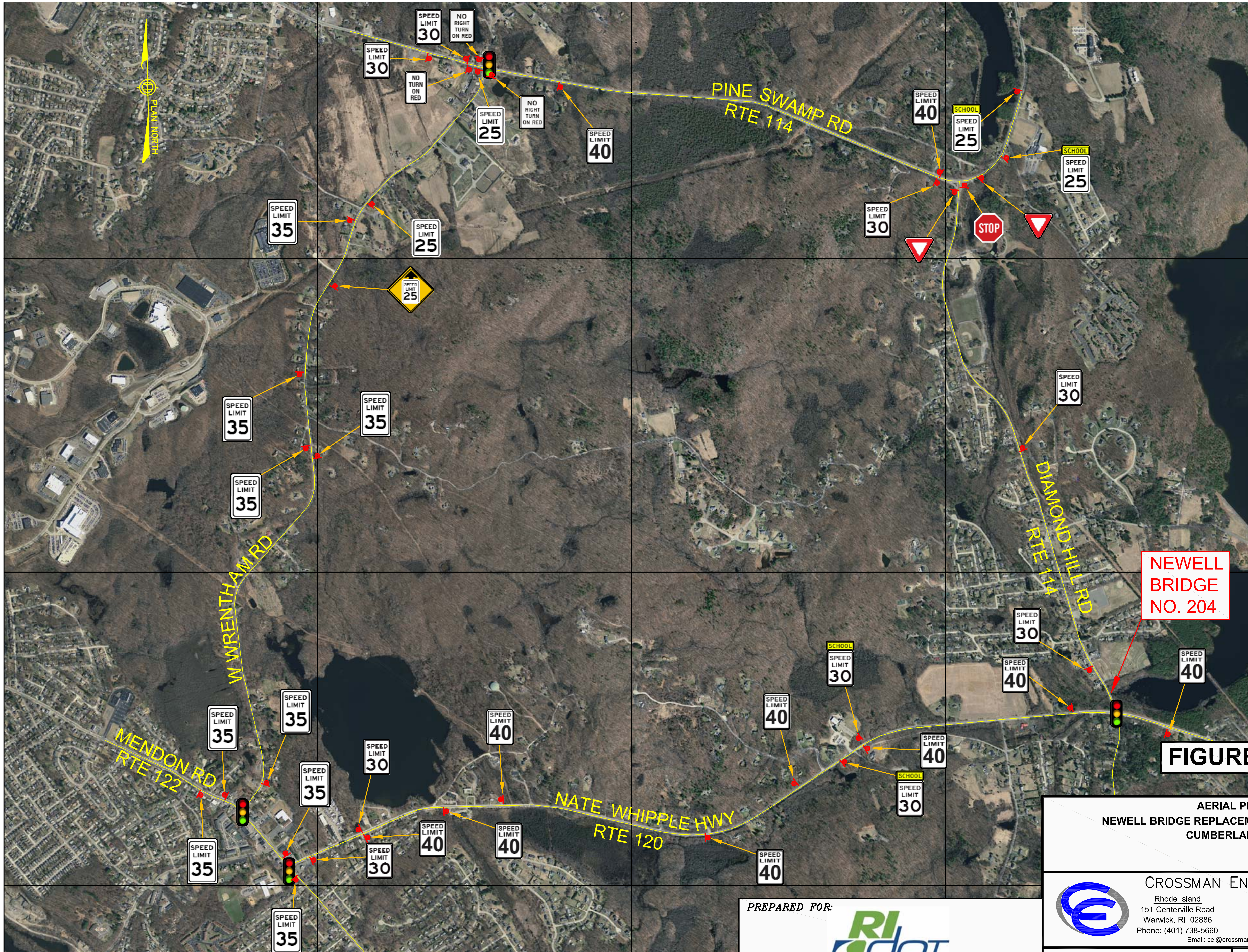

FIGURE 1

AERIAL PLAN
NEWELL BRIDGE REPLACEMENT TRAFFIC STUDY
CUMBERLAND, RI

PREPARED FOR:
RIDOT

CROSSMAN ENGINEERING

Rhode Island
151 Centerville Road
Warwick, RI 02886
Phone: (401) 738-5660

Massachusetts
103 Commonwealth Avenue
North Attleboro, MA 02763
Phone: (508) 695-1700

Email: cei@crossmaneng.com

Date: MARCH 2020

NOT TO SCALE

sidewalks on Diamond Hill Road except at 55' along the approaches to the Nate Whipple Highway signal.

Nate Whipple Highway (Route 120)

Nate Whipple Highway generally runs east-west from Hickory Road (Route 120) at the North Attleboro, MA town line to Mendon Road (Route 122) in Cumberland. In the vicinity of the study area, the road consists of one lane in each direction. From the 2019 Rhode Island Highway Functional Classification map dated March 11, 2019, Nate Whipple Highway is classified as an urban minor arterial. In the study area, the road has a posted speed of 40 mph in both directions east of Sprague Street and 30 mph west of Sprague Street. There are existing sidewalks on both sides of the street west of Meehan Lane, east of Diamond Hill Road and for 540' along the eastbound approach to Diamond Hill Road.

Mendon Road (Route 122)

Mendon Road generally runs northwest-southeast from Paine Street at the Bellingham, MA / Woonsocket town line to Lonsdale Avenue (Route 122) at the Cumberland / Lincoln town line. In the vicinity of the study area, the road generally consists of one lane in each direction. Between Manville Hill Road and Nate Whipple Highway the road widens to allow for an added left-turn only lane in both directions. Between Manville Hill Road and West Wrentham Road, Mendon Road consists of one lane in each direction separated by a single two-way left-turn lane (TWLTL). From the 2019 Rhode Island Highway Functional Classification map dated March 11, 2019, Mendon Road is classified as an urban principal arterial. It is a major connection to Route I-295 south of the study area. In the study area, the road has a posted speed of 35 mph. There are existing sidewalks on both sides of the road.

West Wrentham Road

West Wrentham Road generally runs north-south from Spring Street at the Wrentham, MA town line to Mendon Road (Route 122). In the vicinity of the study area, the road consists of one lane in each direction. From the 2019 Rhode Island Highway Functional Classification map dated March 11, 2019, West Wrentham Road is classified as an urban minor arterial. In the study area, the road has a posted speed of 35 mph and a posted speed of 25 mph at the approach to Pine Swamp Road. There are existing sidewalks on both sides of the road only at the 900' approach to Mendon Road.

Pine Swamp Road (Route 114)

Pine Swamp Road runs east – west from the intersection of Wrentham Road / Diamond Hill Road (Route 114) in Cumberland to Bound Road / Diamond Hill Road (Route 114) on the Woonsocket city line. The road generally consists of one lane in each direction. There are existing sidewalks on both sides of Pine Swamp Road west of West Wrentham Road and for 85' on the east side of West Wrentham Road. From the 2019 Rhode Island Highway Functional Classification map dated March 11, 2019, Pine Swamp Road is classified as an urban principal arterial. In the study area, Pine Swamp Road has the following posted speed limits:

- 30 mph eastbound from just east of Northland Farm and Garden Center to approximately 1,400' east of the West Wrentham Road intersection
- 40 mph eastbound from approximately 1,400' east of the West Wrentham Road intersection to just east of Little Street
- 30 mph eastbound just east of Little Street
- 40 mph westbound from Diamond Hill Road to 76 Pine Swamp Road (just west of West Wrentham Road signal)

Wrentham Road (Route 121)

Wrentham Road generally runs north – south from Cumberland Road (Route 121) on the Wrentham, MA town line to Pine Swamp Road (Route 114) / Diamond Hill Road (Route 114) in Cumberland. In the vicinity of the study area, the road generally consists of one lane in each direction. From the 2019 Rhode Island Highway Functional Classification map dated March 11, 2019, Wrentham Road is classified as an urban minor arterial. The road has a posted speed of 30 mph. In the vicinity of the study area there are no existing sidewalks on Diamond Hill road except at 55' along the approaches to the Nate Whipple Highway signal.

B. Intersections

Diamond Hill Road (Route 114) / Nate Whipple Highway (Route 120)

Diamond Hill Road at Nate Whipple Highway is a four-legged signalized intersection. There is a signalized pedestrian crosswalk across each approach. Each approach consists of a single traffic lane and shoulder in each direction. Land use around the intersection is mostly residential. The signal operates in two phases:

- Nate Whipple Highway eastbound and westbound
- Diamond Hill Road northbound and southbound

Diamond Hill Road north of the intersection measures approximately 29' and consists of a 12' travel lane with 4' shoulder northbound and an 11.5' travel lane with 1.5' shoulder southbound. The southern parapet to the Newell Bridge on Diamond Hill Road is located approximately 245' north of the southbound stop line. The Newell Bridge structure measures 26.5' in length from parapet to parapet and 26' wide between edge of pavement. Diamond Hill Road south of the intersection measures approximately 30.5’ and consists of an 11’ travel lane with 3’ shoulder northbound and an 11.5’ travel lane with 5’ shoulder southbound.

Nate Whipple Highway east of the intersection measures approximately 35.5’ and consists of a 12’ travel lane with 7’ shoulder eastbound and a 12.5’ travel lane with 4’ shoulder westbound. Nate Whipple Highway west of the intersection measures approximately 36’ and consists of a 12.5’ travel lane with 5’ shoulder eastbound and a 13’ travel lane with 5.5’ shoulder westbound.


Diamond Hill Rd NB facing Newell Bridge ahead


Nate Whipple Hwy EB at Diamond Hill Rd signal

<u>Nate Whipple Highway (Route 120) / Mendon Road (Route 122)</u>

Nate Whipple Highway at Mendon Road is a three-legged signalized intersection. There is a signalized pedestrian crosswalk across the westbound and southeast bound approaches as well as across the channelized right turn lane northwest bound. Land use around the intersection is a mix of commercial and residential. The signal operates in three phases:

- Mendon Road northwest bound and southeast bound
- Mendon Road southeast bound
- Nate Whipple Highway westbound

The westbound Nate Whipple Highway approach measures approximately 36.5’ and consists of a 12.5’ travel lane with 5’ shoulder eastbound and a 13’ travel lane with 6’ shoulder southbound. Mendon Road northwest of the intersection measures approximately 51’ and consists of a 10.5’ left turn lane, 13.5’ thru lane with 1.5’ shoulder northwest bound, and in the southeast direction an 11’ left turn lane, a 13’ thru lane with 1.5’ shoulder. Mendon Road southeast of the intersection measures 43.5’ wide. The northwest approach to the intersection consists of a 15.5’ travel lane (that splits to a thru lane and right turn channelized lane) with 2.5’ shoulder; the southeast direction consists of a 12.5’ departure lane with 3’ shoulder. Southeast of the intersection, the lanes are separated by a 10’ wide painted median island.

Nate Whipple Hwy WB facing Mendon Rd

Mendon Rd SE bound toward Nate Whipple Hwy

Mendon Road (Route 122) / West Wrentham Road

Mendon Road at West Wrentham Road is a four-legged signalized intersection including the small shopping plaza driveway on the northbound approach. There is a signalized pedestrian crosswalk across the southbound and northwest bound approaches. Land use around the intersection is a mix of commercial and residential. The signal operates in two phases:

- Mendon Road northwest bound and southeast bound
- West Wrentham Road southbound and plaza driveway northbound

The southeast side of Mendon Road measures approximately 44.5’ and consists of an 11’ two-way left turn lane (TWLTL), 14’ thru/right lane travel with 2.5’ shoulder northwest bound, and a 14.5’ travel lane with 2.5’ shoulder southeast bound. The northwest side of Mendon Road measures approximately 43.5’ and consists of a 13.5’ travel lane with 2.5’ shoulder northwest bound, an 11’ painted median; southeast bound a 13.5’ travel lane with 3’ shoulder.

West Wrentham Road measures 34’ and consists of a 12.5’ travel lane in each direction, a 4’ northbound shoulder and a 5’ southbound shoulder.

The signalized plaza exit driveway to the south measures 19’ wide and the separate entrance driveway measures 19’ wide.


Mendon Rd NW bound at West Wrentham Rd


West Wrentham Rd SB at Mendon Rd

West Wrentham Road / Pine Swamp Road (Route 114)

West Wrentham Road at Pine Swamp Road is a four-legged signalized intersection. Except for the eastbound approach, there is a signalized pedestrian crosswalk across each approach. Each approach consists of a single traffic lane in each direction. Land use around the intersection is mostly residential with some commercial. The signal operates in two phases:

- Pine Swamp Road eastbound and westbound
- West Wrentham Road northbound and southbound

West Wrentham Road north of the intersection measures only 21’ and consists of a 10.5’ travel lane in each direction. South of the intersection West Wrentham Road measures approximately 37’ consisting of a 13’ travel lane with 5’ shoulder northbound and 14.5’ travel lane with 4.5’ shoulder southbound. Both the northbound and southbound West Wrentham Road approaches to the intersection are posted, “NO RIGHT TURN ON RED”.

Pine Swamp Road east of the intersection measures 40.5’ consisting of a 12.5’ travel lane in each direction, a 7.5’ shoulder westbound and 8’ shoulder eastbound. West of the intersection Pine Swamp Road measures 41’ consisting of a 12.5’ travel lane in each direction, a 7.5’ shoulder westbound and 8.5’ shoulder eastbound. The Pine Swamp Road eastbound approach to the intersection is posted, “NO TURN ON RED”.

West Wrentham Rd NB at Pine Swamp Rd

Pine Swamp Rd EB at West Wrentham Rd

Pine Swamp Road (Route 114) / Wrentham Road (Route 121) / Diamond Hill Road (Route 114)

Pine Swamp Road / Wrentham Road / Diamond Hill Road is a three-legged unsignalized intersection. The Pine Swamp Road eastbound approach is uncontrolled for the thru movement to Wrentham Road and yield controlled at the right turn channelized lane to Diamond Hill Road to the south. There is no control at the Wrentham Road westbound approach. The Diamond Hill Road northbound approach is stop controlled at the T-intersection for left turns and yield controlled at the channelized right turn lane merging onto Wrentham Road.

At the intersection Pine Swamp Road widens from one lane in each direction. Pine Swamp Road adds a channelized right turn lane eastbound beginning approximately 420' in advance of the intersection. Pine Swamp Road on the west side of the intersection consists of a 12' right turn channelized lane and 12' thru travel lane eastbound, painted median, 12' westbound lane and varying shoulders in both directions.

At the intersection Wrentham Road widens from one lane in each direction. Wrentham Road adds a left turn lane westbound beginning approximately 270' in advance of the intersection. Wrentham Road on the east side of the intersection consists of a 12.5' left turn lane, 12.5' thru travel lane eastbound, and a westbound thru lane and merging departure lane measuring a total of 24' westbound with varying shoulders in both directions.

South of the intersection Diamond Hill Road measures approximately 31' consisting of a 12' travel lane in each direction and a 3' shoulder northbound and 4' shoulder southbound. Closer to the intersection Diamond Hill Road widens and splits to a 15' channelized right turn lane and a 15' approach lane and 15' departure lane at the T-intersection.

Pine Swamp Rd EB at Diamond Hill Rd/Wrentham Rd   Diamond Hill Rd NB at Pine Swamp Hill Rd /Wrentham Rd

C. Existing Traffic Volumes

Manual turning movement traffic counts were conducted on Thursday March 5, 2020 between 7-9 AM and 4-6 PM and Saturday March 7, 2020 10 AM – 2 PM at the five study intersections. For the study area, the weekday morning peak hour was determined to be 7:30-8:30 AM, the weekday afternoon peak hour was determined to be 4:45-5:45 PM and the Saturday peak hour was determined to be 10:45 – 11:45 AM. The peak hour volumes counts can be found in the Appendix and the peak hour volumes are shown in Figures 2 - 4.

BRIDGE CONSTRUCTION TRAFFIC ALTERNATIVES

A. Full Bridge Closure with Detour

The first alternative CE analyzed during weekday AM, weekday PM and Saturday peak hours is full closure of the Newell Bridge on Diamond Hill Road during replacement of the bridge. This construction alternative will require re-routing peak existing northbound traffic from Diamond Hill Road to Nate Whipple Highway westbound, to Mendon Road northwest bound, to West Wrentham Road northbound to Pine Swamp Road eastbound. Likewise, it will require re-routing peak existing southbound traffic from Diamond Hill Road to Pine Swamp Road westbound, to West Wrentham Road southbound, to Mendon Road southeast bound, to Nate Whipple Highway eastbound. The change in existing traffic due to full bridge closure (detour on Diamond Hill Road in both directions) is shown in Figures 5-7. The resulting traffic is shown in Figures 8-10.

B. Two Weekend (55-Hour) Full Bridge Closures

Two weekend (55-Hour) full bridge closures will be performed so that the bridge can be constructed over the course of two separate weekends. The change in existing traffic due to full bridge closure (detour on Diamond Hill Road in both directions) is shown in Figure 7. The resulting traffic is shown in Figure 10.

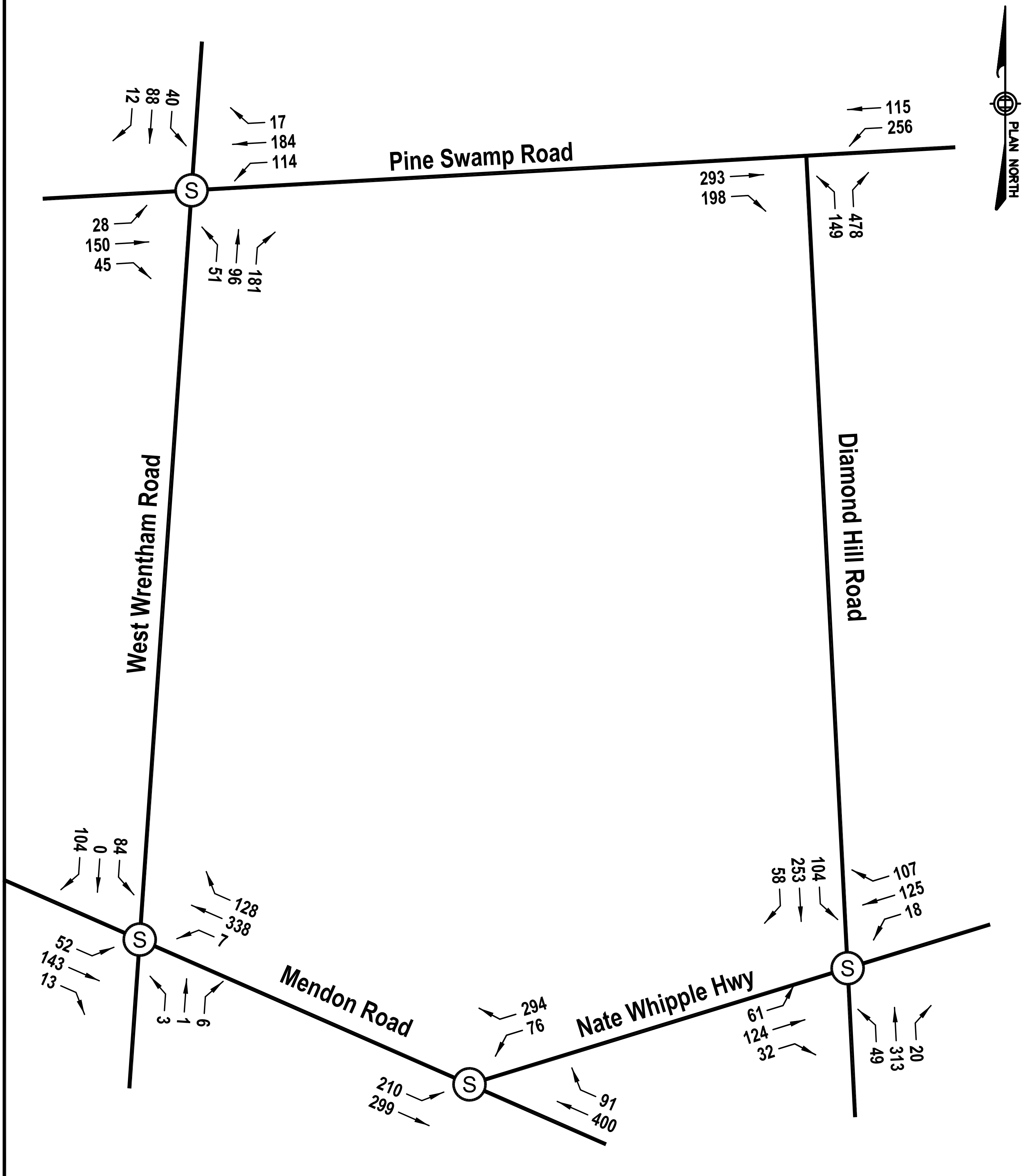

Figure 2

- Civil
- Transportation
- Environmental
- Site Planning
- Surveying
- Permitting
- Landscape Architecture

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Warwick, RI 02886
Phone: (401) 738-5660

Massachusetts
103 Commonwealth Avenue
North Attleboro, MA 02763
Phone: (508) 695-1700

Email: cel@crossmaneng.com

NEWELL BRIDGE REPLACEMENT
TRAFFIC STUDY
CUMBERLAND, RHODE ISLAND
EXISTING AM PEAK HOUR
TRAFFIC VOLUMES
7:30 - 8:30 AM

DATE: MARCH 2020

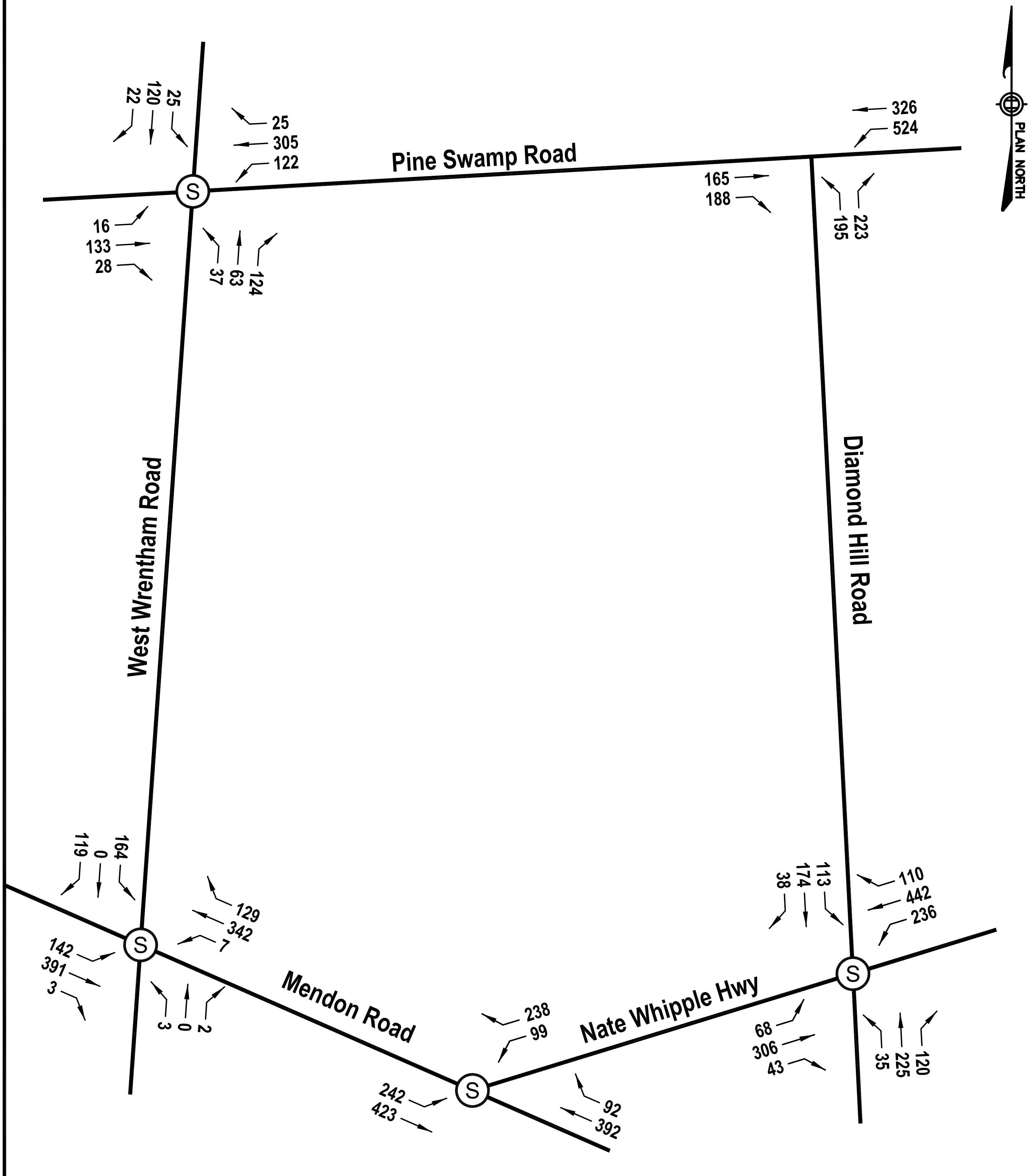

Figure 3

• Civil
• Transportation
• Environmental
• Site Planning
• Surveying
• Permitting
• Landscape Architecture

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Massachusetts
103 Commonwealth Avenue
North Attleboro, MA 02763
Phone: (508) 695-1700

Email: cel@crossmaneng.com

NEWELL BRIDGE REPLACEMENT
TRAFFIC STUDY
CUMBERLAND, RHODE ISLAND
EXISTING PM PEAK HOUR
TRAFFIC VOLUMES
4:45 - 5:45 PM

DATE: MARCH 2020

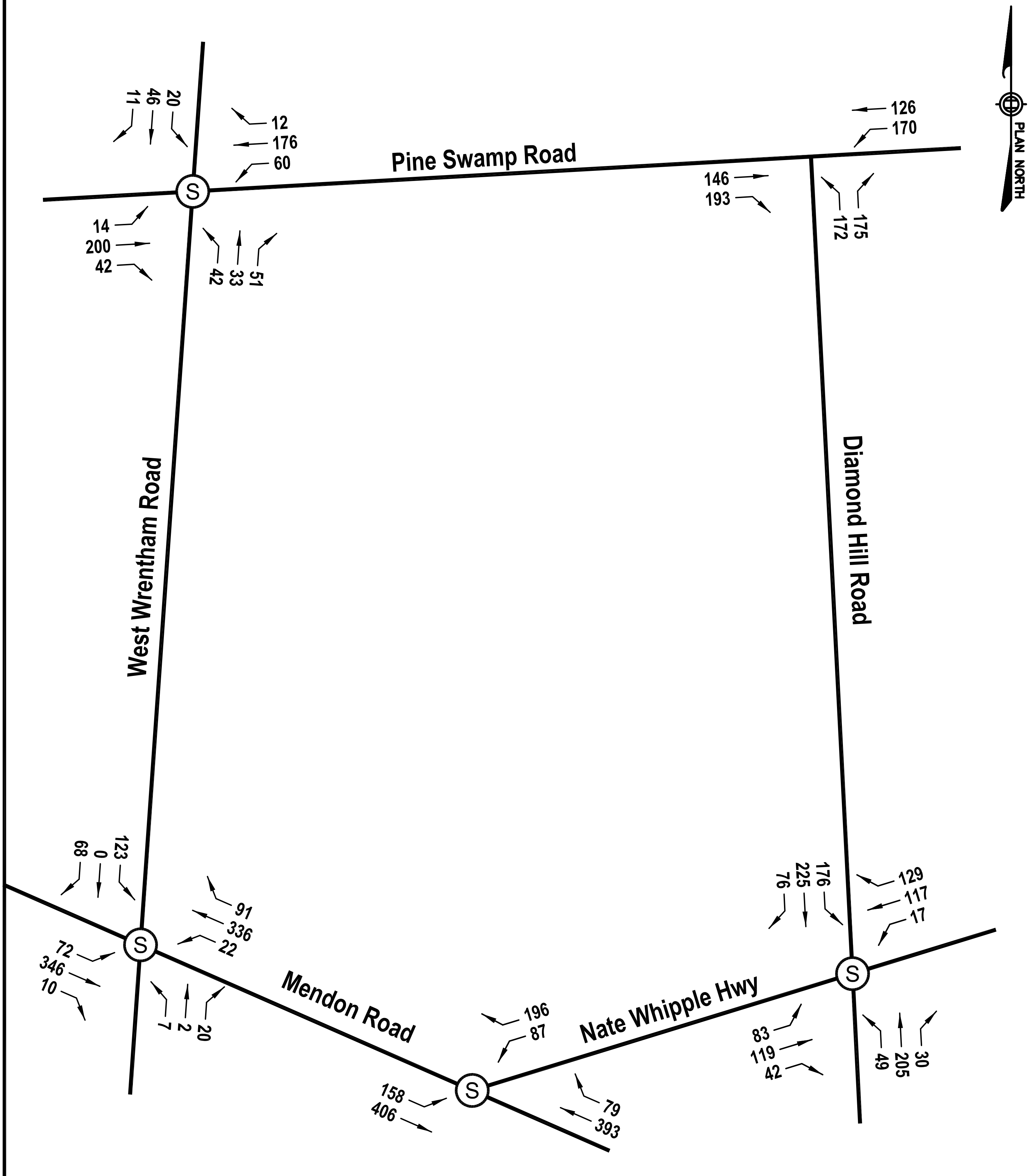

Figure 4

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- Landscape Architecture

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Warwick, RI 02886
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Massachusetts
103 Commonwealth Avenue
North Attleboro, MA 02763
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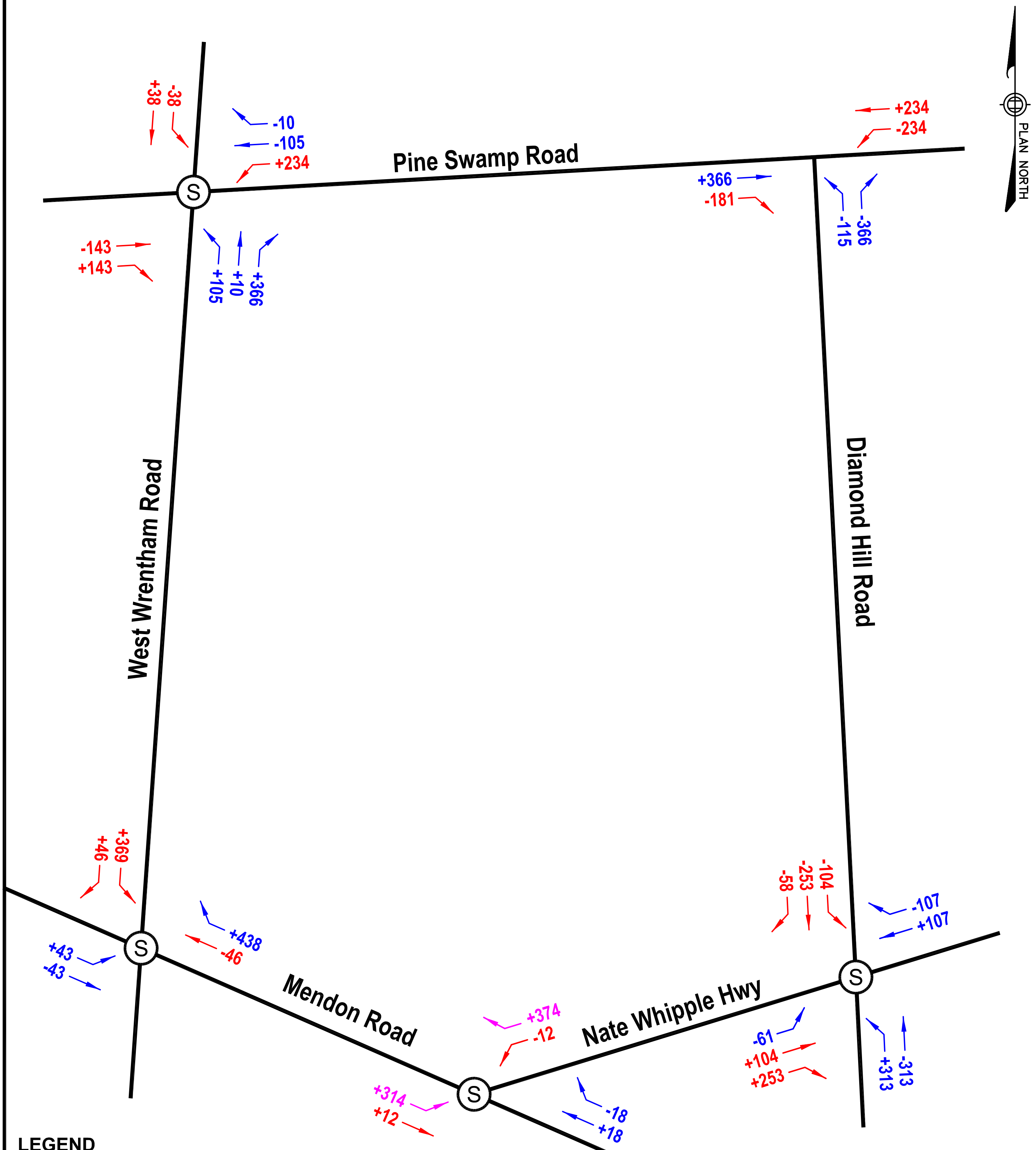
Email: cel@crossmaneng.com

NEWELL BRIDGE REPLACEMENT
TRAFFIC STUDY
CUMBERLAND, RHODE ISLAND
EXISTING SATURDAY AM PEAK
HOUR TRAFFIC VOLUMES
10:45 - 11:45 AM

DATE: MARCH 2020



LEGEND

= SB DETOUR TRAFFIC
= NB DETOUR TRAFFIC
= SB + NB COMBINED DETOUR TRAFFIC

Figure 5

- Civil
- Transportation
- Environmental
- Site Planning
- Surveying
- Permitting
- Landscape Architecture

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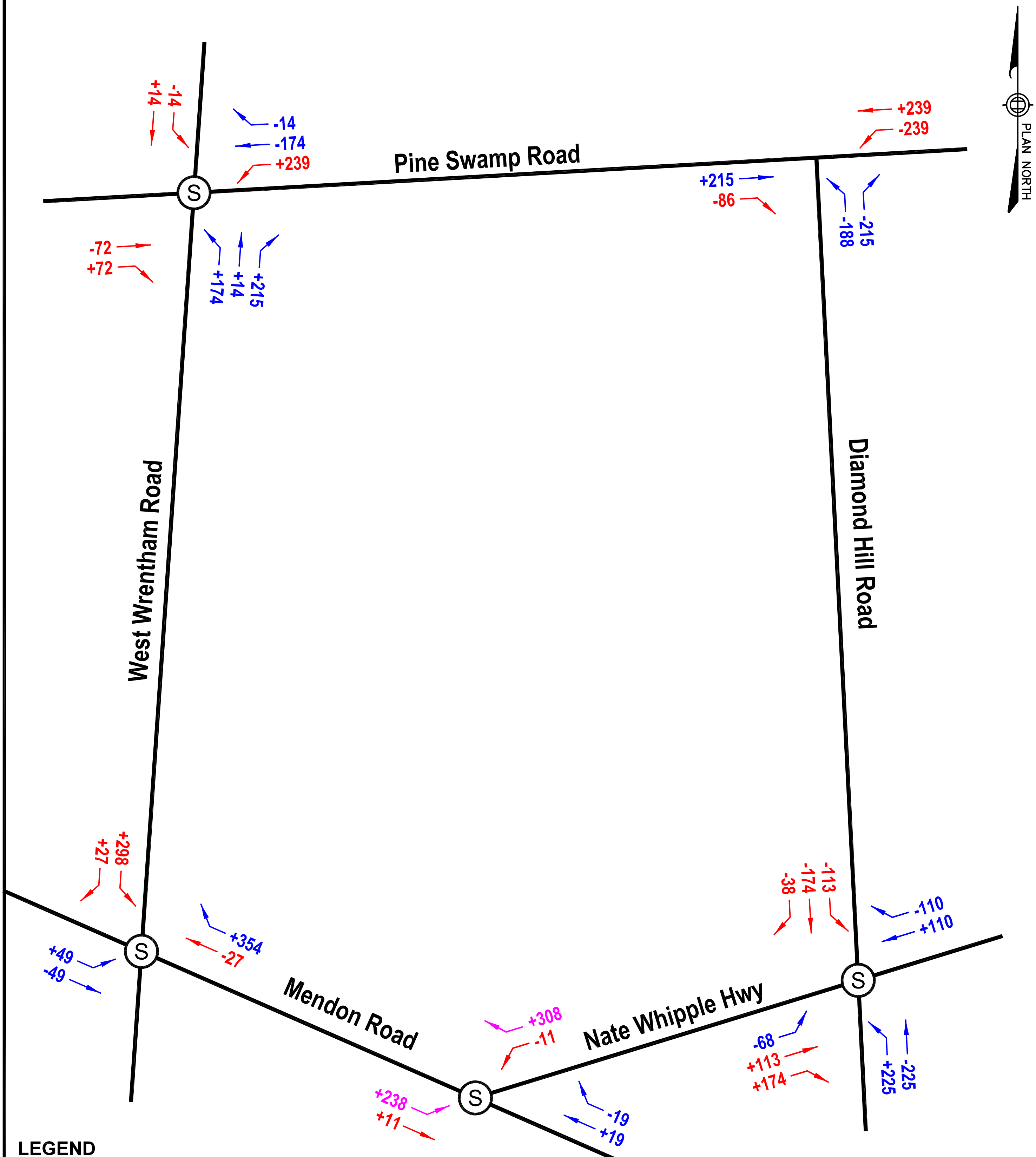
Massachusetts
103 Commonwealth Avenue
North Attleboro, MA 02763
Phone: (508) 695-1700

Email: cel@crossmaneng.com

NEWELL BRIDGE REPLACEMENT
TRAFFIC STUDY
CUMBERLAND, RHODE ISLAND
AM PEAK DETOUR TRAFFIC
FULL BRIDGE CLOSURE

DATE: MARCH 2020



LEGEND
= SB DETOUR TRAFFIC
= NB DETOUR TRAFFIC
= SB + NB COMBINED DETOUR TRAFFIC

Figure 6

• Civil
• Transportation
• Environmental
• Site Planning
• Surveying
• Permitting
• Landscape Architecture

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Warwick, RI 02886
Phone: (401) 738-5660

Massachusetts
103 Commonwealth Avenue
North Attleboro, MA 02763
Phone: (508) 695-1700

Email: cel@crossmaneng.com

NEWELL BRIDGE REPLACEMENT
TRAFFIC STUDY
CUMBERLAND, RHODE ISLAND
PM PEAK DETOUR TRAFFIC
FULL BRIDGE CLOSURE

DATE: MARCH 2020

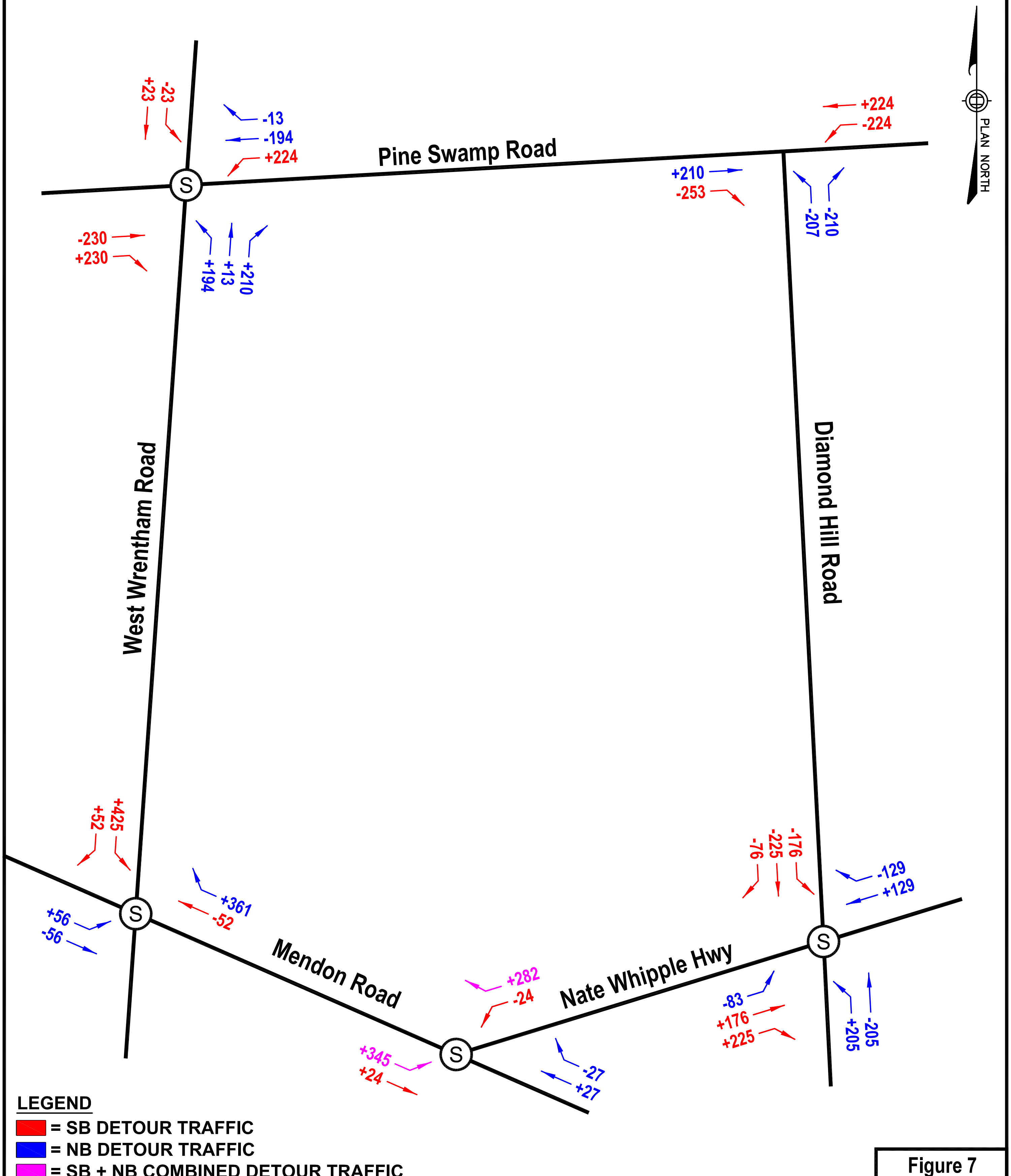

Figure 7

• Civil
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• Environmental
• Site Planning
• Surveying
• Permitting
• Landscape Architecture

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Warwick, RI 02886
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Massachusetts
103 Commonwealth Avenue
North Attleboro, MA 02763
Phone: (508) 695-1700

Email: cel@crossmaneng.com

NEWELL BRIDGE REPLACEMENT
TRAFFIC STUDY
CUMBERLAND, RHODE ISLAND
SATURDAY PEAK DETOUR TRAFFIC
FULL BRIDGE CLOSURE

DATE: MARCH 2020

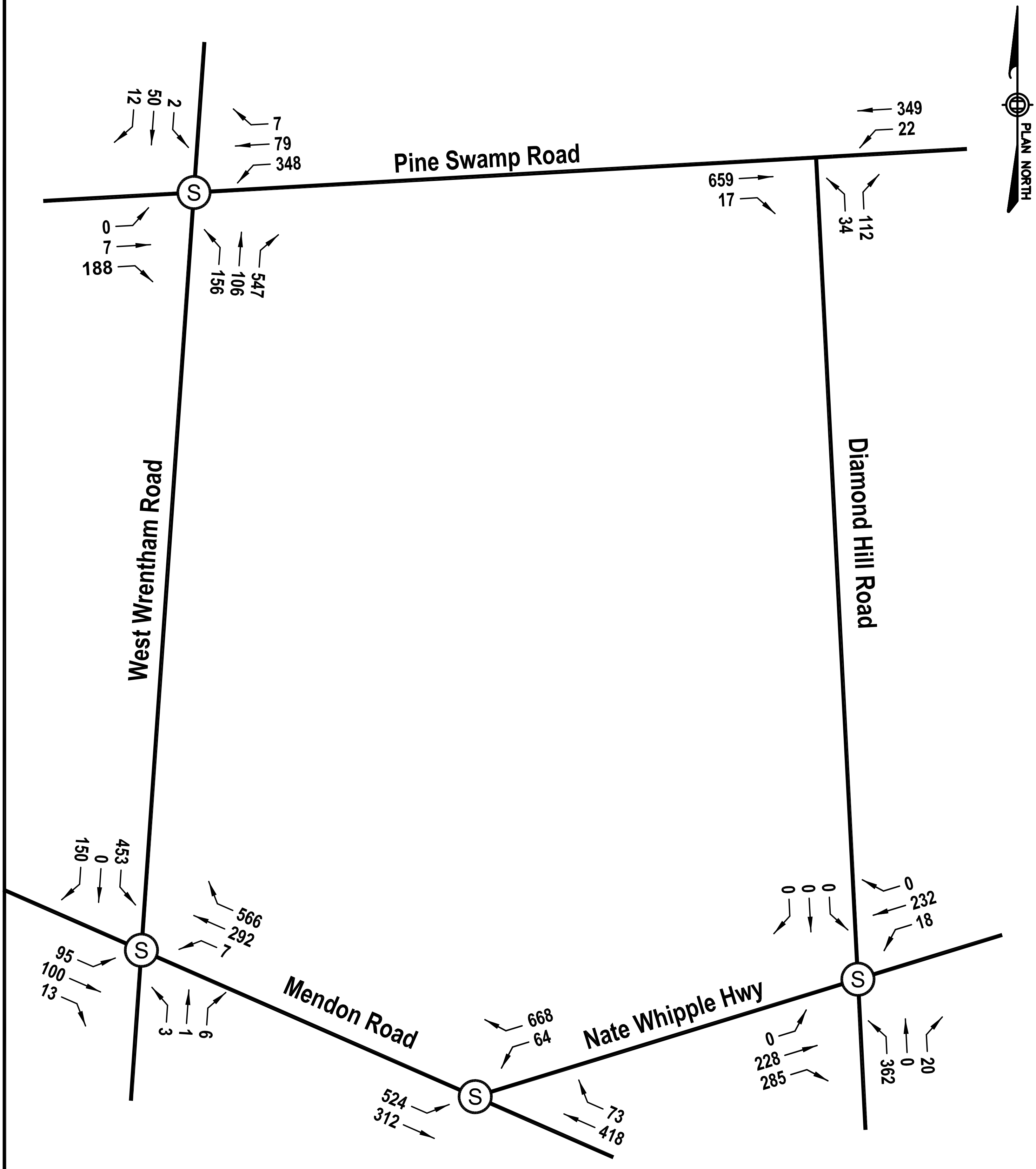

Figure 8

• Civil
• Transportation
• Environmental
• Site Planning
• Surveying
• Permitting
• Landscape Architecture

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Massachusetts
103 Commonwealth Avenue
North Attleboro, MA 02763
Phone: (508) 695-1700
Email: cel@crossmaneng.com

NEWELL BRIDGE REPLACEMENT
TRAFFIC STUDY
CUMBERLAND, RHODE ISLAND
AM PEAK TRAFFIC WITH DETOUR
FULL BRIDGE CLOSURE

DATE: MARCH 2020

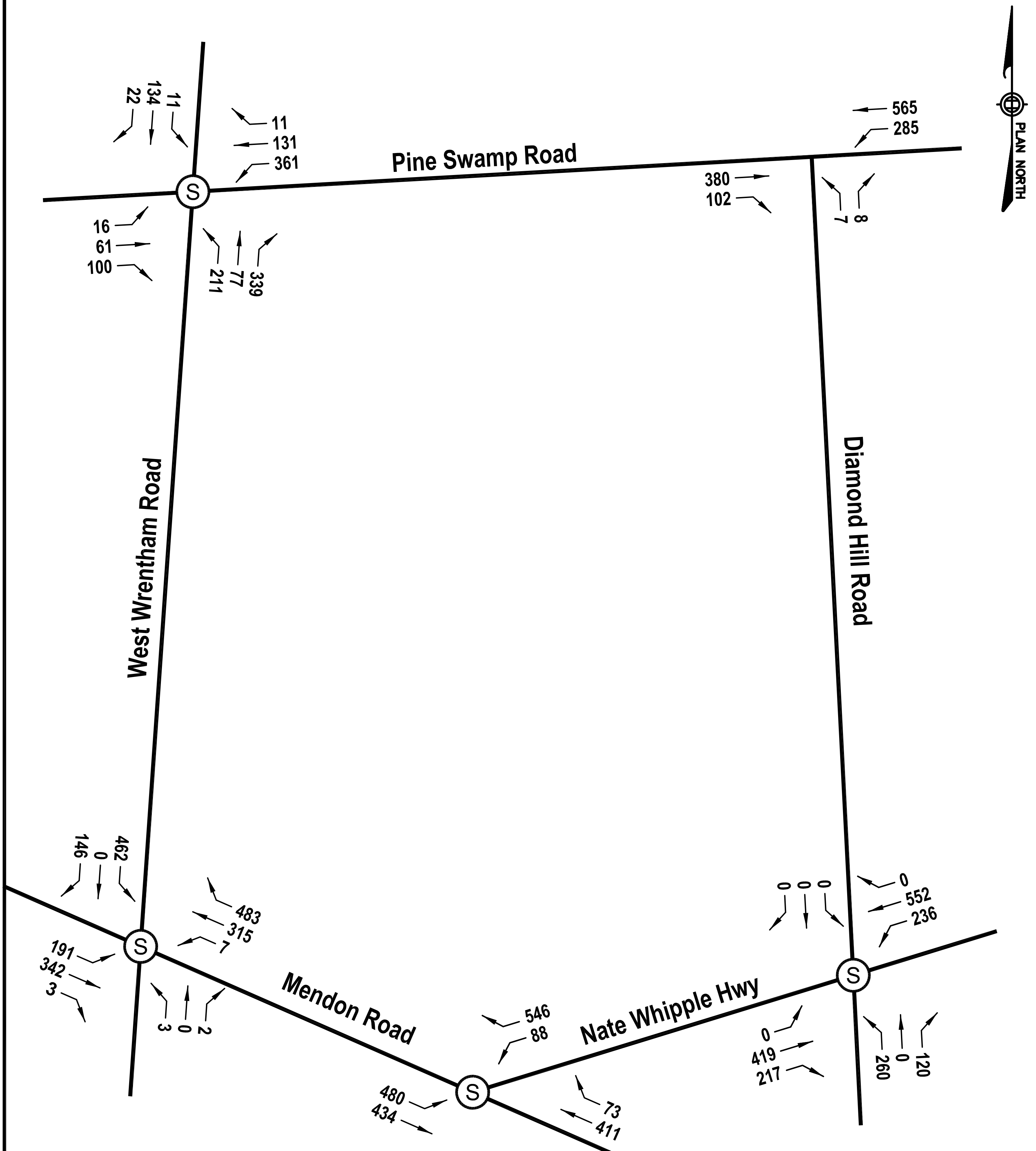

Figure 9

- Civil
- Transportation
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- Landscape Architecture

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NEWELL BRIDGE REPLACEMENT
TRAFFIC STUDY
CUMBERLAND, RHODE ISLAND
PM PEAK TRAFFIC WITH DETOUR
FULL BRIDGE CLOSURE

DATE: MARCH 2020

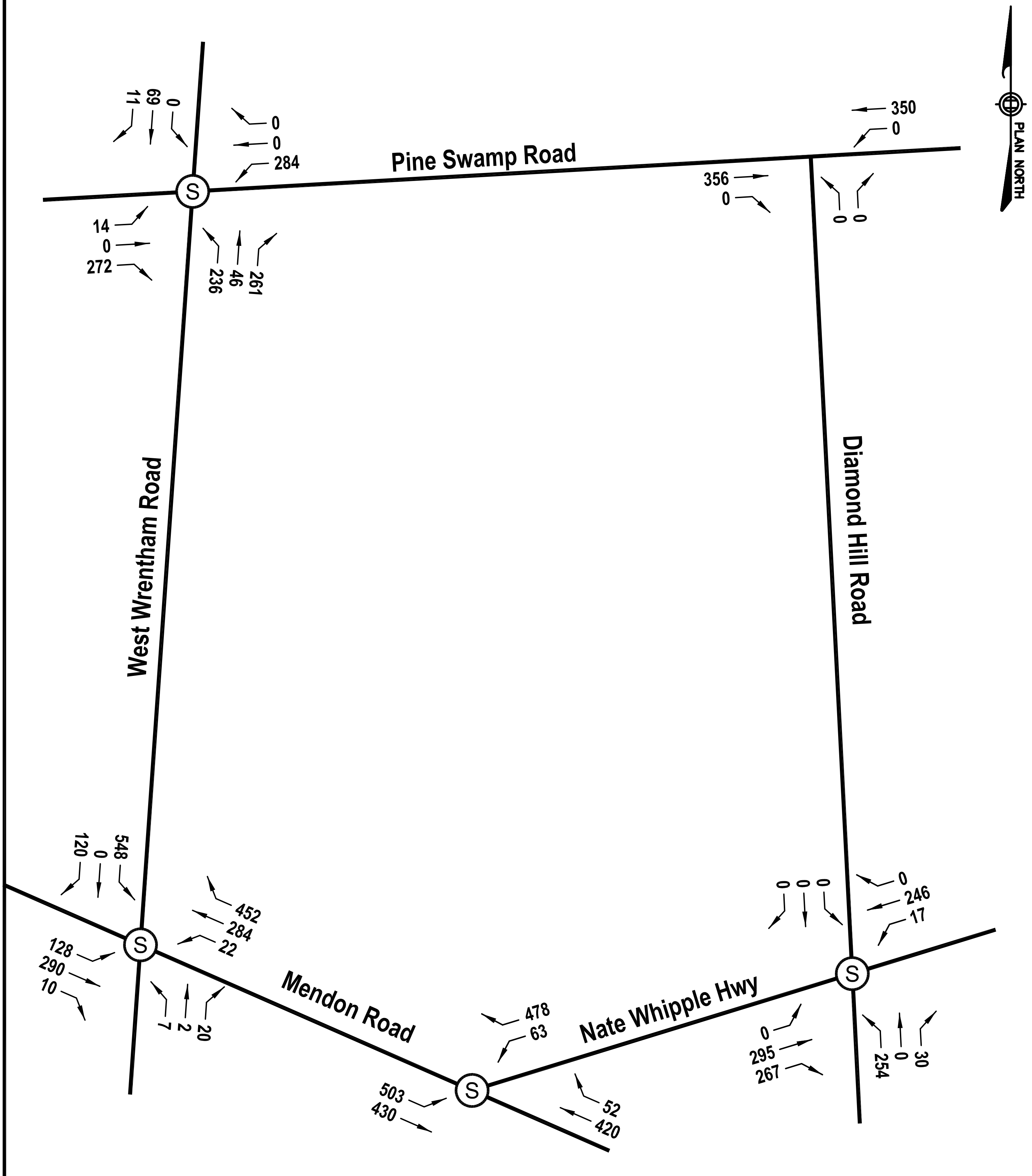

Figure 10

• Civil
• Transportation
• Environmental
• Site Planning
• Surveying
• Permitting
• Landscape Architecture

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Massachusetts
103 Commonwealth Avenue
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NEWELL BRIDGE REPLACEMENT
TRAFFIC STUDY
CUMBERLAND, RHODE ISLAND
SATURDAY PEAK TRAFFIC
WITH DETOUR
FULL BRIDGE CLOSURE

DATE: MARCH 2020

C. Two-Stage Construction with Temporary Signal

The final alternative analyzed will include a temporary signal on the north side of the Newell Bridge which will run coordinated and on the same controller as the existing signal at Diamond Hill Road / Nate Whipple Highway. The temporary signal will allow one lane to remain open at the bridge location for the passage of one-way traffic alternating between northbound traffic and southbound traffic on Diamond Hill Road. The work will be staged for construction on the east side of the bridge while maintaining a full traffic lane for one-way alternating passage on the west, then construction on the west side of bridge while maintaining a full traffic lane for one-way alternating passage on the east. This alternative does not require re-routing traffic for detours.

Facing north on Diamond Hill Rd toward Newell Bridge

SB toward bridge in advance of Nate Whipple Hwy signal

TRAFFIC OPERATIONS ANALYSIS

Traffic operations analysis describes the quality of traffic flow at the study intersections for the traffic demands. As a basis for this assessment, intersection capacity analyses were conducted using Synchro capacity analysis software for the study area intersections for the 2020 Existing Conditions, Full Bridge Closure (Detour Diamond Hill Road both directions), Bridge Closure with Temporary Bridge (Detour Northbound Traffic Only) and Temporary Signal. This analysis is based on procedures contained in the 2010 Highway Capacity Manual (HCM). A discussion of the evaluation criteria and a summary of the results of the capacity analyses are presented below.

Level-Of-Service Criteria

The analyses result in a Level of Service (LOS) being assigned to the intersection. LOS is defined as a qualitative measure describing operational conditions based on vehicular delay. There are six levels of service ranging from LOS A (little or no delay) to LOS F (worst operating conditions – high delays) with LOS D being considered acceptable for peak hour conditions at signalized intersections.

Signalized Intersections

The levels of service at signalized intersections are determined by a procedure described in the 2010 Highway Capacity Manual and as shown in Table 1.

Table 1 – Level of Service Criteria for Signalized Intersections

LOS	Control Delay (seconds/vehicle)	General Description
A	$\leq$10	Free Flow
B	>10.0 to 20.0	Stable Flow (slight delays)
C	>20.0 to 35.0	Stable Flow (acceptable delays)
D	>35.0 to 55.0	Approaching Unstable Flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55.0 to 80.0	Unstable Flow (operating at capacity)
F	>80.0	Forced Flow (congested and queues fail to clear)

Unsignalized Intersections

The levels of service at unsignalized intersections are determined by a procedure described in the 2010 Highway Capacity Manual. The level of service criteria for unsignalized intersections is described in Table 2.

Table 2 - Level of Service Criteria for Unsignalized Intersections

LOS	Control Delay (seconds/vehicle)
A	$\leq$10.
B	>10.0 to 15.0
C	>15.0 to 25.0
D	>25.0 to 35.0
E	>35.0 to 50.0
F	>50.0

CAPACITY ANALYSIS RESULTS

The capacity analyses indicated volume to capacity ratios, average vehicle delay (in seconds), and the levels of service shown in Tables 3, 4, 5 and Table 6 for signalized intersections and unsignalized intersections, respectively, in the study area.

Table 3 - AM Peak Hour Signalized Level-Of-Service Analysis Summary

Location	Movement	2020 Existing			Full Bridge Closure			Full Bridge Closure Optimized			Temporary Signal		
		v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
AM PEAK HOUR													
Diamond Hill Rd / Nate Whipple Hwy	**OVERALL**	**0.62**	**12.4**	**B**	**0.80**	**20.1**	**C**	**0.81**	**18.0**	**B**	**1.20**	**145.9**	**F**
Nate Whipple Hwy	EB	0.56	16.5	B	0.80	21.2	C	0.81	19.1	B	1.57	330.3	F
Nate Whipple Hwy	WB	0.51	15.7	B	0.43	12.4	B	0.52	11.1	B	0.87	73.0	E
Diamond Hill Rd	NB	0.55	9.1	A	0.81	23.4	C	0.82	21.1	C	1.37	234.7	F
Diamond Hill Rd	SB	0.66	11.2	B	0.00	0.0	A	0.00	0.0	A	0.56	11.7	B
Mendon Rd / Nate Whipple Hwy	**OVERALL**	**0.88**	**43.9**	**D**	**1.46**	**379.1**	**F**	**1.38**	**163.2**	**F**			
Nate Whipple Hwy	WB	0.76	30.8	C	1.25	157.4	F	1.29	181.3	F			
Mendon Rd	SE	1.22	72.7	E	3.25	703.8	F	1.42	145.5	F			
Mendon Rd	NW	0.79	20.3	C	0.82	23.2	C	1.38	175.7	F			
Plaza Driveway / W. Wrentham Rd / Mendon Rd	**OVERALL**	**0.50**	**8.5**	**A**	**1.68**	**173.8**	**F**	**1.50**	**160.9**	**F**	**Diamond Hill Rd Temporary Signal North Side of Bridge**		
Plaza Driveway	NB	0.04	10.1	B	0.03	16.0	B	0.03	22.7	C	0.28	0.3	A
W. Wrentham Rd	SB	0.38	11.7	B	1.60	304.9	F	1.61	317.7	F	1.70	374.8	F
Mendon Rd	SE	0.35	6.6	A	1.74	372.8	F	1.44	244.7	F			
Mendon Rd	NW	0.57	7.9	A	0.93	29.2	C	0.90	28.6	C			
W. Wrentham Rd / Pine Swamp Rd	**OVERALL**	**0.80**	**17.3**	**B**	**1.68**	**465.1**	**F**	**1.66**	**290.7**	**F**	**Diamond Hill Rd Temporary Signal South Side of Bridge**		
Pine Swamp Rd	EB	0.48	11.8	B	0.31	9.1	A	0.40	27.4	C			
Pine Swamp Rd	WB	0.77	19.3	B	1.04	64.3	E	1.62	330.4	F			
W. Wrentham Rd	NB	0.84	21.7	C	2.59	742.3	F	1.69	342.5	F	0.57	1.7	A
W. Wrentham Rd	SB	0.36	10.2	B	0.18	13.7	B	0.12	13.5	B	0.24	0.0	A

Table 4 - PM Peak Hour Signalized Level-Of-Service Analysis Summary

Location	Movement	2020 Existing			Full Bridge Closure			Full Bridge Closure Optimized			Temporary Signal		
		v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
PM PEAK HOUR													
Diamond Hill Rd / Nate Whipple Hwy	**OVERALL**	**1.58**	**277.5**	**F**	**7.81**	**2432.2**	**F**	**1.94**	**283.7**	**F**	**2.55**	**735.2**	**F**
Nate Whipple Hwy	EB	1.03	71.0	E	1.05	61.9	E	0.73	14.2	B	1.42	245.2	F
Nate Whipple Hwy	WB	2.34	633.6	F	13.11	5493.6	F	2.10	520.6	F	4.00	1400.6	F
Diamond Hill Rd	NB	0.65	19.1	B	0.82	30.2	C	1.43	266.2	F	2.21	611.8	F
Diamond Hill Rd	SB	0.91	41.5	D	0.00	0.0	A	0.00	0.0	A	0.60	20.5	C
Mendon Rd / Nate Whipple Hwy	**OVERALL**	**0.70**	**20.4**	**C**	**1.03**	**93.0**	**F**	**0.96**	**43.2**	**D**			
Nate Whipple Hwy	WB	0.72	29.8	C	1.08	93.3	F	0.93	51.5	D			
Mendon Rd	SE	0.70	14.8	B	1.44	131.9	F	0.95	26.4	C			
Mendon Rd	NW	0.68	20.3	C	0.75	25.8	C	1.01	59.6	E			
Plaza Driveway / W. Wrentham Rd / Mendon Rd	**OVERALL**	**0.85**	**21.1**	**C**	**1.70**	**281.6**	**F**	**1.80**	**273.3**	**F**	**Diamond Hill Rd Temporary Signal North Side of Bridge**		
Plaza Driveway	NB	0.00	17.0	B	0.00	27.3	C	0.00	25.7	C	0.24	0.3	A
W. Wrentham Rd	SB	0.74	28.0	C	2.34	648.0	F	2.13	550.9	F	1.63	348.4	F
Mendon Rd	SE	0.90	28.7	C	1.50	251.7	F	1.68	334.4	F			
Mendon Rd	NW	0.47	8.8	A	0.68	10.1	B	0.70	11.7	B			
W. Wrentham Rd / Pine Swamp Rd	**OVERALL**	**0.65**	**10.8**	**B**	**1.21**	**172.3**	**F**	**1.19**	**95.5**	**F**	**Diamond Hill Rd Temporary Signal South Side of Bridge**		
Pine Swamp Rd	EB	0.30	6.3	A	0.32	7.2	A	0.40	17.9	B			
Pine Swamp Rd	WB	0.68	10.3	B	0.89	24.4	C	1.23	147.9	F			
W. Wrentham Rd	NB	0.59	14.7	B	1.80	388.1	F	1.14	140.1	F	0.43	1.4	A
W. Wrentham Rd	SB	0.42	12.9	B	0.40	15.9	B	0.25	14.6	B	0.19	0.0	A

Table 5 - Saturday Peak Hour Signalized Level-Of-Service Analysis Summary

Location	Movement	2020 Existing			Full Bridge Closure			Full Bridge Closure Optimized			Temporary Signal		
		v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS	v/c	Delay	LOS
SATURDAY PEAK HOUR													
Diamond Hill Rd / Nate Whipple Hwy	**OVERALL**	**0.73**	**16.9**	**B**	**0.81**	**19.4**	**B**	**0.81**	**17.4**	**B**	**1.27**	**190.7**	**F**
Nate Whipple Hwy	EB	0.65	21.7	C	0.85	21.7	C	0.82	18.1	B	1.98	515.0	F
Nate Whipple Hwy	WB	0.55	18.7	B	0.55	11.8	B	0.58	10.6	B	0.96	88.8	F
Diamond Hill Rd	NB	0.41	9.3	A	0.77	22.0	C	0.81	22.2	C	1.55	323.7	F
Diamond Hill Rd	SB	0.78	17.7	B	0.00	0.0	A	0.00	0.0	A	0.55	4.9	A
Mendon Rd / Nate Whipple Hwy	**OVERALL**	**0.63**	**15.6**	**B**	**0.94**	**74.7**	**E**	**0.88**	**33.0**	**C**			
Nate Whipple Hwy	WB	0.59	23.3	C	0.75	32.8	C	0.58	25.6	C			
Mendon Rd	SE	0.55	10.2	B	1.46	131.3	F	0.93	23.3	C			
Mendon Rd	NW	0.69	17.2	B	0.76	21.7	C	1.01	57.3	E			
Plaza Driveway / W. Wrentham Rd / Mendon Rd	**OVERALL**	**0.58**	**9.1**	**A**	**1.34**	**236.3**	**F**	**1.67**	**203.2**	**F**	**Diamond Hill Rd Temporary Signal North Side of Bridge**		
Plaza Driveway	NB	0.05	13.3	B	0.05	24.3	C	0.04	27.1	C	0.24	0.3	A
W. Wrentham Rd	SB	0.53	16.4	B	2.41	673.5	F	1.60	320.3	F	1.60	323.0	F
Mendon Rd	SE	0.61	8.3	A	0.98	44.6	D	1.70	353.7	F			
Mendon Rd	NW	0.48	6.7	A	0.68	9.7	A	0.78	21.8	C			
W. Wrentham Rd / Pine Swamp Rd	**OVERALL**	**0.42**	**7.5**	**A**	**1.12**	**109.3**	**F**	**1.10**	**73.1**	**E**	**Diamond Hill Rd Temporary Signal South Side of Bridge**		
Pine Swamp Rd	EB	0.37	5.5	A	0.60	12.8	B	0.64	28.0	C			
Pine Swamp Rd	WB	0.36	5.5	A	0.86	31.1	C	1.10	114.2	F			
W. Wrentham Rd	NB	0.53	12.0	B	1.41	209.4	F	1.09	88.5	F	0.56	1.7	A
W. Wrentham Rd	SB	0.32	10.8	B	0.17	10.6	B	0.13	14.2	B	0.28	0.0	A

Table 6 - Unsignalized Level-Of-Service Analysis Summary

Location	Movement	2020 Existing			Full Bridge Closure		
		v/c	Delay	LOS	v/c	Delay	LOS
AM PEAK HOUR							
Diamond Hill Rd / Pine Swamp Rd / Wrentham Rd							
Pine Swamp Rd	EB	0.24	0.0	A	0.53	0.0	A
Wrentham Rd	WB	0.26	5.6	A	0.34	0.4	A
Diamond Hill Rd	NB	1.40	215.1	F	0.37	29.6	D
PM PEAK HOUR							
Diamond Hill Rd / Pine Swamp Rd / Wrentham Rd							
Pine Swamp Rd	EB	0.14	0.0	A	0.32	0.0	A
Wrentham Rd	WB	0.41	5.7	A	0.37	3.2	A
Diamond Hill Rd	NB	3.93	Err	F	0.12	35.4	E
SATURDAY PEAK HOUR							
Diamond Hill Rd / Pine Swamp Rd / Wrentham Rd							
Pine Swamp Rd	EB	0.12	0.0	A	0.25	0.0	A
Wrentham Rd	WB	0.15	4.8	A	0.00	0.0	A
Diamond Hill Rd	NB	0.61	21.2	C	0.00	0.0	A

CONCLUSION

Existing Conditions
At the signalized intersections, overall levels of service (LOS) are generally good, with LOS C or better. The exceptions to this are:

- Mendon Road / Nate Whipple Highway during the AM Peak where overall LOS is D
- Diamond Hill Road / Nate Whipple Highway during the PM Peak where overall LOS is F

At the unsignalized intersection of Pine Swamp Road / Diamond Hill Road, all approaches are good, LOS C or better during Saturday peak and on the eastbound and westbound approaches during AM Peak and PM Peak. The Northbound stop-controlled approach of Diamond Hill Road experiences LOS F during the AM and Peak hours.

Full Bridge Closure with Optimized Signal Timing
With the additional traffic added to the study intersections from detouring all traffic from the bridge, during the AM Peak Diamond Hill Road / Nate Whipple Highway can maintain existing overall LOS B but the remaining signals all deteriorate to overall LOS F.

For the PM Peak hour Diamond Hill Road / Nate Whipple Highway remains an overall LOS F. Mendon Road / Nate Whipple Highway degrades from overall LOS C to D. West Wrentham Road / Mendon Road deteriorates from overall LOS C to F. West Wrentham Road / Pine Swamp Road deteriorate from overall LOS B to LOS F

For the Saturday Peak hour Diamond Hill Road / Nate Whipple Highway maintains an overall LOS B. Mendon Road / Nate Whipple Highway degrades from overall LOS B to C. West Wrentham Road / Mendon Road deteriorates from overall LOS A to F. West Wrentham Road / Pine Swamp Road deteriorate from overall LOS A to LOS E.

At the unsignalized intersection of Pine Swamp Road / Diamond Hill Road, all approaches are very good, LOS A during Saturday peak and on the eastbound and westbound approaches during AM Peak and PM Peak. The Northbound stop-controlled approach of Diamond Hill Road experiences LOS D during the AM Peak and LOS E during PM Peak.

Temporary Signal
In order to provide a safe clearance time for alternating traffic to completely pass through the bridge construction zone, the southbound approach to the temporary signal and the eastbound, westbound and northbound approaches to the Diamond Hill Road / Nate Whipple Highway signal experience excessively long delays and queues and all function as LOS F.

RECOMMENDATION

Based on field, traffic, and signal conditions in 2020, the alternative that is least disruptive to traffic of the three options analyzed is Option 2 - Two Weekend (55-Hour) Full Bridge Closures. This appears to be the most feasible because traffic disruptions would be limited to the shortest amount of time (two separate weekends). The temporary signal is not considered feasible as it would create excessive delays and extensive queues along the Nate Whipple Highway and Diamond Hill Road corridors and could result in long periods of gridlock. In addition, the close proximity of the bridge, and alternating temporary signal to the Diamond Hill Road / Nate Whipple Highway signal provides very little queuing area for traffic and would also require prohibiting right turns on red for Nate Whipple Highway westbound.

APPENDIX

TRAFFIC COUNTS

TO: Steve Baker, Steere Engineering

FROM: Valerie J. Southern, VJS-TC, LLC

DATE: March 9, 2020

SUBJ: **DELIVERABLE:** Weekday AM Traffic Counts – Cumberland RI

==

Thursday, March 5, 2020 – 7:00 AM - 9:00AM

Type text here

1 – Diamond Hill Road @ Nate Whipple Highway
2 – Pine Swamp Road @ Wrentham Road
3 – Pine Swamp Road @ Diamond Hill Road
4 – Mendon Road @ West Wrentham Road
5 – Nate Whipple Highway @ Mendon Road

43 CLINTON AVENUE
JAMESTOWN, RHODE ISLAND 02835
(401) 560-7930

VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

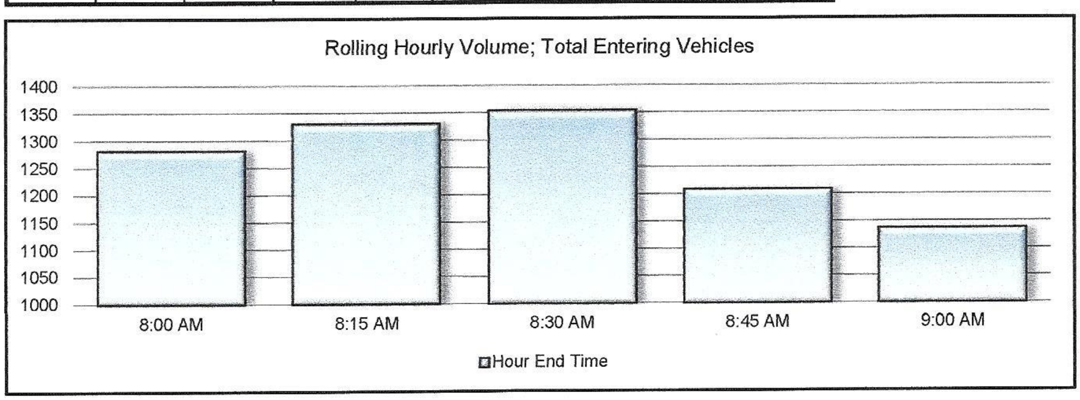
Location:	Diamond Hill Road @ Nate Whipple Highway		City/Town	Cumberland, RI
Checker:	DCN	Weather: Sunny	Job:	Group 17C Newell
Date:	3/5/20 Tue	Start Time: 7:00 AM	Pk Hr:	7:30 AM 8:30 AM
# of minutes counted per interval:	14.0 minutes			

END TIME	From the NORTH (SOUTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	N Leg Peds	From the EAST (WESTBOUND) RT	TH	LT	TOTAL	HV	Bikes	E Leg Peds
7:15 AM	11	50	20	81	3	0	0	21	24	4	49	3	4	0
7:30 AM	13	59	24	96	3	0	0	25	29	4	58	3	5	0
7:45 AM	18	77	32	127	4	0	0	32	38	5	75	4	6	0
8:00 AM	12	54	22	88	3	0	0	23	27	4	54	3	4	0
8:15 AM	13	59	24	96	3	0	0	25	29	4	58	3	5	0
8:30 AM	15	63	26	104	4	0	0	27	31	5	63	3	5	0
8:45 AM	11	50	21	82	3	0	0	21	24	4	49	3	4	0
9:00 AM	9	41	17	67	2	0	0	17	20	3	40	2	6	0
PK HR	58	253	104	415	14	0	0	107	125	18	250	13	20	0
Adj HR	62	271	111	444	15	0	0	115	134	19	268	14	21	0

END TIME	From the SOUTH (NORTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	S Leg Peds	From the WEST (EASTBOUND) RT	TH	LT	TOTAL	HV	Bikes	W Leg Peds
7:15 AM	4	61	10	75	3	0	0	6	24	12	42	3	0	0
7:30 AM	5	73	11	89	3	0	0	9	28	14	51	3	0	0
7:45 AM	6	95	15	116	4	0	0	10	37	19	66	4	0	0
8:00 AM	4	67	11	82	3	0	0	7	27	13	47	3	0	0
8:15 AM	5	73	11	89	3	0	0	7	29	14	50	3	0	0
8:30 AM	5	78	12	95	4	0	0	8	31	15	54	3	0	0
8:45 AM	4	61	10	75	3	0	0	6	24	12	42	3	0	0
9:00 AM	3	50	8	61	2	0	0	5	20	10	35	2	0	0
PK HR	20	313	49	382	14	0	0	32	124	61	217	13	0	0
Adj HR	21	335	53	409	15	0	0	34	133	65	232	14	0	0

END TIME	15 Min Totals (adj) Veh	HV	Peds	Bikes
7:15	265	13	4	0
7:30	315	13	5	0
7:45	411	17	6	0
8:00	290	13	4	0
8:15	314	13	5	0
8:30	339	15	5	0
8:45	266	13	4	0
9:00	218	9	6	0

Time Start -	End	Rolling Hr Vol	Pk Hr?
7:00 AM	8:00 AM	1281	no
7:15 AM	8:15 AM	1330	no
7:30 AM	8:30 AM	1354	YES
7:45 AM	8:45 AM	1209	no
8:00 AM	9:00 AM	1137	no

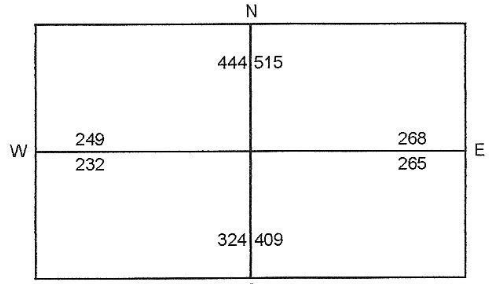


William Popp Associates©

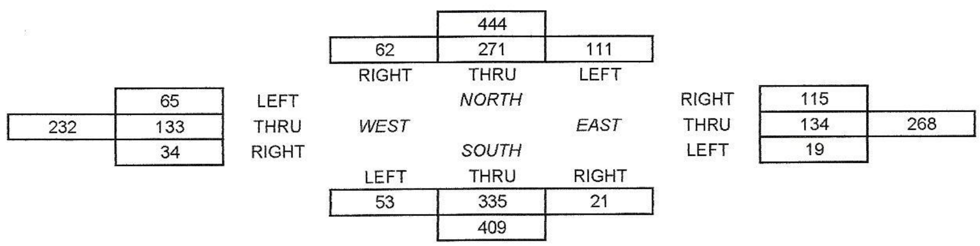
VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

INTERSECTION:	Diamond Hill Road @ Nate Whipple Highway
PEAK HOUR:	7:30 AM 8:30 AM
DATE:	5-Mar-20

DIRECTIONAL LEG VOLUMES -- PEAK HOUR



APPROACH VOLUME TURN MOVEMENTS -- PEAK HOUR



Pedestrians (Peak Hour)	
Crossing Leg	# of
North	0
South	0
East	0
West	0
Total	0

Bikes (Peak Hour)	
Approach	# of
From North:	0
From South:	0
From East:	21
From West:	0
Total	21

ADJUSTMENT FACTORS DERIVED FROM COUNT

Peak Hour Factors:	From North:	0.82	SB
	From South:	0.82	NB
	From East:	0.83	WB
	From West:	0.82	EB
	Total	0.82	All

Heavy Vehicles:	From North:	15	3.4%	SB
	From South:	15	3.7%	NB
	From East:	14	5.2%	WB
	From West:	14	6.0%	EB

William Popp Associates©

VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

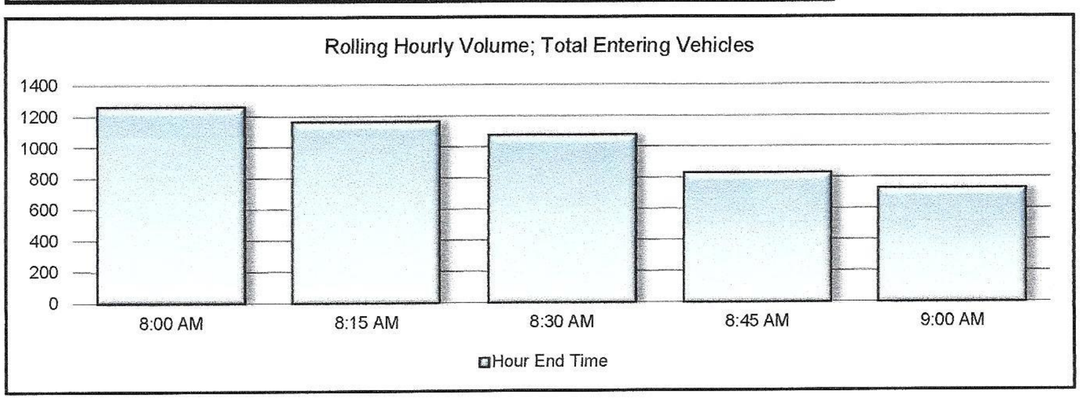
Location:	Pine Swamp Road @ Wrentham Road	City/Town	Cumberland, RI
Checker:	VJS Weather: Sunny	Job:	Group 17C Newell
Date:	3/5/20 Tue Start Time: 7:00 AM	Pk Hr:	7:00 AM 8:00 AM
# of minutes counted per interval:	14.0 minutes		

END TIME	From the NORTH (SOUTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	N Leg Peds	From the EAST (WESTBOUND) RT	TH	LT	TOTAL	HV	Bikes	E Leg Peds
7:15 AM	2	23	9	34	0	0	0	4	41	26	71	3	0	0
7:30 AM	2	28	11	41	1	0	0	4	48	31	83	4	0	0
7:45 AM	3	35	14	52	1	0	0	6	61	39	106	4	0	0
8:00 AM	2	25	10	37	0	0	0	4	44	28	76	4	0	0
8:15 AM	0	17	5	22	0	0	0	4	30	18	52	1	0	0
8:30 AM	7	11	11	29	3	0	0	3	49	29	81	4	0	0
8:45 AM	4	10	3	17	0	0	0	1	24	14	39	1	0	0
9:00 AM	0	11	0	11	1	0	0	0	46	18	64	1	0	0
PK HR	9	111	44	164	2	0	0	18	194	124	336	15	0	0
Adj HR	10	119	47	176	2	0	0	19	208	133	360	16	0	0

END TIME	From the SOUTH (NORTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	S Leg Peds	From the WEST (EASTBOUND) RT	TH	LT	TOTAL	HV	Bikes	W Leg Peds
7:15 AM	53	26	7	86	0	0	0	10	40	5	55	1	0	0
7:30 AM	64	31	9	104	0	0	0	12	47	6	65	0	0	0
7:45 AM	81	39	11	131	0	0	0	15	60	7	82	0	0	0
8:00 AM	58	28	8	94	0	0	0	11	43	5	59	1	0	0
8:15 AM	30	16	6	52	0	0	0	10	14	9	33	1	0	0
8:30 AM	12	13	26	51	0	0	0	9	33	7	49	0	0	0
8:45 AM	11	3	17	31	0	0	0	2	47	5	54	1	0	0
9:00 AM	10	12	18	40	3	0	0	1	49	7	57	2	0	0
PK HR	256	124	35	415	0	0	0	48	190	23	261	2	0	0
Adj HR	274	133	38	445	0	0	0	51	204	25	280	2	0	0

END TIME	15 Min Totals (adj) Veh	HV	Peds	Bikes
7:15	264	4	0	0
7:30	314	5	0	0
7:45	398	5	0	0
8:00	285	5	0	0
8:15	170	2	0	0
8:30	225	8	0	0
8:45	151	2	0	0
9:00	184	8	0	0

Time Start	End	Rolling Hr Vol	Pk Hr?
7:00 AM	8:00 AM	1261	YES
7:15 AM	8:15 AM	1167	no
7:30 AM	8:30 AM	1078	no
7:45 AM	8:45 AM	831	no
8:00 AM	9:00 AM	730	no

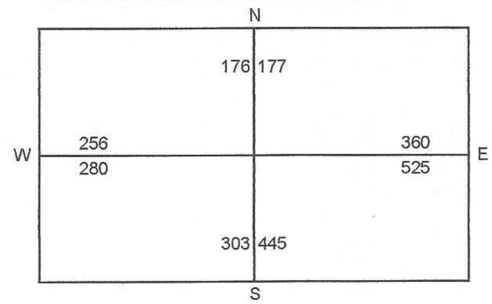


William Popp Associates©

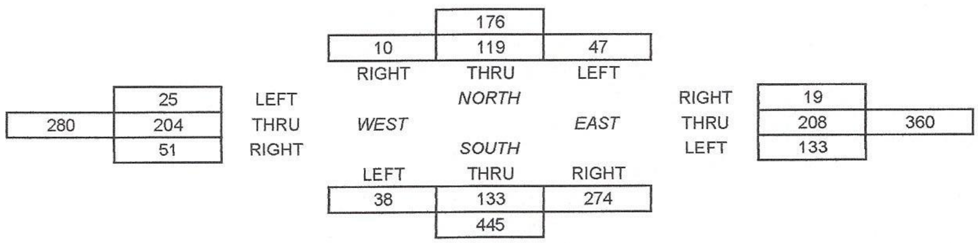
VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

INTERSECTION:	Pine Swamp Road @ Wrentham Road
PEAK HOUR:	7:00 AM 8:00 AM
DATE:	5-Mar-20

DIRECTIONAL LEG VOLUMES -- PEAK HOUR



APPROACH VOLUME TURN MOVEMENTS -- PEAK HOUR



Pedestrians (Peak Hour)	
Crossing Leg	# of
North	0
South	0
East	0
West	0
Total	0

Bikes (Peak Hour)	
Approach	# of
From North:	0
From South:	0
From East:	0
From West:	0
Total	0

ADJUSTMENT FACTORS DERIVED FROM COUNT

Peak Hour Factors:	From North:	0.79	SB
	From South:	0.79	NB
	From East:	0.79	WB
	From West:	0.80	EB
	Total	0.79	All

Heavy Vehicles:	From North:	2	1.1%	SB
	From South:	0	0.0%	NB
	From East:	16	4.4%	WB
	From West:	2	0.7%	EB

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VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

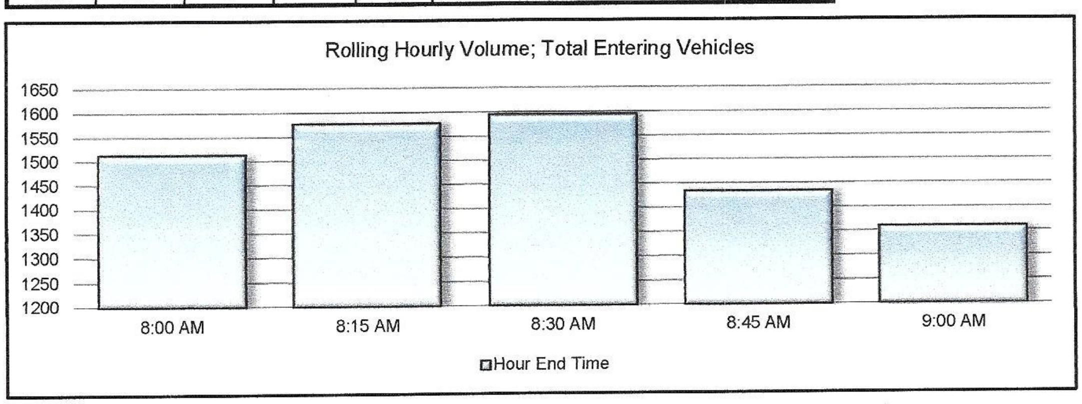
Location:	Pine Swamp Road@Diamond Hill Road	City/Town	Cumberland, RI
Checker:	GAN	Weather: Sunny	Job: Group 17C Newell
Date:	3/5/20 Tue	Start Time: 7:00 AM	Pk Hr: 7:30 AM 8:30 AM
# of minutes counted per interval:	14.0 minutes		

END	From the NORTH (SOUTHBOUND)						N Leg	From the EAST (WESTBOUND)						E Leg
TIME	RT	TH	LT	TOTAL	HV	Bikes	Peds	RT	TH	LT	TOTAL	HV	Bikes	Peds
7:15 AM	0	0	0	0	0	0	0	0	14	49	63	2	0	0
7:30 AM	0	0	0	0	0	0	0	0	16	59	75	3	0	0
7:45 AM	0	0	0	0	0	0	0	0	21	74	95	4	0	0
8:00 AM	0	0	0	0	0	0	0	0	15	53	68	2	0	0
8:15 AM	0	0	0	0	0	0	0	0	31	55	86	1	0	0
8:30 AM	0	0	0	0	0	0	0	0	48	74	122	0	0	0
8:45 AM	0	0	0	0	0	0	0	0	32	70	102	4	0	0
9:00 AM	0	0	0	0	0	0	0	0	32	41	73	2	0	0
PK HR	0	0	0	0	0	0	0	0	115	256	371	7	0	0
Adj HR	0	0	0	0	0	0	0	0	123	274	397	8	0	0

END	From the SOUTH (NORTHBOUND)						S Leg	From the WEST (EASTBOUND)						W Leg
TIME	RT	TH	LT	TOTAL	HV	Bikes	Peds	RT	TH	LT	TOTAL	HV	Bikes	Peds
7:15 AM	87	0	24	111	5	0	0	54	66	0	120	2	0	0
7:30 AM	105	0	29	134	4	0	0	65	79	0	144	1	0	0
7:45 AM	132	0	36	168	6	0	0	82	100	0	182	3	0	0
8:00 AM	95	0	26	121	5	0	0	59	72	0	131	2	0	0
8:15 AM	128	0	38	166	4	0	0	36	66	0	102	4	0	0
8:30 AM	123	0	49	172	3	0	0	21	55	0	76	0	0	0
8:45 AM	80	0	32	112	2	0	0	46	35	0	81	1	0	0
9:00 AM	57	0	32	89	1	0	0	44	45	0	89	2	0	0
PK HR	478	0	149	627	18	0	0	198	293	0	491	9	0	0
Adj HR	512	0	160	672	19	0	0	212	314	0	526	10	0	0

END	15 Min Totals (adj)			
TIME	Veh	HV	Peds	Bikes
7:15	315	10	0	0
7:30	378	9	0	0
7:45	477	14	0	0
8:00	343	10	0	0
8:15	379	10	0	0
8:30	396	3	0	0
8:45	316	8	0	0
9:00	269	5	0	0

Time Start -	End	Rolling Hr Vol	Pk Hr?
7:00 AM	8:00 AM	1513	no
7:15 AM	8:15 AM	1577	no
7:30 AM	8:30 AM	1595	YES
7:45 AM	8:45 AM	1434	no
8:00 AM	9:00 AM	1360	no

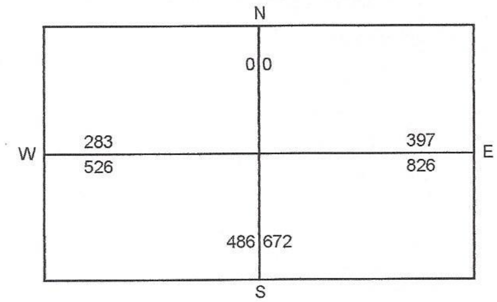


William Popp Associates©

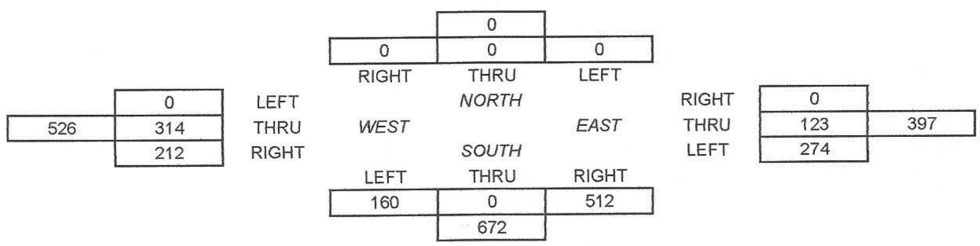
VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

INTERSECTION:	Pine Swamp Road@Diamond Hill Road
PEAK HOUR:	7:30 AM 8:30 AM
DATE:	5-Mar-20

DIRECTIONAL LEG VOLUMES -- PEAK HOUR



APPROACH VOLUME TURN MOVEMENTS -- PEAK HOUR



Pedestrians (Peak Hour)	
Crossing Leg	# of
North	0
South	0
East	0
West	0
Total	0

Bikes (Peak Hour)	
Approach	# of
From North:	0
From South:	0
From East:	0
From West:	0
Total	0

ADJUSTMENT FACTORS DERIVED FROM COUNT

Peak Hour Factors:	From North:	n/a	SB
	From South:	0.91	NB
	From East:	0.76	WB
	From West:	0.67	EB
	Total	0.84	All

Heavy Vehicles:	From North:	0	#DIV/0!	SB
	From South:	19	2.8%	NB
	From East:	8	2.0%	WB
	From West:	10	1.9%	EB

William Popp Associates©

VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

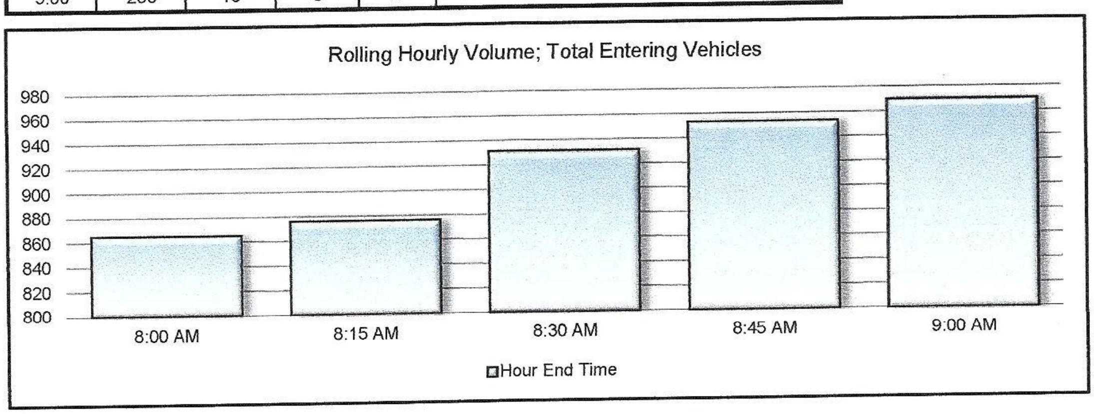
Location:	Mendon Road @ West Wrentham Road	City/Town	Cumberland, RI
Checker:	LF	Weather:	Sunny
Date:	3/5/20 Tue	Start Time:	7:00 AM
# of minutes counted per interval:	14.0 minutes	Job:	Group 17C Newell
		Pk Hr:	8:00 AM 9:00 AM

END TIME	From the NORTH (SOUTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	N Leg Peds	From the EAST (WESTBOUND) RT	TH	LT	TOTAL	HV	Bikes	E Leg Peds
7:15 AM	12	0	18	30	0	0	0	14	38	2	54	5	0	0
7:30 AM	12	0	19	31	0	0	0	15	39	2	56	5	0	0
7:45 AM	33	0	23	56	3	0	0	33	94	1	128	6	0	0
8:00 AM	25	0	25	50	2	0	0	27	85	4	116	4	0	0
8:15 AM	18	0	21	39	1	0	0	37	62	1	100	4	0	0
8:30 AM	28	0	15	43	2	0	0	31	97	1	129	3	0	0
8:45 AM	40	0	37	77	3	0	0	37	90	1	128	3	0	0
9:00 AM	19	0	18	37	2	0	0	29	100	2	131	4	0	0
PK HR	105	0	91	196	8	0	0	134	349	5	488	14	0	0
Adj HR	113	0	98	211	9	0	0	144	374	5	523	15	0	0

END TIME	From the SOUTH (NORTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	S Leg Peds	From the WEST (EASTBOUND) RT	TH	LT	TOTAL	HV	Bikes	W Leg Peds
7:15 AM	0	0	0	0	0	0	0	14	51	18	83	0	0	0
7:30 AM	0	0	0	0	0	0	0	5	52	20	77	0	0	0
7:45 AM	0	0	0	0	0	0	0	8	45	16	69	3	0	0
8:00 AM	0	0	0	0	0	0	0	1	45	11	57	0	0	0
8:15 AM	0	0	0	0	0	0	0	3	25	10	38	3	0	0
8:30 AM	0	0	0	0	0	0	0	1	28	15	44	1	0	0
8:45 AM	0	0	0	0	0	0	0	0	60	8	68	4	0	0
9:00 AM	0	0	0	0	0	0	0	0	59	12	71	6	0	0
PK HR	0	0	0	0	0	0	0	4	172	45	221	14	0	0
Adj HR	0	0	0	0	0	0	0	4	184	48	236	15	0	0

END TIME	15 Min Totals (adj) Veh	HV	Peds	Bikes
7:15	179	5	0	0
7:30	176	5	0	0
7:45	271	13	0	0
8:00	239	6	0	0
8:15	190	9	0	0
8:30	231	6	0	0
8:45	293	11	0	0
9:00	256	13	0	0

Time Start	End	Rolling Hr Vol	Pk Hr?
7:00 AM	8:00 AM	865	no
7:15 AM	8:15 AM	876	no
7:30 AM	8:30 AM	931	no
7:45 AM	8:45 AM	953	no
8:00 AM	9:00 AM	970	YES

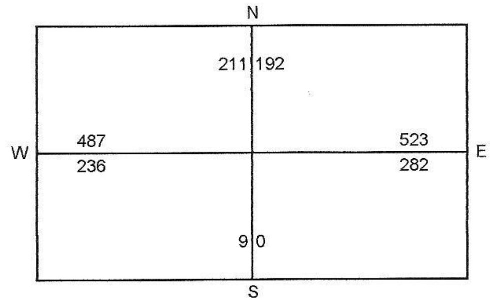


William Popp Associates©

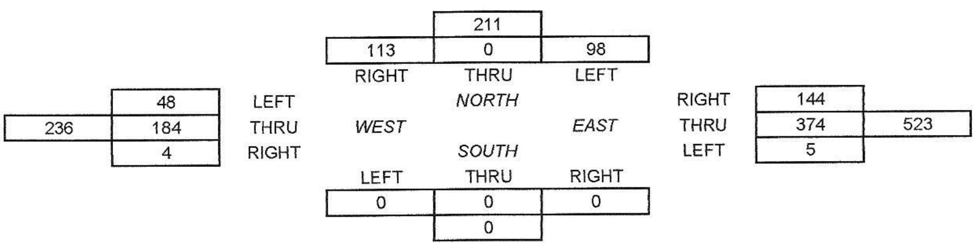
VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

INTERSECTION:	Mendon Road @ West Wrentham Road
PEAK HOUR:	8:00 AM 9:00 AM
DATE:	5-Mar-20

DIRECTIONAL LEG VOLUMES -- PEAK HOUR



APPROACH VOLUME TURN MOVEMENTS -- PEAK HOUR



Pedestrians (Peak Hour)	
Crossing Leg	# of
North	0
South	0
East	0
West	0
Total	0

Bikes (Peak Hour)	
Approach	# of
From North:	0
From South:	0
From East:	0
From West:	0
Total	0

ADJUSTMENT FACTORS DERIVED FROM COUNT

Peak Hour Factors:	From North:	0.64	SB
	From South:	n/a	NB
	From East:	0.93	WB
	From West:	0.78	EB
	Total	0.83	All

Heavy Vehicles:	From North:	9	4.3%	SB
	From South:	0	#DIV/0!	NB
	From East:	15	2.9%	WB
	From West:	15	6.4%	EB

William Popp Associates©

VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

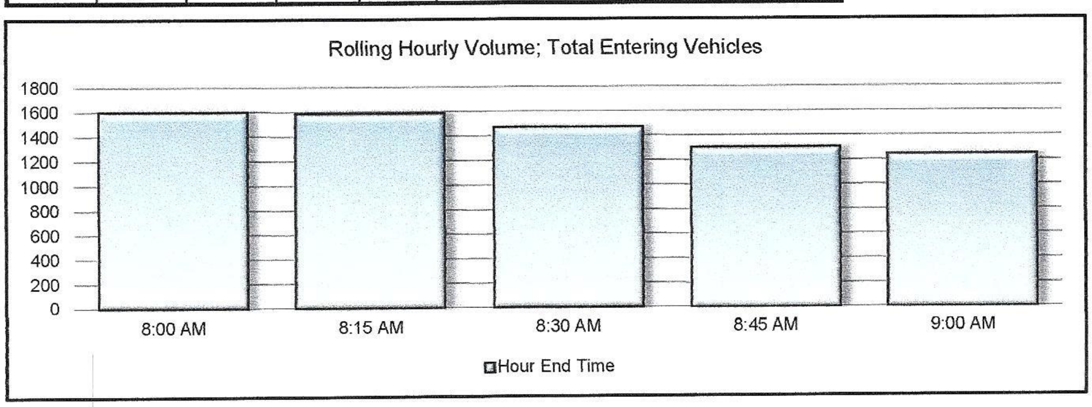
Location:	Nate Whipple Highway@Mendon Road			City/Town	Cumberland, RI
Checker:	AF	Weather:	Sunny	Job:	Group 17C Newell
Date:	3/5/20 Tue	Start Time:	7:00 AM	Pk Hr:	7:00 AM 8:00 AM
# of minutes counted per interval:	14.0 minutes				

END TIME	From the NORTH (SOUTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	N Leg Peds	From the EAST (WESTBOUND) RT	TH	LT	TOTAL	HV	Bikes	E Leg Peds
7:15 AM	54	0	28	82	7	0	0	33	85	0	118	11	0	0
7:30 AM	64	0	24	88	4	0	0	36	113	0	149	11	0	0
7:45 AM	74	0	20	94	1	0	0	39	142	0	181	12	0	0
8:00 AM	81	0	19	100	3	0	0	23	83	0	106	2	0	0
8:15 AM	75	0	28	103	8	0	0	20	85	0	105	4	0	0
8:30 AM	64	0	9	73	0	0	0	9	90	0	99	3	0	0
8:45 AM	70	0	6	76	2	0	0	21	93	0	114	4	0	0
9:00 AM	50	0	14	64	2	0	0	27	105	0	132	7	0	0
PK HR	273	0	91	364	15	0	0	131	423	0	554	36	0	0
Adj HR	293	0	98	391	16	0	0	140	453	0	593	39	0	0

END TIME	From the SOUTH (NORTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	S Leg Peds	From the WEST (EASTBOUND) RT	TH	LT	TOTAL	HV	Bikes	W Leg Peds
7:15 AM	0	0	0	0	0	0	0	0	72	40	112	8	0	0
7:30 AM	0	0	0	0	0	0	0	0	90	42	132	10	0	0
7:45 AM	0	0	0	0	0	0	0	0	107	90	197	11	0	0
8:00 AM	0	0	0	0	0	0	0	0	73	61	134	3	0	0
8:15 AM	0	0	0	0	0	0	0	0	61	31	92	6	0	0
8:30 AM	0	0	0	0	0	0	0	0	58	28	86	6	0	0
8:45 AM	0	0	0	0	0	0	0	0	70	59	129	5	0	0
9:00 AM	0	0	0	0	0	0	0	0	85	3	88	8	0	0
PK HR	0	0	0	0	0	0	0	0	342	233	575	32	0	0
Adj HR	0	0	0	0	0	0	0	0	366	250	616	34	0	0

END TIME	15 Min Totals (adj) Veh	HV	Peds	Bikes
7:15	334	28	0	0
7:30	395	27	0	0
7:45	506	26	0	0
8:00	364	9	0	0
8:15	321	19	0	0
8:30	276	10	0	0
8:45	342	12	0	0
9:00	304	18	0	0

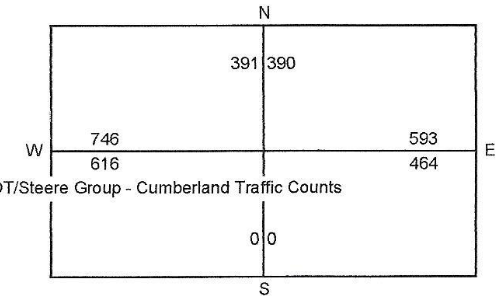
Time Start	- End	Rolling Hr Vol	Pk Hr?
7:00 AM	8:00 AM	1599	YES
7:15 AM	8:15 AM	1586	no
7:30 AM	8:30 AM	1467	no
7:45 AM	8:45 AM	1303	no
8:00 AM	9:00 AM	1243	no



VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

INTERSECTION:	Nate Whipple Highway@Mendon Road
PEAK HOUR:	7:00 AM 8:00 AM
DATE:	5-Mar-20

DIRECTIONAL LEG VOLUMES -- PEAK HOUR



VJS-TC, LLC - RIDOT/Steere Group - Cumberland Traffic Counts

APPROACH VOLUME TURN MOVEMENTS -- PEAK HOUR

				391				
			293	0	98			
			RIGHT	THRU	LEFT			
	250	LEFT		*NORTH*		RIGHT	140	
616	366	THRU	*WEST*		*EAST*	THRU	453	593
	0	RIGHT		*SOUTH*		LEFT	0	
			LEFT	THRU	RIGHT			
			0	0	0			
				0				

Pedestrians (Peak Hour)	
Crossing Leg	# of
North	0
South	0
East	0
West	0
Total	0

Bikes (Peak Hour)	
Approach	# of
From North:	0
From South:	0
From East:	0
From West:	0
Total	0

ADJUSTMENT FACTORS DERIVED FROM COUNT

Peak Hour Factors:	From North:	0.91	SB
	From South:	n/a	NB
	From East:	0.76	WB
	From West:	0.73	EB
	Total	0.79	All

Heavy Vehicles:	From North:	16	4.1%	SB
	From South:	0	#DIV/0!	NB
	From East:	39	6.6%	WB
	From West:	34	5.5%	EB

VALERIE J. SOUTHERN – TRANSPORTATION CONSULTANT, LLC

TO: Steve Baker, Steere Engineering

FROM: Valerie J. Southern, VJS-TC, LLC

DATE: March 9, 2020

SUBJ: **DELIVERABLE:** Weekday PM Traffic Counts – Cumberland RI

==

<u>Thursday, March 5, 2020 – 3:00 PM – 6:00 PM</u>

1 – Diamond Hill Road @ Nate Whipple Highway
2 – Pine Swamp Road @ Wrentham Road
3 – Pine Swamp Road @ Diamond Hill Road
4 – Mendon Road @ West Wrentham Road
5 – Nate Whipple Highway @ Mendon Road

43 CLINTON AVENUE
JAMESTOWN, RHODE ISLAND 02835
(401) 560-7930

VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

Location:	Diamond Hill Road @ Nate Whipple Highway	City/Town:	Cumberland, RI
Checker:	DLN Weather: Sunny	Job:	Group 17C Newell
Date:	3/5/20 enter day Start Time: 3:00 PM	Pk Hr:	4:45 PM to 5:45 PM
# of minutes counted per interval:	14 minutes		

END	From the NORTH (SOUTHBOUND)						N Leg	From the EAST (WESTBOUND)						E Leg
TIME	RT	TH	LT	TOTAL	HV	Bikes	Peds	RT	TH	LT	TOTAL	HV	Bikes	Peds
3:15 PM	6	17	9	32	0	0	0	17	36	10	63	0	0	0
3:30 PM	7	20	10	37	4	0	0	18	38	8	64	0	0	0
3:45 PM	6	19	8	33	4	0	0	17	36	9	62	6	2	0
4:00 PM	7	14	12	33	3	0	0	30	75	27	132	1	0	0
4:15 PM	7	7	10	24	0	0	0	22	50	24	96	4	0	0
4:30 PM	2	7	9	18	0	0	0	13	33	9	55	4	0	0
4:45 PM	16	54	30	100	7	0	0	37	141	65	243	13	0	0
5:00 PM	12	60	29	101	8	0	0	32	133	57	222	13	0	0
5:15 PM	1	24	15	40	3	0	0	20	66	35	121	9	0	0
5:30 PM	10	38	28	76	4	0	0	26	103	60	189	10	0	0
5:45 PM	15	52	41	108	5	0	0	32	140	84	256	13	0	0
6:00 PM	8	21	24	53	4	0	0	30	45	3	78	0	0	0
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PK HR	38	174	113	325	20	0	0	110	442	236	788	45	0	0
Adj HR	41	186	121	348	21	0	0	118	474	253	845	48	0	0

END	From the SOUTH (NORTHBOUND)						S Leg	From the WEST (EASTBOUND)						W Leg
TIME	RT	TH	LT	TOTAL	HV	Bikes	Peds	RT	TH	LT	TOTAL	HV	Bikes	Peds
3:15 PM	10	20	3	33	2	0	0	1	9	8	18	1	0	0
3:30 PM	13	25	4	42	3	0	0	3	12	7	22	1	0	0
3:45 PM	16	25	5	46	14	4	0	4	11	13	28	2	0	0
4:00 PM	22	35	4	61	4	0	0	11	49	8	68	3	0	0
4:15 PM	1	9	0	10	0	0	0	3	25	0	28	0	0	0
4:30 PM	4	6	1	11	0	0	0	6	17	6	29	4	0	0
4:45 PM	47	45	14	106	8	0	0	6	81	18	105	7	0	0
5:00 PM	39	54	9	102	6	0	0	7	79	14	100	14	0	0
5:15 PM	19	33	8	60	2	0	0	14	44	13	71	9	0	0
5:30 PM	28	57	10	95	3	0	0	12	74	18	104	13	0	0
5:45 PM	34	81	8	123	8	0	0	10	109	23	142	17	0	0
6:00 PM	14	62	14	90	8	0	0	0	41	6	47	8	0	0
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PK HR	120	225	35	380	19	0	0	43	306	68	417	53	0	0
Adj HR	129	241	38	408	20	0	0	46	328	73	447	57	0	0

END	15 Min Totals (adj)			
TIME	Veh	HV	Peds	Bikes
3:15 PM	156	3	0	0
3:30 PM	177	9	0	0
3:45 PM	181	28	6	0
4:00 PM	315	12	0	0
4:15 PM	169	4	0	0
4:30 PM	121	9	0	0
4:45 PM	594	38	0	0
5:00 PM	563	44	0	0
5:15 PM	313	25	0	0
5:30 PM	497	32	0	0
5:45 PM	674	46	0	0
6:00 PM	287	21	0	0
6:15 PM	0	0	0	0
6:30 PM	0	0	0	0
6:45 PM	0	0	0	0
7:00 PM	0	0	0	0

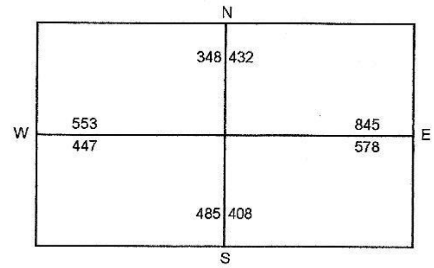
Rolling Hour			Rolling Hour	
Start	to	End	Volume	Pk Hr?
3:00 PM	-	4:00 PM	829	no
3:15 PM	-	4:15 PM	842	no
3:30 PM	-	4:30 PM	786	no
3:45 PM	-	4:45 PM	1199	no
4:00 PM	-	5:00 PM	1447	no
4:15 PM	-	5:15 PM	1591	no
4:30 PM	-	5:30 PM	1967	no
4:45 PM	-	5:45 PM	2047	YES
5:00 PM	-	6:00 PM	1771	no
5:15 PM	-	6:15 PM	1458	no
5:30 PM	-	6:30 PM	961	no
5:45 PM	-	6:45 PM	287	no
6:00 PM	-	7:00 PM	0	no

SPECIAL CONDITIONS NOTES

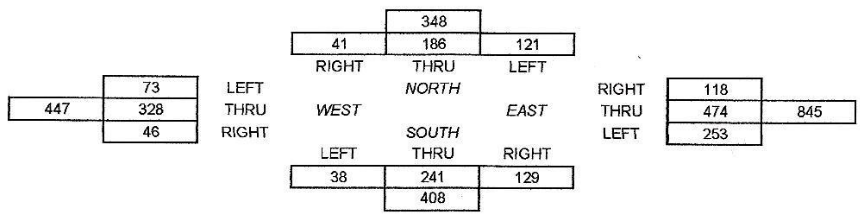
VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

INTERSECTION:	Diamond Hill Road @ Nate Whipple Highway
PEAK HOUR:	4:45 PM 5:45 PM
DATE:	Thursday, March 05, 2020

DIRECTIONAL LEG VOLUMES -- PEAK HOUR



APPROACH VOLUME TURN MOVEMENTS -- PEAK HOUR



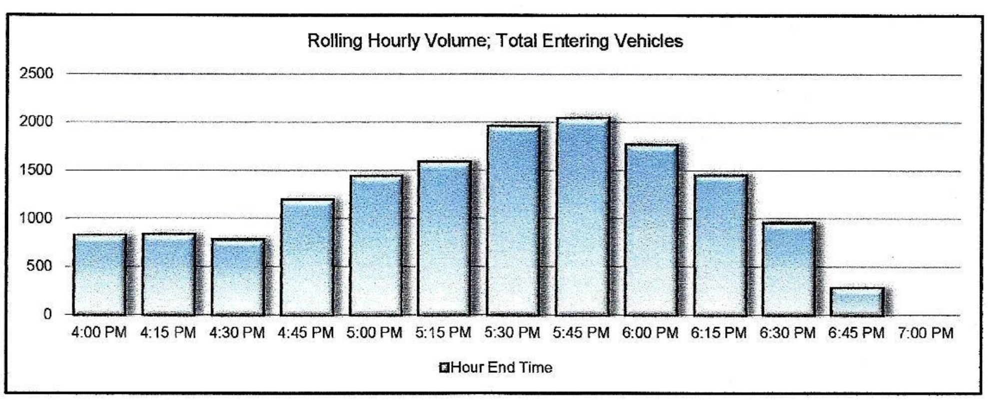
Pedestrians (Peak Hour)	
Crossing Leg	# of
North	0
South	0
East	0
West	0
Total	0

Bikes (Peak Hour)	
Approach	# of
From North:	0
From South:	0
From East:	0
From West:	0
Total	0

ADJUSTMENT FACTORS DERIVED FROM COUNT

Peak Hour Factors:	From North:	0.75	SB
	From South:	0.77	NB
	From East:	0.77	WB
	From West:	0.73	EB
	Total	0.76	All

Heavy Vehicles:	From North:	21	6.0%	SB
	From South:	20	4.9%	NB
	From East:	48	5.7%	WB
	From West:	57	12.8%	EB



VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

Location:	Pine Swamp Road @ Wrentham Road			City/Town:	Cumberland, RI
Checker:	VJS	Weather:	Sunny	Job:	Group 17C Newell
Date:	3/5/20 enter day	Start Time:	3:00 PM	Pk Hr:	4:45 PM to 5:45 PM
# of minutes counted per interval:	14 minutes				

END TIME	From the NORTH (SOUTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	N Leg Peds
3:15 PM	6	16	5	27	0	0	0
3:30 PM	7	20	6	33	0	0	0
3:45 PM	8	18	5	31	1	0	0
4:00 PM	3	29	11	43	1	0	0
4:15 PM	6	22	8	36	1	0	0
4:30 PM	7	24	5	36	0	0	0
4:45 PM	3	27	7	37	0	0	0
5:00 PM	5	35	5	45	1	0	0
5:15 PM	4	26	5	35	0	0	0
5:30 PM	6	35	8	49	0	0	0
5:45 PM	7	24	7	38	0	0	0
6:00 PM	4	22	3	29	0	0	0
6:15 PM	0	0	0	0	0	0	0
6:30 PM	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0
PK HR	22	120	25	167	1	0	0
Adj HR	24	129	27	180	1	0	0

END TIME	From the EAST (WESTBOUND) RT	TH	LT	TOTAL	HV	Bikes	E Leg Peds
3:15 PM	2	36	15	53	1	0	0
3:30 PM	3	45	19	67	0	0	0
3:45 PM	3	63	26	92	2	0	0
4:00 PM	3	79	37	119	1	0	0
4:15 PM	6	77	37	120	1	0	0
4:30 PM	1	82	30	113	0	0	0
4:45 PM	2	90	24	116	1	0	0
5:00 PM	5	96	30	131	0	0	0
5:15 PM	8	61	27	96	1	0	0
5:30 PM	7	78	36	121	2	0	0
5:45 PM	5	70	29	104	0	0	0
6:00 PM	1	81	31	113	0	0	0
6:15 PM	0	0	0	0	0	0	0
6:30 PM	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0
PK HR	25	305	122	452	3	0	0
Adj HR	27	327	131	485	3	0	0

END TIME	From the SOUTH (NORTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	S Leg Peds
3:15 PM	2	5	14	21	0	0	0
3:30 PM	3	6	18	27	0	0	0
3:45 PM	13	6	26	45	1	0	0
4:00 PM	16	11	7	34	0	0	0
4:15 PM	5	7	22	34	1	0	0
4:30 PM	7	10	25	42	0	0	0
4:45 PM	20	12	5	37	1	0	0
5:00 PM	35	12	7	54	0	0	0
5:15 PM	23	18	11	52	0	0	0
5:30 PM	26	19	8	53	0	0	0
5:45 PM	40	14	11	65	0	0	0
6:00 PM	21	15	11	47	0	0	0
6:15 PM	0	0	0	0	0	0	0
6:30 PM	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0
PK HR	124	63	37	224	0	0	0
Adj HR	133	68	40	241	0	0	0

END TIME	From the WEST (EASTBOUND) RT	TH	LT	TOTAL	HV	Bikes	W Leg Peds
3:15 PM	2	27	5	34	0	0	0
3:30 PM	2	34	6	42	0	0	0
3:45 PM	10	53	3	66	3	0	0
4:00 PM	8	40	12	60	0	0	0
4:15 PM	1	49	10	60	0	0	0
4:30 PM	7	40	4	51	0	0	0
4:45 PM	2	32	3	37	0	0	0
5:00 PM	12	46	3	61	0	0	0
5:15 PM	3	36	2	41	0	0	0
5:30 PM	4	14	8	26	0	0	0
5:45 PM	9	37	3	49	0	0	0
6:00 PM	4	36	3	43	0	0	0
6:15 PM	0	0	0	0	0	0	0
6:30 PM	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0
PK HR	28	133	16	177	0	0	0
Adj HR	30	143	17	190	0	0	0

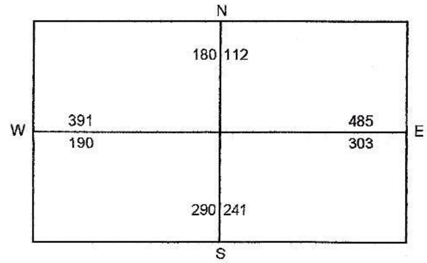
END TIME	15 Min Totals (adj) Veh	HV	Peds	Bikes
3:15 PM	145	1	0	0
3:30 PM	181	0	0	0
3:45 PM	251	8	0	0
4:00 PM	274	2	0	0
4:15 PM	268	3	0	0
4:30 PM	259	0	0	0
4:45 PM	243	2	0	0
5:00 PM	312	1	0	0
5:15 PM	240	1	0	0
5:30 PM	267	2	0	0
5:45 PM	274	0	0	0
6:00 PM	249	0	0	0
6:15 PM	0	0	0	0
6:30 PM	0	0	0	0
6:45 PM	0	0	0	0
7:00 PM	0	0	0	0

Rolling Hour Start	to	End	Rolling Hour Volume	Pk Hr?
3:00 PM	-	4:00 PM	851	no
3:15 PM	-	4:15 PM	974	no
3:30 PM	-	4:30 PM	1052	no
3:45 PM	-	4:45 PM	1044	no
4:00 PM	-	5:00 PM	1082	no
4:15 PM	-	5:15 PM	1054	no
4:30 PM	-	5:30 PM	1062	no
4:45 PM	-	5:45 PM	1093	YES
5:00 PM	-	6:00 PM	1030	no
5:15 PM	-	6:15 PM	790	no
5:30 PM	-	6:30 PM	523	no
5:45 PM	-	6:45 PM	249	no
6:00 PM	-	7:00 PM	0	no

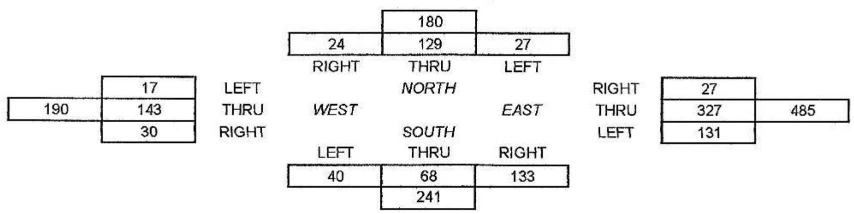
SPECIAL CONDITIONS NOTES

INTERSECTION:	Pine Swamp Road @ Wrentham Road
PEAK HOUR:	4:45 PM 5:45 PM
DATE:	Thursday, March 05, 2020

DIRECTIONAL LEG VOLUMES -- PEAK HOUR



APPROACH VOLUME TURN MOVEMENTS -- PEAK HOUR



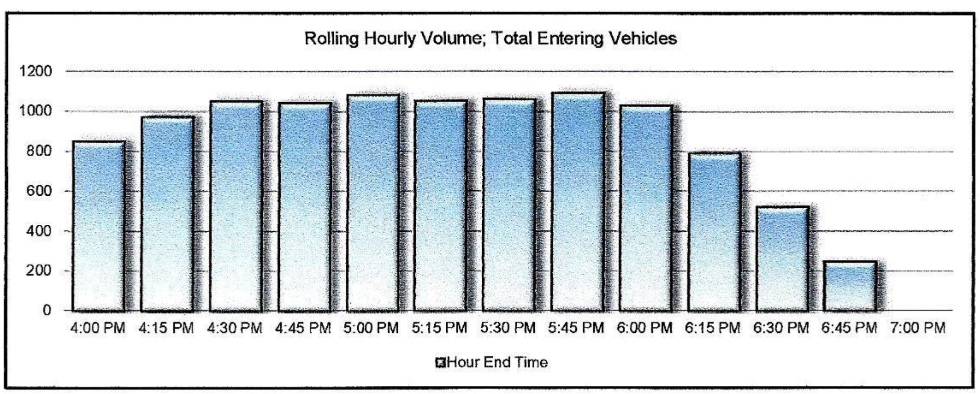
Pedestrians (Peak Hour)	
Crossing Leg	# of
North	0
South	0
East	0
West	0
Total	0

Bikes (Peak Hour)	
Approach	# of
From North:	0
From South:	0
From East:	0
From West:	0
Total	0

ADJUSTMENT FACTORS DERIVED FROM COUNT

Peak Hour Factors:	From North:	0.85	SB
	From South:	0.86	NB
	From East:	0.86	WB
	From West:	0.73	EB
	Total	0.88	All

Heavy Vehicles:	From North:	1	0.6%	SB
	From South:	0	0.0%	NB
	From East:	3	0.6%	WB
	From West:	0	0.0%	EB



VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

Location:	Pine Swamp Road @ Diamond Hill Road			City/Town:	Cumberland, RI	
Checker:	GN	Weather:	Sunny	Job:	Group 17C Newell	
Date:	3/5/20 enter day	Start Time:	3:00 PM	Pk Hr:	4:45 PM to	5:45 PM
# of minutes counted per interval:	14 minutes					

END	From the NORTH (SOUTHBOUND)						N Leg	From the EAST (WESTBOUND)						E Leg
TIME	RT	TH	LT	TOTAL	HV	Bikes	Peds	RT	TH	LT	TOTAL	HV	Bikes	Peds
3:15 PM	0	0	0	0	0	0	0	0	70	92	162	6	0	0
3:30 PM	0	0	0	0	0	0	0	0	88	116	204	7	0	0
3:45 PM	0	0	0	0	0	0	0	0	70	79	149	9	0	0
4:00 PM	0	0	0	0	0	0	0	0	91	112	203	7	0	0
4:15 PM	0	0	0	0	0	0	0	0	94	131	225	5	0	0
4:30 PM	0	0	0	0	0	0	0	0	82	121	203	3	0	0
4:45 PM	0	0	0	0	0	0	0	0	84	128	212	4	0	0
5:00 PM	0	0	0	0	0	0	0	0	77	129	206	0	0	0
5:15 PM	0	0	0	0	0	0	0	0	91	128	219	2	0	0
5:30 PM	0	0	0	0	0	0	0	0	77	131	208	3	0	0
5:45 PM	0	0	0	0	0	0	0	0	81	136	217	5	0	0
6:00 PM	0	0	0	0	0	0	0	0	72	89	161	1	0	0
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PK HR	0	0	0	0	0	0	0	0	326	524	850	10	0	0
Adj HR	0	0	0	0	0	0	0	0	349	561	910	11	0	0

END	From the SOUTH (NORTHBOUND)						S Leg	From the WEST (EASTBOUND)						W Leg
TIME	RT	TH	LT	TOTAL	HV	Bikes	Peds	RT	TH	LT	TOTAL	HV	Bikes	Peds
3:15 PM	47	0	25	72	3	0	0	33	31	0	64	1	0	0
3:30 PM	60	0	32	92	4	0	0	42	39	0	81	1	0	0
3:45 PM	32	0	46	78	2	0	0	52	34	0	86	4	0	0
4:00 PM	38	0	43	81	3	0	0	62	21	0	83	3	0	0
4:15 PM	44	0	68	112	4	0	0	49	30	0	79	3	0	0
4:30 PM	45	0	59	104	1	0	0	49	39	0	88	4	0	0
4:45 PM	49	0	51	100	1	0	0	35	38	0	73	2	0	0
5:00 PM	40	0	55	95	1	0	0	45	32	0	77	0	0	0
5:15 PM	53	0	51	104	1	0	0	51	33	0	84	0	0	0
5:30 PM	56	0	45	101	2	0	0	45	40	0	85	1	0	0
5:45 PM	74	0	44	118	0	0	0	47	60	0	107	2	0	0
6:00 PM	40	0	46	86	1	0	0	32	35	0	67	1	0	0
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PK HR	223	0	195	418	4	0	0	188	165	0	353	3	0	0
Adj HR	239	0	209	448	4	0	0	201	177	0	378	3	0	0

END	15 Min Totals (adj)			
TIME	Veh	HV	Peds	Bikes
3:15 PM	319	11	0	0
3:30 PM	404	13	0	0
3:45 PM	335	16	0	0
4:00 PM	393	14	0	0
4:15 PM	446	13	0	0
4:30 PM	423	9	0	0
4:45 PM	413	8	0	0
5:00 PM	405	1	0	0
5:15 PM	436	3	0	0
5:30 PM	422	6	0	0
5:45 PM	474	8	0	0
6:00 PM	336	3	0	0
6:15 PM	0	0	0	0
6:30 PM	0	0	0	0
6:45 PM	0	0	0	0
7:00 PM	0	0	0	0

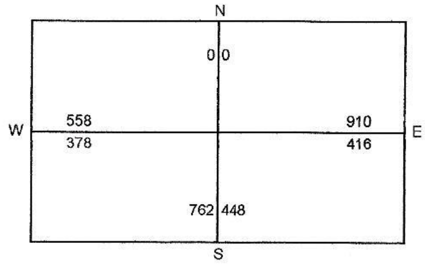
Rolling Hour			Rolling Hour	
Start	to	End	Volume	Pk Hr?
3:00 PM	-	4:00 PM	1451	no
3:15 PM	-	4:15 PM	1578	no
3:30 PM	-	4:30 PM	1597	no
3:45 PM	-	4:45 PM	1675	no
4:00 PM	-	5:00 PM	1687	no
4:15 PM	-	5:15 PM	1677	no
4:30 PM	-	5:30 PM	1676	no
4:45 PM	-	5:45 PM	1737	YES
5:00 PM	-	6:00 PM	1668	no
5:15 PM	-	6:15 PM	1232	no
5:30 PM	-	6:30 PM	810	no
5:45 PM	-	6:45 PM	336	no
6:00 PM	-	7:00 PM	0	no

SPECIAL CONDITIONS
NOTES

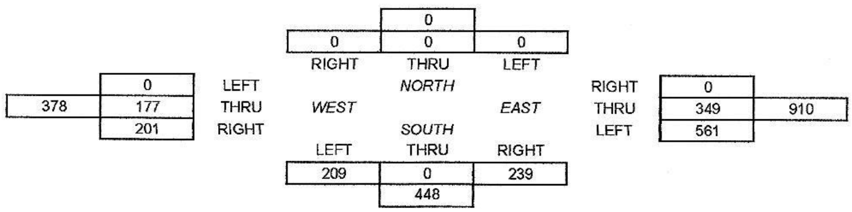
VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

INTERSECTION:	Pine Swamp Road @ Diamond Hill Road
PEAK HOUR:	4:45 PM 5:45 PM
DATE:	Thursday, March 05, 2020

DIRECTIONAL LEG VOLUMES -- PEAK HOUR



APPROACH VOLUME TURN MOVEMENTS -- PEAK HOUR



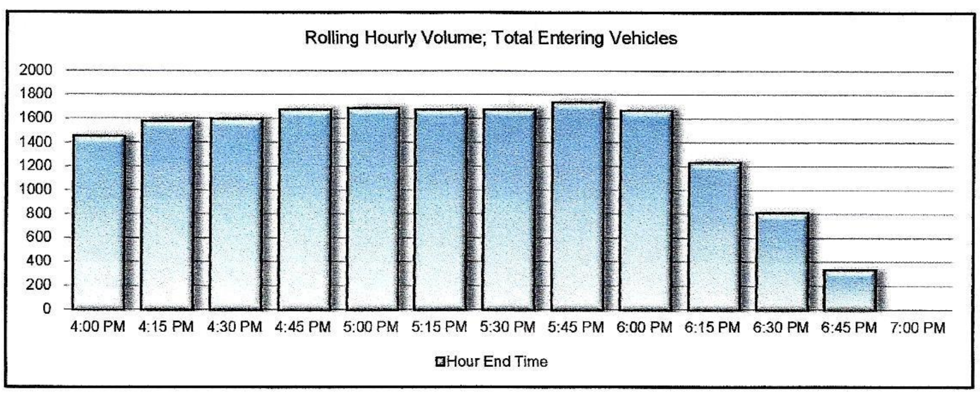
Pedestrians (Peak Hour)	
Crossing Leg	# of
North	0
South	0
East	0
West	0
Total	0

Bikes (Peak Hour)	
Approach	# of
From North:	0
From South:	0
From East:	0
From West:	0
Total	0

ADJUSTMENT FACTORS DERIVED FROM COUNT

Peak Hour Factors:	From North:	0.00	SB
	From South:	0.89	NB
	From East:	0.97	WB
	From West:	0.82	EB
	Total	0.92	All

Heavy Vehicles:	From North:	0	0.0%	SB
	From South:	4	0.9%	NB
	From East:	11	1.2%	WB
	From West:	3	0.8%	EB



VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

Location: Mendon Road@West Wrentham Road		City/Town:	Cumberland, RI
Checker: LF	Weather: Sunny	Job:	Group 17C Newell
Date: 3/5/20 enter day	Start Time: 3:00 PM	Pk Hr:	4:45 PM to 5:45 PM
# of minutes counted per interval: 14 minutes			

END TIME	From the NORTH (SOUTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	N Leg Peds	From the EAST (WESTBOUND) RT	TH	LT	TOTAL	HV	Bikes	E Leg Peds
3:15 PM	19	2	33	54	3	0	0	34	99	2	135	5	0	0
3:30 PM	24	2	41	67	6	0	0	42	124	3	169	6	0	0
3:45 PM	22	0	37	59	2	0	0	32	85	1	118	4	0	0
4:00 PM	30	0	30	60	2	0	0	31	85	2	118	5	0	0
4:15 PM	42	0	35	77	4	0	0	30	112	6	148	3	0	0
4:30 PM	29	0	31	60	0	0	0	32	70	0	102	2	0	0
4:45 PM	29	1	39	69	2	0	0	18	73	3	94	0	0	0
5:00 PM	26	0	52	78	3	0	0	34	99	4	137	1	0	0
5:15 PM	24	0	27	51	0	0	0	35	58	0	93	1	0	0
5:30 PM	38	0	41	79	2	0	0	36	90	1	127	2	0	0
5:45 PM	31	0	44	75	0	0	0	24	95	2	121	1	0	0
6:00 PM	31	0	23	54	0	0	0	24	98	1	123	1	0	0
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PK HR	119	0	164	283	5	0	0	129	342	7	478	5	0	0
Adj HR	128	0	176	304	5	0	0	138	366	8	512	5	0	0

END TIME	From the SOUTH (NORTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	S Leg Peds	From the WEST (EASTBOUND) RT	TH	LT	TOTAL	HV	Bikes	W Leg Peds
3:15 PM	0	0	0	0	0	0	0	1	67	10	78	2	0	0
3:30 PM	0	0	0	0	0	0	0	0	84	12	96	3	0	0
3:45 PM	0	0	0	0	0	0	0	1	107	13	121	5	0	0
4:00 PM	0	0	0	0	0	0	0	2	74	14	90	3	0	0
4:15 PM	0	0	0	0	0	0	0	3	110	25	138	1	0	0
4:30 PM	0	0	0	0	0	0	0	0	71	32	103	3	0	0
4:45 PM	0	0	0	0	0	0	0	1	71	26	98	4	0	0
5:00 PM	0	0	0	0	0	0	0	0	102	31	133	4	0	0
5:15 PM	0	0	0	0	0	0	0	1	97	34	132	1	0	0
5:30 PM	0	0	0	0	0	0	0	0	88	31	119	4	0	0
5:45 PM	0	0	0	0	0	0	0	2	104	46	152	0	0	0
6:00 PM	0	0	0	0	0	0	0	0	98	26	124	0	0	0
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PK HR	0	0	0	0	0	0	0	3	391	142	536	9	0	0
Adj HR	0	0	0	0	0	0	0	3	419	152	574	10	0	0

END TIME	15 Min Totals (adj) Veh	HV	Peds	Bikes
3:15 PM	286	11	0	0
3:30 PM	356	16	0	0
3:45 PM	319	12	0	0
4:00 PM	287	11	0	0
4:15 PM	389	9	0	0
4:30 PM	284	5	0	0
4:45 PM	280	6	0	0
5:00 PM	373	9	0	0
5:15 PM	296	2	0	0
5:30 PM	348	9	0	0
5:45 PM	373	1	0	0
6:00 PM	323	1	0	0
6:15 PM	0	0	0	0
6:30 PM	0	0	0	0
6:45 PM	0	0	0	0
7:00 PM	0	0	0	0

Rolling Hour Start	to	End	Rolling Hour Volume	Pk Hr?
3:00 PM	-	4:00 PM	1248	no
3:15 PM	-	4:15 PM	1351	no
3:30 PM	-	4:30 PM	1279	no
3:45 PM	-	4:45 PM	1240	no
4:00 PM	-	5:00 PM	1326	no
4:15 PM	-	5:15 PM	1233	no
4:30 PM	-	5:30 PM	1297	no
4:45 PM	-	5:45 PM	1390	YES
5:00 PM	-	6:00 PM	1340	no
5:15 PM	-	6:15 PM	1044	no
5:30 PM	-	6:30 PM	696	no
5:45 PM	-	6:45 PM	323	no
6:00 PM	-	7:00 PM	0	no

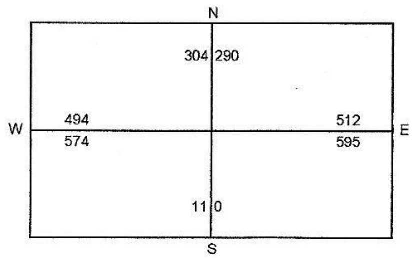
SPECIAL CONDITIONS NOTES

William Popp Associates©

VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

INTERSECTION:	Mendon Road@West Wrentham Road
PEAK HOUR:	4:45 PM 5:45 PM
DATE:	Thursday, March 05, 2020

DIRECTIONAL LEG VOLUMES -- PEAK HOUR



APPROACH VOLUME TURN MOVEMENTS -- PEAK HOUR

North approach (total 304):

RIGHT	THRU	LEFT
128	0	176

West approach (total 574):

LEFT	THRU	RIGHT
152	419	3

East approach (total 512):

RIGHT	THRU	LEFT
138	366	8

South approach (total 0):

LEFT	THRU	RIGHT
0	0	0

Pedestrians (Peak Hour)

Crossing Leg	# of
North	0
South	0
East	0
West	0
Total	0

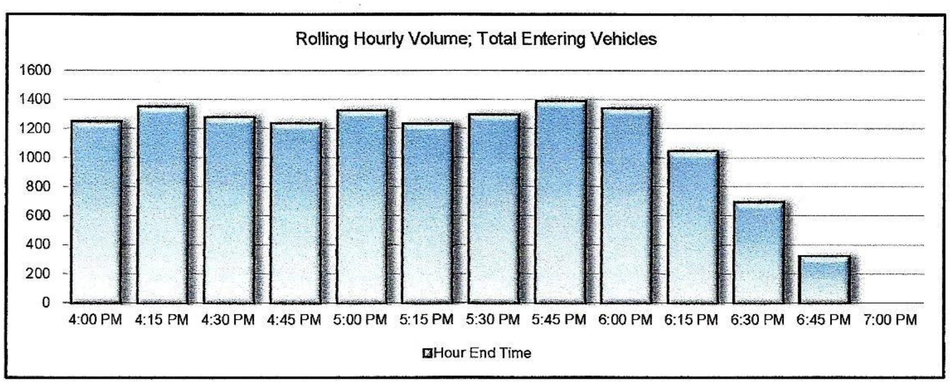
Bikes (Peak Hour)

Approach	# of
From North:	0
From South:	0
From East:	0
From West:	0
Total	0

ADJUSTMENT FACTORS DERIVED FROM COUNT

Peak Hour Factors:			
	From North:	0.90	SB
	From South:	0.00	NB
	From East:	0.87	WB
	From West:	0.88	EB
	Total	0.93	All

Heavy Vehicles:				
	From North:	5	1.6%	SB
	From South:	0	0.0%	NB
	From East:	5	1.0%	WB
	From West:	10	1.7%	EB



VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

Location:	Nate Whipple Highway @ Mendon Road			City/Town:	Cumberland, RI
Checker:	AF	Weather:	Sunny	Job:	Group 17C Newell
Date:	3/5/20 enter day	Start Time:	3:00 PM	Pk Hr:	4:45 PM to 5:45 PM
# of minutes counted per interval:	14 minutes				

END TIME	From the NORTH (SOUTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	N Leg Peds	From the EAST (WESTBOUND) RT	TH	LT	TOTAL	HV	Bikes	E Leg Peds
3:15 PM	23	0	21	44	2	0	0	14	72	0	86	2	0	0
3:30 PM	46	0	18	64	0	0	0	31	111	0	142	4	0	0
3:45 PM	68	0	42	110	1	0	0	25	102	0	127	4	0	0
4:00 PM	39	0	37	76	1	0	0	14	81	0	95	3	0	0
4:15 PM	73	0	35	108	2	0	0	22	80	0	102	2	0	0
4:30 PM	57	0	23	80	1	0	0	25	86	0	111	2	0	0
4:45 PM	38	0	24	62	1	0	0	31	74	0	105	0	0	0
5:00 PM	55	0	25	80	0	0	0	18	94	0	112	0	0	0
5:15 PM	46	0	24	70	2	0	0	23	95	0	118	1	0	0
5:30 PM	83	0	25	108	0	0	0	22	114	0	136	1	0	0
5:45 PM	54	0	25	79	0	0	0	29	89	0	118	1	0	0
6:00 PM	50	0	25	75	0	0	0	29	91	0	120	0	0	0
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PK HR	238	0	99	337	2	0	0	92	392	0	484	3	0	0
Adj HR	255	0	106	361	2	0	0	99	420	0	519	3	0	0

END TIME	From the SOUTH (NORTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	S Leg Peds	From the WEST (EASTBOUND) RT	TH	LT	TOTAL	HV	Bikes	W Leg Peds
3:15 PM	0	0	0	0	0	0	0	0	105	42	147	8	0	0
3:30 PM	0	0	0	0	0	0	0	0	99	51	150	5	0	0
3:45 PM	0	0	0	0	0	0	0	0	123	61	184	4	0	0
4:00 PM	0	0	0	0	0	0	0	0	87	59	146	2	0	0
4:15 PM	0	0	0	0	0	0	0	0	95	56	151	5	0	0
4:30 PM	0	0	0	0	0	0	0	0	86	64	150	3	0	0
4:45 PM	0	0	0	0	0	0	0	0	87	52	139	1	0	0
5:00 PM	0	0	0	0	0	0	0	0	101	49	150	1	0	0
5:15 PM	0	0	0	0	0	0	0	0	105	63	168	1	0	0
5:30 PM	0	0	0	0	0	0	0	0	104	65	169	3	0	0
5:45 PM	0	0	0	0	0	0	0	0	113	65	178	1	0	0
6:00 PM	0	0	0	0	0	0	0	0	74	52	126	0	0	0
6:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PK HR	0	0	0	0	0	0	0	0	423	242	665	6	0	0
Adj HR	0	0	0	0	0	0	0	0	453	259	712	6	0	0

END TIME	15 Min Totals (adj) Veh	HV	Peds	Bikes
3:15 PM	297	13	0	0
3:30 PM	381	10	0	0
3:45 PM	451	10	0	0
4:00 PM	340	6	0	0
4:15 PM	387	10	0	0
4:30 PM	365	6	0	0
4:45 PM	328	2	0	0
5:00 PM	366	1	0	0
5:15 PM	381	4	0	0
5:30 PM	443	4	0	0
5:45 PM	402	2	0	0
6:00 PM	344	0	0	0
6:15 PM	0	0	0	0
6:30 PM	0	0	0	0
6:45 PM	0	0	0	0
7:00 PM	0	0	0	0

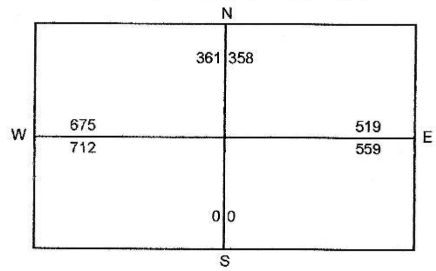
Rolling Hour Start	to	End	Rolling Hour Volume	Pk Hr?
3:00 PM	-	4:00 PM	1469	no
3:15 PM	-	4:15 PM	1559	no
3:30 PM	-	4:30 PM	1543	no
3:45 PM	-	4:45 PM	1420	no
4:00 PM	-	5:00 PM	1446	no
4:15 PM	-	5:15 PM	1440	no
4:30 PM	-	5:30 PM	1518	no
4:45 PM	-	5:45 PM	1592	YES
5:00 PM	-	6:00 PM	1570	no
5:15 PM	-	6:15 PM	1189	no
5:30 PM	-	6:30 PM	746	no
5:45 PM	-	6:45 PM	344	no
6:00 PM	-	7:00 PM	0	no

SPECIAL CONDITIONS NOTES

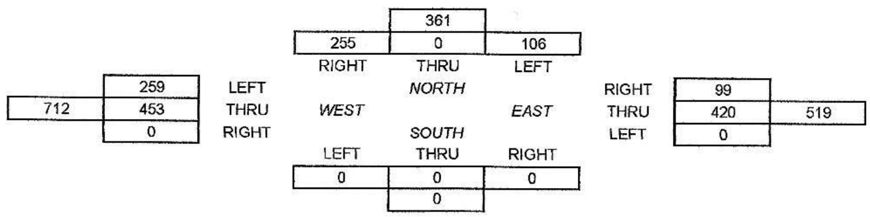
VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

INTERSECTION:	Nate Whipple Highway @ Mendon Road
PEAK HOUR:	4:45 PM 5:45 PM
DATE:	Thursday, March 05, 2020

DIRECTIONAL LEG VOLUMES -- PEAK HOUR



APPROACH VOLUME TURN MOVEMENTS -- PEAK HOUR



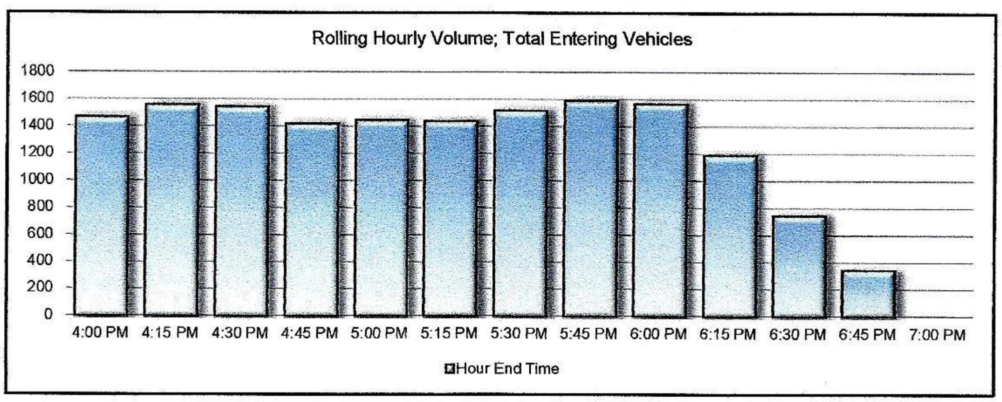
Pedestrians (Peak Hour)	
Crossing Leg	# of
North	0
South	0
East	0
West	0
Total	0

Bikes (Peak Hour)	
Approach	# of
From North:	0
From South:	0
From East:	0
From West:	0
Total	0

ADJUSTMENT FACTORS DERIVED FROM COUNT

Peak Hour Factors:			
	From North:	0.78	SB
	From South:	0.00	NB
	From East:	0.89	WB
	From West:	0.93	EB
	Total	0.90	All

Heavy Vehicles:				
	From North:	2	0.6%	SB
	From South:	0	0.0%	NB
	From East:	3	0.6%	WB
	From West:	6	0.8%	EB



VALERIE J. SOUTHERN – TRANSPORTATION CONSULTANT, LLC

TO: Steve Baker, Steere Engineering

FROM: Valerie J. Southern, VJS-TC, LLC

DATE: March 9, 2020

SUBJ: **DELIVERABLE:** Weekend Traffic Counts – Cumberland RI

===

<u>Saturday, March 7, 2020 – 10:00 AM – 2:00 PM</u>

1 – Diamond Hill Road @ Nate Whipple Highway
2 – Pine Swamp Road @ Wrentham Road
3 – Pine Swamp Road @ Diamond Hill Road
4 – Mendon Road @ West Wrentham Road
5 – Nate Whipple Highway @ Mendon Road

43 CLINTON AVENUE
JAMESTOWN, RHODE ISLAND 02835
(401) 560-7930

VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

Location:	Diamond Hill Road @ Nate Whipple Highway	City/Town:	Cumberland, RI
Checker:	DLN Weather: Sunny	Job:	Group 17C Newell
Date:	3/7/20 enter day Start Time: 10:00 AM	Pk Hr:	10:45 AM to 11:45 AM
# of minutes counted per interval:	14 minutes		

END TIME	From the NORTH (SOUTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	N Leg Peds	From the EAST (WESTBOUND) RT	TH	LT	TOTAL	HV	Bikes	E Leg Peds
10:15 AM	9	45	28	82	1	0	0	15	21	6	42	1	0	0
10:30 AM	10	48	30	88	1	0	1	16	22	6	44	1	0	0
10:45 AM	14	58	29	101	2	0	0	25	27	3	55	3	0	0
11:00 AM	24	56	58	138	2	0	0	32	23	2	57	1	0	0
11:15 AM	18	56	54	128	1	1	0	28	39	8	75	1	0	0
11:30 AM	18	55	31	104	2	0	1	38	24	3	65	0	0	0
11:45 AM	16	58	33	107	3	0	0	31	31	4	66	3	0	0
12:00 PM	14	53	27	94	1	0	0	27	23	4	54	2	0	0
12:15 PM	20	32	40	92	1	0	0	24	18	10	52	2	0	0
12:30 PM	20	40	48	108	2	0	0	33	20	10	63	1	0	0
12:45 PM	21	48	57	126	1	1	0	42	22	10	74	0	0	0
1:00 PM	6	28	27	61	3	0	0	39	28	8	75	1	0	0
1:15 PM	28	59	36	123	0	0	0	23	29	0	52	1	0	0
1:30 PM	14	41	34	89	0	0	0	27	31	8	66	2	0	0
1:45 PM	14	40	40	94	3	0	0	30	31	5	66	2	0	0
2:00 PM	15	57	40	112	3	0	0	43	29	13	85	1	0	0
PK HR	76	225	176	477	8	1	1	129	117	17	263	5	0	0
Adj HR	81	241	189	511	9	1	1	138	125	18	281	5	0	0

END TIME	From the SOUTH (NORTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	S Leg Peds	From the WEST (EASTBOUND) RT	TH	LT	TOTAL	HV	Bikes	W Leg Peds
10:15 AM	5	29	18	52	1	0	0	5	29	18	52	1	0	0
10:30 AM	5	31	19	55	2	0	0	5	31	19	55	2	0	0
10:45 AM	7	38	7	52	0	0	0	8	44	14	66	1	0	0
11:00 AM	6	55	18	79	0	0	0	8	31	24	63	4	0	0
11:15 AM	9	55	10	74	1	0	0	13	35	22	70	4	0	0
11:30 AM	5	54	14	73	2	0	0	14	25	15	54	1	0	0
11:45 AM	10	41	7	58	2	0	0	7	28	22	57	4	0	0
12:00 PM	5	53	13	71	1	0	0	15	26	18	59	1	0	0
12:15 PM	4	42	8	54	6	0	0	12	18	4	34	1	0	0
12:30 PM	5	48	6	59	5	0	0	13	22	7	42	2	0	0
12:45 PM	6	54	5	65	6	0	0	14	26	10	50	1	0	0
1:00 PM	10	70	14	94	5	0	0	14	32	30	76	0	0	0
1:15 PM	4	55	3	62	0	0	0	3	25	9	37	0	0	0
1:30 PM	9	41	15	65	1	0	0	9	29	13	51	2	0	0
1:45 PM	6	53	10	69	0	0	0	9	33	17	59	1	0	0
2:00 PM	6	48	10	64	2	0	0	7	34	11	52	0	0	0
PK HR	30	205	49	284	5	0	0	42	119	83	244	13	0	0
Adj HR	32	220	53	305	5	0	0	45	128	89	262	14	0	0

END TIME	15 Min Totals (adj) Veh	HV	Peds	Bikes
10:15 AM	244	4	0	0
10:30 AM	259	6	0	1
10:45 AM	294	6	0	0
11:00 AM	361	8	0	0
11:15 AM	372	8	1	0
11:30 AM	317	5	0	1
11:45 AM	309	13	0	0
12:00 PM	298	5	0	0
12:15 PM	249	11	0	0
12:30 PM	291	11	0	0
12:45 PM	338	9	1	0
1:00 PM	328	10	0	0
1:15 PM	294	1	0	0
1:30 PM	290	5	0	0
1:45 PM	309	6	0	0
2:00 PM	335	6	0	0

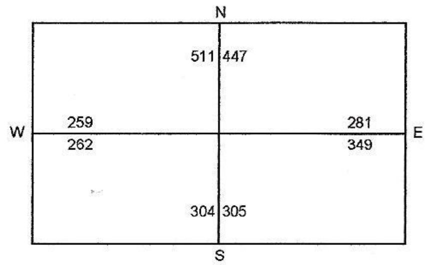
Start	Rolling Hour to	End	Rolling Hour Volume	Pk Hr?
10:00 AM	-	11:00 AM	1158	no
10:15 AM	-	11:15 AM	1286	no
10:30 AM	-	11:30 AM	1344	no
10:45 AM	-	11:45 AM	1359	YES
11:00 AM	-	12:00 PM	1296	no
11:15 AM	-	12:15 PM	1173	no
11:30 AM	-	12:30 PM	1147	no
11:45 AM	-	12:45 PM	1176	no
12:00 PM	-	1:00 PM	1206	no
12:15 PM	-	1:15 PM	1251	no
12:30 PM	-	1:30 PM	1250	no
12:45 PM	-	1:45 PM	1221	no
1:00 PM	-	2:00 PM	1228	no

SPECIAL CONDITIONS NOTES

VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

INTERSECTION:	Diamond Hill Road @ Nate Whipple Highway
PEAK HOUR:	10:45 AM 11:45 AM
DATE:	Saturday, March 07, 2020

DIRECTIONAL LEG VOLUMES -- PEAK HOUR



APPROACH VOLUME TURN MOVEMENTS -- PEAK HOUR

Approach	Total	Left	Thru	Right
NORTH	511	189	241	81
SOUTH	305	53	220	32
EAST	281	18	125	138
WEST	262	89	128	45

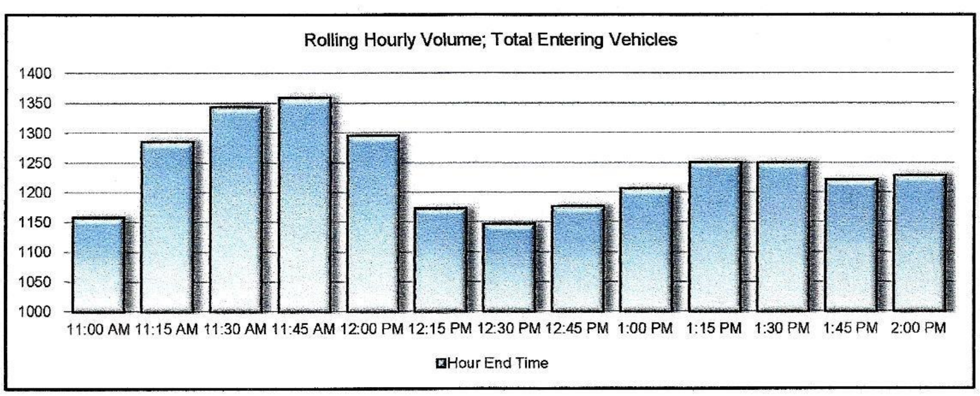
Pedestrians (Peak Hour)	
Crossing Leg	# of
North	1
South	0
East	0
West	0
Total	1

Bikes (Peak Hour)	
Approach	# of
From North:	1
From South:	0
From East:	0
From West:	0
Total	1

ADJUSTMENT FACTORS DERIVED FROM COUNT

Peak Hour Factors:			
	From North:	0.86	SB
	From South:	0.90	NB
	From East:	0.88	WB
	From West:	0.87	EB
	Total	0.91	All

Heavy Vehicles:				
	From North:	9	1.8%	SB
	From South:	5	1.6%	NB
	From East:	5	1.8%	WB
	From West:	14	5.3%	EB



VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

Location:	West Wrentham Road @ Pine Swamp Road			City/Town:	Cumberland, RI	
Checker:	VJS	Weather:	Sunny	Job:	Group 17C Newell	
Date:	3/7/20 enter day	Start Time:	10:00 AM	Pk Hr:	12:30 PM to	1:30 PM
# of minutes counted per interval:	14 minutes					

END TIME	From the NORTH (SOUTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	N Leg Peds	From the EAST (WESTBOUND) RT	TH	LT	TOTAL	HV	Bikes	E Leg Peds
10:15 AM	0	14	31	45	0	0	0	6	31	14	51	0	0	0
10:30 AM	4	4	4	12	0	0	0	4	30	6	40	0	0	0
10:45 AM	2	10	5	17	0	0	1	1	32	8	41	0	0	0
11:00 AM	3	11	5	19	0	0	0	2	45	12	59	0	0	0
11:15 AM	3	17	3	23	1	0	0	3	52	18	73	0	0	1
11:30 AM	4	10	3	17	0	0	0	4	41	15	60	2	0	0
11:45 AM	1	8	9	18	0	0	0	3	38	15	56	0	0	0
12:00 PM	1	9	6	16	0	0	0	4	47	13	64	1	0	0
12:15 PM	1	6	4	11	0	0	0	3	33	9	45	1	0	0
12:30 PM	2	8	6	16	0	0	0	4	51	11	66	1	0	0
12:45 PM	5	11	8	24	0	0	0	5	68	12	85	0	0	0
1:00 PM	5	10	6	21	0	0	0	4	48	8	60	1	0	0
1:15 PM	1	8	3	12	0	0	2	6	57	16	79	1	0	0
1:30 PM	4	13	3	20	0	0	0	2	42	20	64	0	1	0
1:45 PM	3	13	6	22	0	0	0	2	52	12	66	3	0	0
2:00 PM	2	7	2	11	0	0	0	5	42	11	58	0	0	0
PK HR	15	42	20	77	0	0	2	17	215	56	288	2	1	0
Adj HR	16	45	21	82	0	0	2	18	230	60	308	2	1	0

END TIME	From the SOUTH (NORTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	S Leg Peds	From the WEST (EASTBOUND) RT	TH	LT	TOTAL	HV	Bikes	W Leg Peds
10:15 AM	20	3	5	28	0	0	1	3	20	6	29	0	0	0
10:30 AM	14	5	7	26	0	1	0	7	35	4	46	0	0	0
10:45 AM	12	3	8	23	0	0	1	12	55	1	68	0	0	0
11:00 AM	12	4	8	24	0	0	0	8	44	4	56	0	0	0
11:15 AM	14	7	9	30	0	0	0	16	62	3	81	0	0	0
11:30 AM	14	15	19	48	0	0	0	7	48	5	60	2	0	0
11:45 AM	11	7	6	24	0	0	0	11	46	2	59	0	0	0
12:00 PM	11	4	10	25	0	0	0	9	43	2	54	0	0	0
12:15 PM	8	3	7	18	0	0	0	6	30	1	37	1	0	0
12:30 PM	16	8	7	31	0	0	0	10	51	3	64	1	0	0
12:45 PM	24	13	7	44	0	0	0	14	70	4	88	0	0	0
1:00 PM	22	4	7	33	0	0	0	7	45	2	54	0	0	0
1:15 PM	12	0	4	16	0	0	0	8	39	1	48	0	0	0
1:30 PM	16	12	8	36	0	0	0	10	45	3	58	2	0	0
1:45 PM	13	7	4	24	1	0	0	9	49	4	62	0	0	0
2:00 PM	12	4	6	22	0	0	0	11	48	3	62	2	0	0
PK HR	74	29	26	129	0	0	0	39	199	10	248	2	0	0
Adj HR	79	31	28	138	0	0	0	42	213	11	266	2	0	0

END TIME	15 Min Totals (adj) Veh	HV	Peds	Bikes
10:15 AM	164	0	0	1
10:30 AM	133	0	1	0
10:45 AM	160	0	0	2
11:00 AM	169	0	0	0
11:15 AM	222	1	0	1
11:30 AM	198	4	0	0
11:45 AM	168	0	0	0
12:00 PM	170	1	0	0
12:15 PM	119	2	0	0
12:30 PM	190	2	0	0
12:45 PM	258	0	0	0
1:00 PM	180	1	0	0
1:15 PM	166	1	0	2
1:30 PM	191	2	1	0
1:45 PM	186	4	0	0
2:00 PM	164	2	0	0

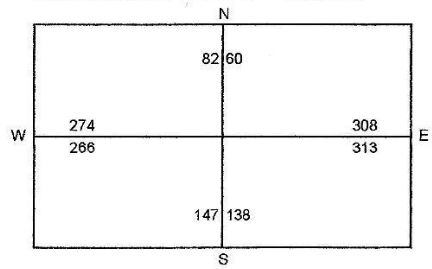
Rolling Hour Start	to	End	Rolling Hour Volume	Pk Hr?
10:00 AM	-	11:00 AM	626	no
10:15 AM	-	11:15 AM	684	no
10:30 AM	-	11:30 AM	749	no
10:45 AM	-	11:45 AM	757	no
11:00 AM	-	12:00 PM	758	no
11:15 AM	-	12:15 PM	655	no
11:30 AM	-	12:30 PM	647	no
11:45 AM	-	12:45 PM	737	no
12:00 PM	-	1:00 PM	747	no
12:15 PM	-	1:15 PM	794	no
12:30 PM	-	1:30 PM	795	YES
12:45 PM	-	1:45 PM	723	no
1:00 PM	-	2:00 PM	707	no

SPECIAL CONDITIONS NOTES

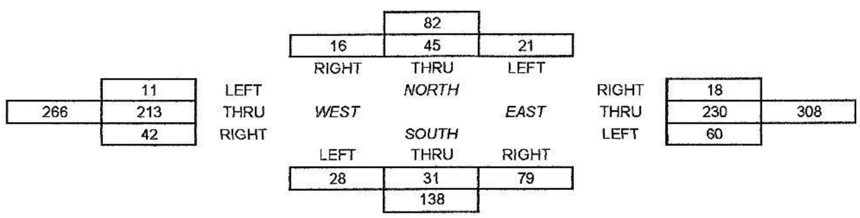
VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

INTERSECTION:	West Wrentham Road @ Pine Swamp Road
PEAK HOUR:	12:30 PM 1:30 PM
DATE:	Saturday, March 07, 2020

DIRECTIONAL LEG VOLUMES -- PEAK HOUR



APPROACH VOLUME TURN MOVEMENTS -- PEAK HOUR



Pedestrians (Peak Hour)

Crossing Leg	# of
North	2
South	0
East	0
West	0
Total	2

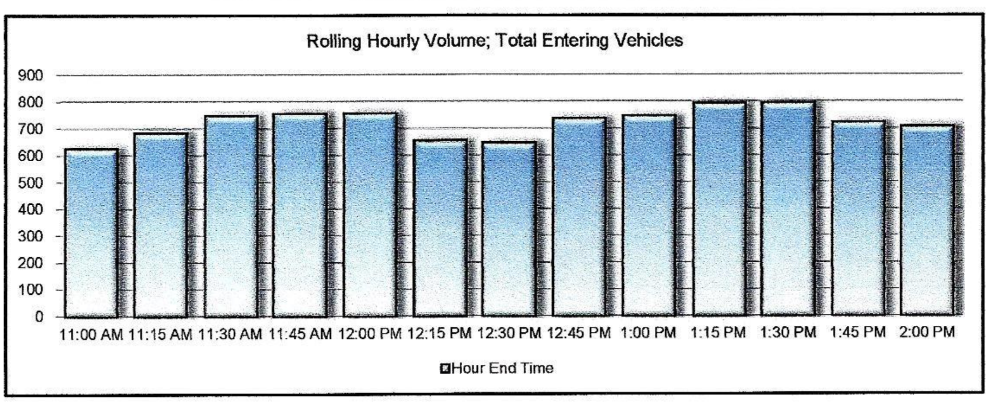
Bikes (Peak Hour)

Approach	# of
From North:	0
From South:	0
From East:	1
From West:	0
Total	1

ADJUSTMENT FACTORS DERIVED FROM COUNT

Peak Hour Factors:	From North:	0.80	SB
	From South:	0.73	NB
	From East:	0.85	WB
	From West:	0.70	EB
	Total	0.77	All

Heavy Vehicles:	From North:	0	0.0%	SB
	From South:	0	0.0%	NB
	From East:	2	0.6%	WB
	From West:	2	0.8%	EB



VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

Location:	Pine Swamp Road @ Diamond Hill Road			City/Town:	Cumberland, RI
Checker:	GAN	Weather:	Sunny	Job:	Group 17C Newell
Date:	3/7/20 enter day	Start Time:	10:15 AM	Pk Hr:	12:30 PM to 1:30 PM
# of minutes counted per interval:	14 minutes				

END TIME	From the NORTH (SOUTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	N Leg Peds	From the EAST (WESTBOUND) RT	TH	LT	TOTAL	HV	Bikes	E Leg Peds
10:30 AM	0	0	0	0	0	0	0	0	19	51	70	1	0	0
10:45 AM	0	0	0	0	0	0	0	0	25	41	66	1	0	0
11:00 AM	0	0	0	0	0	0	0	0	26	33	59	2	0	0
11:15 AM	0	0	0	0	0	0	0	0	36	45	81	2	0	0
11:30 AM	0	0	0	0	0	0	0	0	32	38	70	0	0	0
11:45 AM	0	0	0	0	0	0	0	0	32	54	86	0	0	0
12:00 PM	0	0	0	0	0	0	0	0	26	35	61	1	0	0
12:15 PM	0	0	0	0	0	0	0	0	18	25	43	1	0	0
12:30 PM	0	0	0	0	0	0	0	0	26	41	67	2	0	0
12:45 PM	0	0	0	0	0	0	0	0	33	56	89	3	0	0
1:00 PM	0	0	0	0	0	0	0	0	31	44	75	4	0	0
1:15 PM	0	0	0	0	0	0	0	0	31	44	75	3	0	0
1:30 PM	0	0	0	0	0	0	0	0	36	39	75	0	0	0
1:45 PM	0	0	0	0	0	0	0	0	38	38	76	2	0	0
2:00 PM	0	0	0	0	0	0	0	0	27	56	83	2	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PK HR	0	0	0	0	0	0	0	0	131	183	314	10	0	0
Adj HR	0	0	0	0	0	0	0	0	140	196	336	11	0	0

END TIME	From the SOUTH (NORTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	S Leg Peds	From the WEST (EASTBOUND) RT	TH	LT	TOTAL	HV	Bikes	W Leg Peds
10:30 AM	40	0	14	54	0	0	0	37	16	0	53	0	0	0
10:45 AM	29	0	27	56	0	0	0	43	40	0	83	1	1	0
11:00 AM	36	0	45	81	3	0	0	49	28	0	77	0	0	0
11:15 AM	43	0	49	92	0	0	0	53	44	0	97	1	0	0
11:30 AM	49	0	38	87	1	0	0	48	35	0	83	1	0	0
11:45 AM	47	0	40	87	3	0	0	43	39	0	82	0	0	0
12:00 PM	42	0	47	89	0	0	0	47	32	0	79	1	0	0
12:15 PM	30	0	33	63	1	0	0	33	22	0	55	1	0	0
12:30 PM	45	0	52	97	1	0	0	42	25	0	67	0	0	0
12:45 PM	61	0	70	131	0	0	0	51	28	0	79	0	0	0
1:00 PM	57	0	52	109	2	0	0	77	28	0	105	1	0	0
1:15 PM	43	0	51	94	3	0	1	42	21	0	63	4	0	0
1:30 PM	45	0	46	91	3	1	0	48	32	0	80	2	0	0
1:45 PM	38	0	46	84	2	0	0	52	33	0	85	1	0	0
2:00 PM	46	0	50	96	3	0	0	53	44	0	97	4	0	0
2:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PK HR	206	0	219	425	8	1	1	218	109	0	327	7	0	0
Adj HR	221	0	235	456	9	1	1	234	117	0	351	8	0	0

END TIME	15 Min Totals (adj) Veh	HV	Peds	Bikes
10:30 AM	190	1	0	0
10:45 AM	220	2	1	0
11:00 AM	233	5	0	0
11:15 AM	289	3	0	0
11:30 AM	257	2	0	0
11:45 AM	273	3	0	0
12:00 PM	245	2	0	0
12:15 PM	173	3	0	0
12:30 PM	248	3	0	0
12:45 PM	320	3	0	0
1:00 PM	310	8	0	0
1:15 PM	249	11	0	1
1:30 PM	264	5	1	0
1:45 PM	263	5	0	0
2:00 PM	296	10	0	0
2:15 PM	0	0	0	0

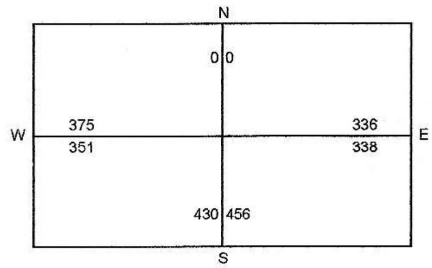
Rolling Hour Start	to	End	Rolling Hour Volume	Pk Hr?
10:15 AM	-	11:15 AM	932	no
10:30 AM	-	11:30 AM	999	no
10:45 AM	-	11:45 AM	1052	no
11:00 AM	-	12:00 PM	1064	no
11:15 AM	-	12:15 PM	948	no
11:30 AM	-	12:30 PM	939	no
11:45 AM	-	12:45 PM	986	no
12:00 PM	-	1:00 PM	1051	no
12:15 PM	-	1:15 PM	1127	no
12:30 PM	-	1:30 PM	1143	YES
12:45 PM	-	1:45 PM	1086	no
1:00 PM	-	2:00 PM	1072	no
1:15 PM	-	2:15 PM	823	no

SPECIAL CONDITIONS NOTES

VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

INTERSECTION:	Pine Swamp Road @ Diamond Hill Road
PEAK HOUR:	12:30 PM 1:30 PM
DATE:	Saturday, March 07, 2020

DIRECTIONAL LEG VOLUMES -- PEAK HOUR



APPROACH VOLUME TURN MOVEMENTS -- PEAK HOUR

NORTH (total 0)

RIGHT	THRU	LEFT
0	0	0

WEST (total 351)

LEFT	THRU	RIGHT
0	117	234

EAST (total 336)

RIGHT	THRU	LEFT
0	140	196

SOUTH (total 456)

LEFT	THRU	RIGHT
235	0	221

Pedestrians (Peak Hour)	
Crossing Leg	# of
North	0
South	1
East	0
West	0
Total	1

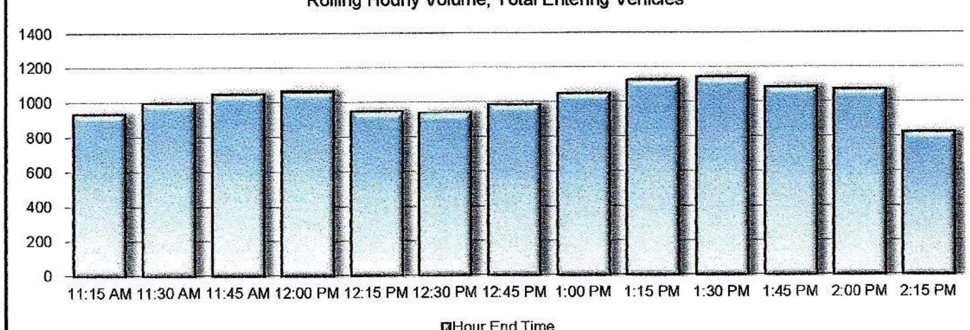
Bikes (Peak Hour)	
Approach	# of
From North:	0
From South:	1
From East:	0
From West:	0
Total	1

ADJUSTMENT FACTORS DERIVED FROM COUNT

Peak Hour Factors:			
	From North:	0.00	SB
	From South:	0.81	NB
	From East:	0.88	WB
	From West:	0.78	EB
	Total	0.89	All

Heavy Vehicles:				
	From North:	0	0.0%	SB
	From South:	9	2.0%	NB
	From East:	11	3.3%	WB
	From West:	8	2.3%	EB

Rolling Hourly Volume; Total Entering Vehicles



VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, IR

Location:	Mendon Road @ West Wrentham Road			City/Town:	Cumberland, RI
Checker:	SP	Weather:	Sunny	Job:	Group 17C Newell
Date:	3/7/20 enter day	Start Time:	10:00 AM	Pk Hr:	10:30 AM to 11:30 AM
# of minutes counted per interval:	14 minutes				

END TIME	From the NORTH (SOUTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	N Leg Peds	From the EAST (WESTBOUND) RT	TH	LT	TOTAL	HV	Bikes	E Leg Peds
10:15 AM	10	0	9	19	0	0	0	18	88	11	117	1	0	0
10:30 AM	14	0	18	32	0	0	0	11	58	3	72	1	0	0
10:45 AM	17	0	33	50	0	0	0	29	52	12	93	4	2	0
11:00 AM	15	0	32	47	1	0	0	24	86	11	121	5	0	0
11:15 AM	15	0	32	47	1	0	0	18	66	6	90	8	0	0
11:30 AM	16	0	26	42	0	0	0	26	104	0	130	3	0	0
11:45 AM	22	0	33	55	2	0	0	23	80	5	108	3	0	0
12:00 PM	22	0	29	51	2	0	0	25	73	6	104	2	0	0
12:15 PM	15	0	20	35	1	0	0	18	57	4	79	1	0	0
12:30 PM	17	0	22	39	1	0	0	23	64	7	94	2	0	0
12:45 PM	19	0	23	42	2	0	0	28	75	9	112	3	0	0
1:00 PM	20	0	34	54	0	0	0	28	88	4	120	0	0	0
1:15 PM	18	0	22	40	0	0	0	17	65	1	83	2	0	0
1:30 PM	22	0	22	44	1	0	0	14	65	3	82	1	0	0
1:45 PM	12	0	16	28	0	0	0	13	67	0	80	1	0	0
2:00 PM	16	0	19	35	0	0	0	18	65	0	83	0	0	0
PK HR	63	0	123	186	2	0	0	97	308	29	434	20	2	0
Adj HR	68	0	132	200	2	0	0	104	330	31	465	21	2	0

END TIME	From the SOUTH (NORTHBOUND) RT	TH	LT	TOTAL	HV	Bikes	S Leg Peds	From the WEST (EASTBOUND) RT	TH	LT	TOTAL	HV	Bikes	W Leg Peds
10:15 AM	0	0	0	0	0	0	0	1	131	11	143	1	0	0
10:30 AM	0	0	0	0	0	0	0	4	69	18	91	1	0	0
10:45 AM	0	0	0	0	0	0	0	6	117	19	142	0	0	0
11:00 AM	0	0	0	0	0	0	0	6	117	22	145	1	0	0
11:15 AM	0	0	0	0	0	0	0	1	65	12	78	2	0	0
11:30 AM	0	0	0	0	0	0	0	2	79	19	100	2	0	0
11:45 AM	0	0	0	0	0	0	0	1	85	19	105	1	0	0
12:00 PM	0	0	0	0	0	0	0	2	82	17	101	5	0	0
12:15 PM	0	0	0	0	0	0	0	2	58	12	72	4	0	0
12:30 PM	0	0	0	0	0	0	0	3	70	15	88	5	0	0
12:45 PM	0	0	0	0	0	0	0	2	82	17	101	5	0	0
1:00 PM	0	0	0	0	0	0	0	1	94	14	109	4	0	0
1:15 PM	0	0	0	0	0	0	0	0	83	9	92	1	0	0
1:30 PM	0	0	0	0	0	0	0	5	57	4	66	4	0	0
1:45 PM	0	0	0	0	0	0	0	1	71	12	84	4	0	0
2:00 PM	0	0	0	0	0	0	0	2	56	13	71	5	0	0
PK HR	0	0	0	0	0	0	0	15	378	72	465	5	0	0
Adj HR	0	0	0	0	0	0	0	16	405	77	498	5	0	0

END TIME	15 Min Totals (adj) Veh	HV	Peds	Bikes
10:15 AM	299	2	0	0
10:30 AM	209	2	0	0
10:45 AM	305	4	2	0
11:00 AM	335	8	0	0
11:15 AM	230	12	0	0
11:30 AM	291	5	0	0
11:45 AM	287	6	0	0
12:00 PM	274	10	0	0
12:15 PM	199	6	0	0
12:30 PM	237	9	0	0
12:45 PM	273	11	0	0
1:00 PM	303	4	0	0
1:15 PM	230	3	0	0
1:30 PM	206	6	0	0
1:45 PM	206	5	0	0
2:00 PM	203	5	0	0

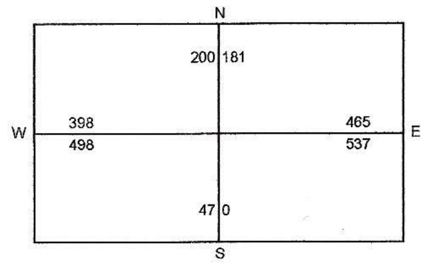
Start	Rolling Hour to	End	Rolling Hour Volume	Pk Hr?
10:00 AM	-	11:00 AM	1148	no
10:15 AM	-	11:15 AM	1079	no
10:30 AM	-	11:30 AM	1161	YES
10:45 AM	-	11:45 AM	1143	no
11:00 AM	-	12:00 PM	1082	no
11:15 AM	-	12:15 PM	1051	no
11:30 AM	-	12:30 PM	997	no
11:45 AM	-	12:45 PM	983	no
12:00 PM	-	1:00 PM	1012	no
12:15 PM	-	1:15 PM	1043	no
12:30 PM	-	1:30 PM	1012	no
12:45 PM	-	1:45 PM	945	no
1:00 PM	-	2:00 PM	845	no

SPECIAL CONDITIONS NOTES

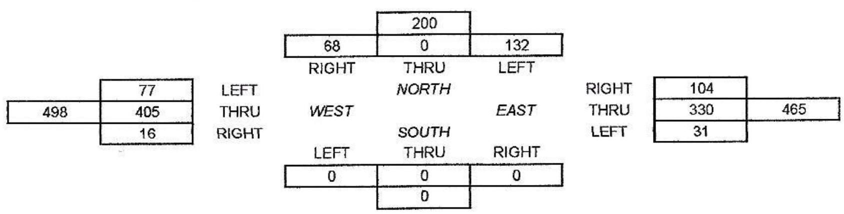
VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, IR

INTERSECTION:	Mendon Road @ West Wrentham Road
PEAK HOUR:	10:30 AM 11:30 AM
DATE:	Saturday, March 07, 2020

DIRECTIONAL LEG VOLUMES -- PEAK HOUR



APPROACH VOLUME TURN MOVEMENTS -- PEAK HOUR



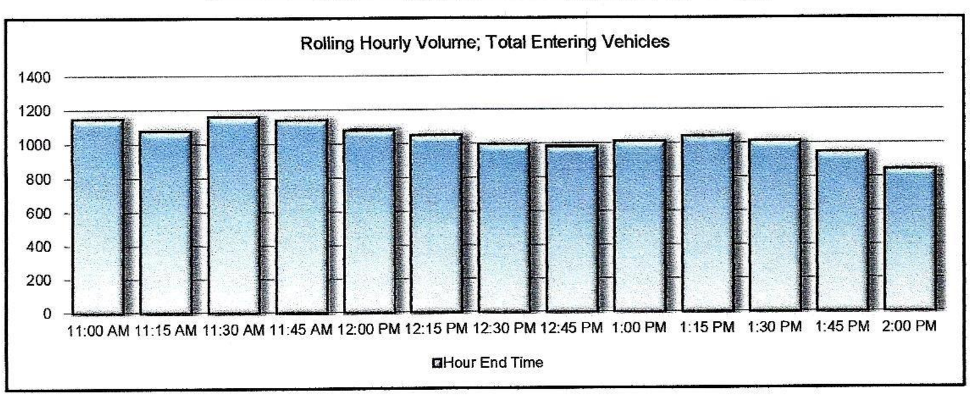
Pedestrians (Peak Hour)	
Crossing Leg	# of
North	0
South	0
East	0
West	0
Total	0

Bikes (Peak Hour)	
Approach	# of
From North:	0
From South:	0
From East:	2
From West:	0
Total	2

ADJUSTMENT FACTORS DERIVED FROM COUNT

Peak Hour Factors:	From North:	0.93	SB
	From South:	0.00	NB
	From East:	0.83	WB
	From West:	0.80	EB
	Total	0.87	All

Heavy Vehicles:	From North:	2	1.0%	SB
	From South:	0	0.0%	NB
	From East:	21	4.5%	WB
	From West:	5	1.0%	EB



VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

Location:	Nate Whipple Highway @ Mendon Road	City/Town:	Cumberland, RI
Checker:	AF Weather: Sunny	Job:	Group 17C Newell
Date:	3/7/20 enter day Start Time: 10:00 AM	Pk Hr:	11:00 AM to 12:00 PM
# of minutes counted per interval:	14 minutes		

END	From the NORTH (SOUTHBOUND)						N Leg	From the EAST (WESTBOUND)						E Leg
TIME	RT	TH	LT	TOTAL	HV	Bikes	Peds	RT	TH	LT	TOTAL	HV	Bikes	Peds
10:15 AM	42	0	23	65	0	0	0	10	68	0	78	2	0	0
10:30 AM	51	0	26	77	0	0	0	10	77	0	87	1	0	0
10:45 AM	39	0	25	64	1	0	0	26	93	0	119	0	2	0
11:00 AM	44	0	21	65	2	0	0	17	80	0	97	1	0	0
11:15 AM	50	0	16	66	0	0	0	14	83	0	97	1	0	0
11:30 AM	45	0	25	70	0	0	0	21	104	0	125	0	0	0
11:45 AM	57	0	25	82	1	0	0	27	126	0	153	0	0	0
12:00 PM	50	0	30	80	0	0	0	20	89	0	109	0	0	0
12:15 PM	29	0	12	41	1	0	0	13	56	0	69	1	0	0
12:30 PM	45	0	19	64	1	0	0	21	94	0	115	1	0	0
12:45 PM	60	0	26	86	1	0	0	29	132	0	161	2	0	0
1:00 PM	37	0	17	54	0	0	0	14	80	0	94	0	0	0
1:15 PM	30	0	25	55	0	0	0	21	99	0	120	0	0	0
1:30 PM	52	0	19	71	0	0	0	23	88	0	111	1	0	0
1:45 PM	43	0	18	61	0	0	0	17	80	0	97	0	0	0
2:00 PM	34	0	10	44	1	0	0	17	71	0	88	1	0	0
PK HR	202	0	96	298	1	0	0	82	402	0	484	1	0	0
Adj HR	216	0	103	319	1	0	0	88	431	0	519	1	0	0

END	From the SOUTH (NORTHBOUND)						S Leg	From the WEST (EASTBOUND)						W Leg
TIME	RT	TH	LT	TOTAL	HV	Bikes	Peds	RT	TH	LT	TOTAL	HV	Bikes	Peds
10:15 AM	0	0	0	0	0	0	0	0	95	32	127	2	0	0
10:30 AM	0	0	0	0	0	0	0	0	80	45	125	1	0	0
10:45 AM	0	0	0	0	0	0	0	0	98	45	143	1	0	0
11:00 AM	0	0	0	0	0	0	0	0	76	31	107	0	0	0
11:15 AM	0	0	0	0	0	0	0	0	104	43	147	4	0	0
11:30 AM	0	0	0	0	0	0	0	0	118	42	160	1	0	0
11:45 AM	0	0	0	0	0	0	0	0	108	42	150	1	0	0
12:00 PM	0	0	0	0	0	0	0	0	90	51	141	1	0	0
12:15 PM	0	0	0	0	0	0	0	0	82	40	122	0	0	0
12:30 PM	0	0	0	0	0	0	0	0	101	43	144	1	0	0
12:45 PM	0	0	0	0	0	0	0	0	120	46	166	2	0	0
1:00 PM	0	0	0	0	0	0	0	0	90	36	126	0	0	0
1:15 PM	0	0	0	0	0	0	0	0	92	34	126	0	0	0
1:30 PM	0	0	0	0	0	0	0	0	67	46	113	1	0	0
1:45 PM	0	0	0	0	0	0	0	0	32	29	61	1	0	0
2:00 PM	0	0	0	0	0	0	0	0	87	29	116	1	0	0
PK HR	0	0	0	0	0	0	0	0	420	178	598	7	0	0
Adj HR	0	0	0	0	0	0	0	0	450	191	641	8	0	0

END	15 Min Totals (adj)			
TIME	Veh	HV	Peds	Bikes
10:15 AM	289	4	0	0
10:30 AM	310	2	0	0
10:45 AM	349	2	2	0
11:00 AM	288	3	0	0
11:15 AM	332	5	0	0
11:30 AM	380	1	0	0
11:45 AM	413	2	0	0
12:00 PM	354	1	0	0
12:15 PM	249	2	0	0
12:30 PM	346	3	0	0
12:45 PM	443	5	0	0
1:00 PM	294	0	0	0
1:15 PM	323	0	0	0
1:30 PM	316	2	0	0
1:45 PM	235	1	0	0
2:00 PM	266	3	0	0

Rolling Hour Start	to	End	Rolling Hour Volume	Pk Hr?
10:00 AM	-	11:00 AM	1236	no
10:15 AM	-	11:15 AM	1279	no
10:30 AM	-	11:30 AM	1349	no
10:45 AM	-	11:45 AM	1413	no
11:00 AM	-	12:00 PM	1479	YES
11:15 AM	-	12:15 PM	1396	no
11:30 AM	-	12:30 PM	1362	no
11:45 AM	-	12:45 PM	1392	no
12:00 PM	-	1:00 PM	1332	no
12:15 PM	-	1:15 PM	1406	no
12:30 PM	-	1:30 PM	1376	no
12:45 PM	-	1:45 PM	1168	no
1:00 PM	-	2:00 PM	1140	no

SPECIAL CONDITIONS
NOTES

VJS-TC, LLC - Steere/RIDOT Counts - Cumberland, RI

INTERSECTION:	Nate Whipple Highway @ Mendon Road
PEAK HOUR:	11:00 AM 12:00 PM
DATE:	Saturday, March 07, 2020

DIRECTIONAL LEG VOLUMES -- PEAK HOUR

		N		
		319 | 279		
W	647 / 641		519 / 553	E
		0 | 0		
		S		

APPROACH VOLUME TURN MOVEMENTS -- PEAK HOUR

Approach	Total	Left	Thru	Right
NORTH	319	103	0	216
WEST	641	191	450	0
EAST	519	0	431	88
SOUTH	0	0	0	0

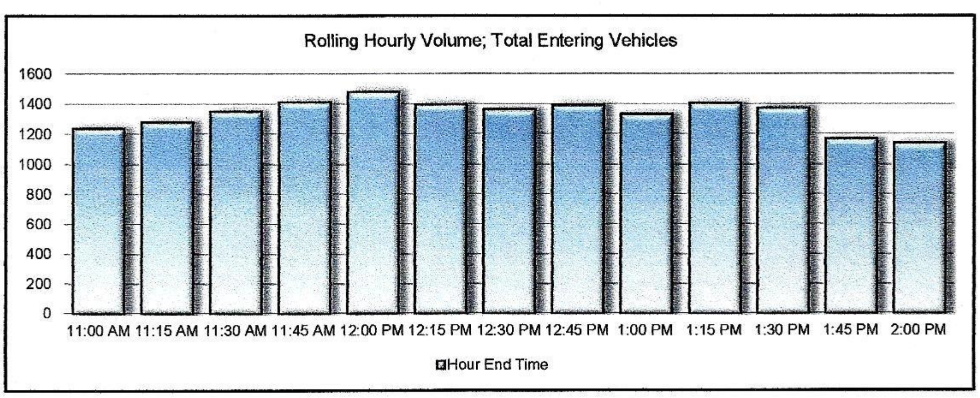
Pedestrians (Peak Hour)	
Crossing Leg	# of
North	0
South	0
East	0
West	0
Total	0

Bikes (Peak Hour)	
Approach	# of
From North:	0
From South:	0
From East:	0
From West:	0
Total	0

ADJUSTMENT FACTORS DERIVED FROM COUNT

Peak Hour Factors:	From North:	0.91	SB
	From South:	0.00	NB
	From East:	0.79	WB
	From West:	0.93	EB
	Total	0.90	All

Heavy Vehicles:	From North:	1	0.3%	SB
	From South:	0	0.0%	NB
	From East:	1	0.2%	WB
	From West:	8	1.2%	EB



AM-PM Weekday Peak Hour Counts
Cumberland Hill Plaza Driveways at West Wrentham Road and Mendon Road
Cumberland, Rhode Island
March 17, 2020

Count Time 7:30 AM to 8:30 AM

	From North			From East			From South			From West		
Report Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left
7:45 AM	0	0	0	0	0	0	0	0	0	0	0	0
8:00 AM	0	0	0	0	0	2	0	1	0	1	0	0
8:15 AM	0	1	0	0	0	5	3	0	0	1	0	0
8:30 AM	0	0	0	0	0	1	3	0	3	1	0	0
Peak Hour	0	1	0	0	0	8	6	1	3	3	0	0
Peak 15 min		1			5			6			1	
PHF		**0.25**			**0.4**			**0.42**			**0.75**	

Count Time 4:45 PM to 5:45 PM

	From North			From East			From South			From West		
Report Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left
5:00 PM	0	0	0	0	0	1	1	0	1	0	0	0
5:15 PM	0	1	0	0	0	0	0	0	0	0	0	0
5:30 PM	0	1	0	0	0	0	1	0	1	0	0	0
5:45 PM	0	0	0	0	0	1	0	0	1	0	0	0
Peak Hour	0	2	0	0	0	2	2	0	3	0	0	0
Peak 15 min		1			1			2			0	
PHF		**0.5**			**0.5**			**0.63**			**0**	

VALERIE J SOUTHERN TRANSPORTATION CONSULTANT, LLC
JAMESTOWN, RI
EMAIL: valerie.southern@vjs-consultant.com

Location : Diamond Hill Road @ South End of Newell Bridge
City, State : Cumberland, RI
Counter # : NT-2811

Site: Loc 01

Seven Day Volume, per Channel

Dual Dir

Interval Start	Sun 3/8/2020	Mon 3/9/2020	Tue 3/10/2020	Wed 3/11/2020	Thu 3/12/2020	Fri 3/13/2020	Sat 3/14/2020	Mon - Fri Average	7 Day Average
12:00 AM	-	35	57	44	64	63	112	52.6	62.5
1:00 AM	-	19	25	25	25	30	47	24.8	28.5
2:00 AM	-	13	28	16	16	15	36	17.6	20.7
3:00 AM	-	13	18	14	28	17	28	18.0	19.7
4:00 AM	-	59	64	69	68	47	28	61.4	55.8
5:00 AM	-	264	272	254	234	241	85	253.0	225.0
6:00 AM	-	726	780	757	718	600	175	716.2	626.0
7:00 AM	-	1107	1144	1129	1096	891	296	1073.4	943.8
8:00 AM	-	1062	1054	1094	1014	928	468	1030.4	936.7
9:00 AM	-	636	644	634	572	510	633	599.2	604.8
10:00 AM	-	540	546	557	552	530	768	545.0	582.2
11:00 AM	-	550	588	583	596	605	976	584.4	649.7
12:00 PM	954	632	642	642	652	621	1018	637.8	737.3
1:00 PM	910	674	626	728	646	661	927	667.0	738.9
2:00 PM	972	911	884	951	872	840	916	891.6	906.6
3:00 PM	911	1202	1164	1072	1066	1106	922	1122.0	1063.3
4:00 PM	795	1350	1245	1258	1240	1112	926	1241.0	1132.3
5:00 PM	674	1426	1324	1326	1212	1090	764	1275.6	1116.6
6:00 PM	602	1000	944	900	880	766	628	898.0	817.1
7:00 PM	450	645	589	522	580	542	422	575.6	535.7
8:00 PM	272	372	398	407	404	342	332	384.6	361.0
9:00 PM	202	231	234	238	304	274	278	256.2	251.6
10:00 PM	102	158	154	128	140	221	196	160.2	157.0
11:00 PM	85	105	89	74	98	161	152	105.4	109.1
Totals	6929	13730	13513	13422	13077	12213	11133	13191.0	12681.8

Peak Hours

12:00 AM - 12:00 PM	-	7:00 AM	7:00 AM	7:00 AM	7:00 AM	8:00 AM	11:00 AM	7:00 AM	7:00 AM
Volume	-	1107	1144	1129	1096	928	976	1073.4	943.8
12:00 PM - 12:00 AM	2:00 PM	5:00 PM	5:00 PM	5:00 PM	4:00 PM	4:00 PM	12:00 PM	5:00 PM	4:00 PM
Volume	972	1426	1324	1326	1240	1112	1018	1275.6	1132.3

VALERIE J SOUTHERN TRANSPORTATION CONSULTANT, LLC
JAMESTOWN, RI
EMAIL: valerie.southern@vjs-consultant.com

Location : Diamond Hill Road @ South End of Newell Bridge
City, State : Cumberland, RI
Counter # : NT-2811

Site: Loc 01

Seven Day Volume, per Channel

Dual Dir

Interval Start	Sun 3/15/2020	Mon 3/16/2020	Tue 3/17/2020	Wed 3/18/2020	Thu 3/19/2020	Fri 3/20/2020	Sat 3/21/2020	Mon - Fri Average	7 Day Average
12:00 AM	104	44	0	0	-	-	-	14.7	37.0
1:00 AM	47	21	0	1	-	-	-	7.3	17.3
2:00 AM	28	15	0	0	-	-	-	5.0	10.8
3:00 AM	16	16	0	0	-	-	-	5.3	8.0
4:00 AM	18	54	0	0	-	-	-	18.0	18.0
5:00 AM	50	232	0	0	-	-	-	77.3	70.5
6:00 AM	106	513	0	0	-	-	-	171.0	154.8
7:00 AM	234	919	0	0	-	-	-	306.3	288.3
8:00 AM	290	844	0	0	-	-	-	281.3	283.5
9:00 AM	522	752	0	0	-	-	-	250.7	318.5
10:00 AM	600	714	0	0	-	-	-	238.0	328.5
11:00 AM	754	788	0	0	-	-	-	262.7	385.5
12:00 PM	807	558	0	0	-	-	-	186.0	341.3
1:00 PM	979	0	0	0	-	-	-	0.0	244.8
2:00 PM	923	0	0	0	-	-	-	0.0	230.8
3:00 PM	978	0	0	0	-	-	-	0.0	244.5
4:00 PM	824	0	0	0	-	-	-	0.0	206.0
5:00 PM	738	0	0	0	-	-	-	0.0	184.5
6:00 PM	538	0	0	0	-	-	-	0.0	134.5
7:00 PM	445	0	0	0	-	-	-	0.0	111.3
8:00 PM	316	0	0	0	-	-	-	0.0	79.0
9:00 PM	192	0	0	0	-	-	-	0.0	48.0
10:00 PM	108	0	0	-	-	-	-	0.0	36.0
11:00 PM	102	0	0	-	-	-	-	0.0	34.0
Totals	9719	5470	0	1	0	0	0	1823.7	3815.0

Peak Hours

12:00 AM - 12:00 PM	11:00 AM	7:00 AM	-	1:00 AM	-	-	-	7:00 AM	11:00 AM
Volume	754	919	-	1	-	-	-	306.3	385.5
12:00 PM - 12:00 AM	1:00 PM	12:00 PM	-	-	-	-	-	12:00 PM	12:00 PM
Volume	979	558	-	-	-	-	-	186.0	341.3

CAPACITY ANALYSES

HCM Signalized Intersection Capacity Analysis
1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)

03/22/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	124	32	18	125	107	49	313	20	104	253	58
Future Volume (vph)	61	124	32	18	125	107	49	313	20	104	253	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.94			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		1789			1757			1803			1787	
Flt Permitted		0.83			0.97			0.89			0.80	
Satd. Flow (perm)		1503			1710			1622			1456	
Peak-hour factor, PHF	0.80	0.84	0.80	0.90	0.82	0.84	0.82	0.82	0.83	0.81	0.82	0.81
Adj. Flow (vph)	76	148	40	20	152	127	60	382	24	128	309	72
RTOR Reduction (vph)	0	7	0	0	30	0	0	3	0	0	8	0
Lane Group Flow (vph)	0	257	0	0	269	0	0	463	0	0	501	0
Heavy Vehicles (%)	6%	6%	6%	5%	5%	5%	4%	4%	4%	3%	3%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		16.2			16.2			27.6			27.6	
Effective Green, g (s)		16.2			16.2			27.6			27.6	
Actuated g/C Ratio		0.31			0.31			0.52			0.52	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Vehicle Extension (s)		2.6			2.6			3.0			3.0	
Lane Grp Cap (vph)		461			524			847			761	
v/s Ratio Prot												
v/s Ratio Perm		c0.17			0.16			0.29			c0.34	
v/c Ratio		0.56			0.51			0.55			0.66	
Uniform Delay, d1		15.3			15.1			8.4			9.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.2			0.7			0.7			2.1	
Delay (s)		16.5			15.7			9.1			11.2	
Level of Service		B			B			A			B	
Approach Delay (s)		16.5			15.7			9.1			11.2	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	12.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	52.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	61	124	32	18	125	107	49	313	20	104	253	58
Future Volume (vph)	61	124	32	18	125	107	49	313	20	104	253	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		1854			4162			1592			454	
Travel Time (s)		31.6			70.9			36.2			10.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.80	0.84	0.80	0.90	0.82	0.84	0.82	0.82	0.83	0.81	0.82	0.81
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	5%	5%	5%	4%	4%	4%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	264	0	0	299	0	0	466	0	0	509	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	29.0	29.0		29.0	29.0		58.0	58.0		58.0	58.0	
Total Split (%)	33.3%	33.3%		33.3%	33.3%		66.7%	66.7%		66.7%	66.7%	
Maximum Green (s)	25.0	25.0		25.0	25.0		53.0	53.0		53.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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	
Total Lost Time (s)		4.0			4.0			5.0			5.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.58			0.55			0.56			0.68	
Control Delay		23.7			20.1			11.7			14.6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		23.7			20.1			11.7			14.6	
Queue Length 50th (ft)		62			62			79			92	
Queue Length 95th (ft)		169			162			171			203	
Internal Link Dist (ft)		1774			4082			1512			374	
Turn Bay Length (ft)												
Base Capacity (vph)		783			906			1446			1300	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.34			0.33			0.32			0.39	

Intersection Summary

Area Type: Other

Cycle Length: 87

Actuated Cycle Length: 53.9

Natural Cycle: 45

Control Type: Actuated-Uncoordinated

Splits and Phases: 1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)

Ø1	Ø2
29 s	58 s

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	76	294	210	299	400	91
Future Volume (vph)	76	294	210	299	400	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	13	11	13	12	12
Total Lost time (s)	4.0		4.0	5.0	5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.90		1.00	1.00	1.00	0.85
Flt Protected	0.99		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1693		1662	1870	1827	1553
Flt Permitted	0.99		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1693		1662	1870	1827	1553
Peak-hour factor, PHF	0.68	0.91	0.58	0.70	0.71	0.58
Adj. Flow (vph)	112	323	362	427	563	157
RTOR Reduction (vph)	149	0	0	0	0	64
Lane Group Flow (vph)	286	0	362	427	563	93
Heavy Vehicles (%)	3%	3%	5%	5%	4%	4%
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Actuated Green, G (s)	14.0		11.2	40.7	24.5	24.5
Effective Green, g (s)	14.0		11.2	40.7	24.5	24.5
Actuated g/C Ratio	0.22		0.18	0.65	0.39	0.39
Clearance Time (s)	4.0		4.0		5.0	5.0
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Lane Grp Cap (vph)	378		296	1213	713	606
v/s Ratio Prot	c0.17		c0.22	0.23	c0.31	0.06
v/s Ratio Perm						
v/c Ratio	0.76		1.22	0.35	0.79	0.15
Uniform Delay, d1	22.8		25.8	5.0	16.8	12.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	8.1		126.7	0.1	5.7	0.1
Delay (s)	30.8		152.5	5.1	22.5	12.5
Level of Service	C		F	A	C	B
Approach Delay (s)	30.8			72.7	20.3	
Approach LOS	C			E	C	

Intersection Summary			
HCM 2000 Control Delay	43.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	62.7	Sum of lost time (s)	13.0
Intersection Capacity Utilization	65.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	76	294	210	299	400	91
Future Volume (vph)	76	294	210	299	400	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	11	13	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			80
Storage Lanes	1	0	1			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			35	35	
Link Distance (ft)	2348			381	2230	
Travel Time (s)	53.4			7.4	43.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.68	0.91	0.58	0.70	0.71	0.58
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	5%	5%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	435	0	362	427	563	157
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Detector Phase	3		2	1 2	1	1
Switch Phase						
Minimum Initial (s)	10.0		5.0		10.0	10.0
Minimum Split (s)	14.0		9.0		15.0	15.0
Total Split (s)	20.0		15.0		35.0	35.0
Total Split (%)	28.6%		21.4%		50.0%	50.0%
Maximum Green (s)	16.0		11.0		30.0	30.0
Yellow Time (s)	3.0		3.0		4.0	4.0
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.0		4.0		5.0	5.0
Lead/Lag			Lag		Lead	Lead
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		None		Min	Min
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
v/c Ratio	0.83		1.22	0.36	0.79	0.24
Control Delay	29.3		156.9	6.7	26.2	6.1

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	29.3		156.9	6.7	26.2	6.1
Queue Length 50th (ft)	94		~203	73	192	13
Queue Length 95th (ft)	113		#192	83	211	18
Internal Link Dist (ft)	2268			301	2150	
Turn Bay Length (ft)						80
Base Capacity (vph)	581		296	1169	888	809
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.75		1.22	0.37	0.63	0.19

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 63

Natural Cycle: 55

Control Type: Actuated-Uncoordinated

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Mendon Rd (RI 122) & Nate Whipple Hwy (RI 120)

Ø1	Ø2	Ø3
35 s	15 s	20 s

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		✥			✥			✥		↰	↱	
Traffic Volume (vph)	3	1	6	84	0	104	52	143	13	7	338	128
Future Volume (vph)	3	1	6	84	0	104	52	143	13	7	338	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	14	14	12	11	14	14
Total Lost time (s)		4.0			4.0			5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.94			0.92			0.98		1.00	0.96	
Flt Protected		0.98			0.98			0.99		0.95	1.00	
Satd. Flow (prot)		1986			1651			1915		1694	1886	
Flt Permitted		0.86			0.86			0.82		0.66	1.00	
Satd. Flow (perm)		1749			1443			1580		1184	1886	
Peak-hour factor, PHF	0.25	0.25	0.50	0.84	0.92	0.79	0.81	0.79	0.41	0.44	0.87	0.86
Adj. Flow (vph)	12	4	12	100	0	132	64	181	32	16	389	149
RTOR Reduction (vph)	0	9	0	0	72	0	0	8	0	0	22	0
Lane Group Flow (vph)	0	19	0	0	160	0	0	269	0	16	516	0
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	3%	3%	3%	3%	3%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		11.4			11.4			19.0		19.0	19.0	
Effective Green, g (s)		11.4			11.4			19.0		19.0	19.0	
Actuated g/C Ratio		0.29			0.29			0.48		0.48	0.48	
Clearance Time (s)		4.0			4.0			5.0		5.0	5.0	
Vehicle Extension (s)		2.6			2.6			2.8		2.8	2.8	
Lane Grp Cap (vph)		506			417			761		570	909	
v/s Ratio Prot											c0.27	
v/s Ratio Perm		0.01			c0.11			0.17		0.01		
v/c Ratio		0.04			0.38			0.35		0.03	0.57	
Uniform Delay, d1		10.1			11.2			6.4		5.4	7.3	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.0			0.5			0.3		0.0	0.8	
Delay (s)		10.1			11.7			6.6		5.4	8.0	
Level of Service		B			B			A		A	A	
Approach Delay (s)		10.1			11.7			6.6			7.9	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	39.4	Sum of lost time (s)	9.0
Intersection Capacity Utilization	65.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		✥			✥			✥		↰	↱	
Traffic Volume (vph)	3	1	6	84	0	104	52	143	13	7	338	128
Future Volume (vph)	3	1	6	84	0	104	52	143	13	7	338	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	12	12	12	14	14	12	11	14	14
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			35			35			35	
Link Distance (ft)		209			662			1525			777	
Travel Time (s)		5.7			12.9			29.7			15.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.25	0.25	0.50	0.84	0.92	0.79	0.81	0.79	0.41	0.44	0.87	0.86
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	3%	3%	3%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	28	0	0	232	0	0	277	0	16	538	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Detector Phase	2	2		2	2		1	1		1	1	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	27.0	27.0		27.0	27.0		43.0	43.0		43.0	43.0	
Total Split (%)	38.6%	38.6%		38.6%	38.6%		61.4%	61.4%		61.4%	61.4%	
Maximum Green (s)	23.0	23.0		23.0	23.0		38.0	38.0		38.0	38.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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			5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		2.8	2.8		2.8	2.8	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.06			0.48			0.36		0.03	0.58	
Control Delay		9.5			11.4			7.8		5.7	9.9	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		9.5			11.4			7.8		5.7	9.9	
Queue Length 50th (ft)		2			18			29		2	61	
Queue Length 95th (ft)		3			82			66		4	148	
Internal Link Dist (ft)		129			582			1445			697	
Turn Bay Length (ft)												
Base Capacity (vph)		1051			903			1461		1095	1747	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.03			0.26			0.19		0.01	0.31	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 39.7
Natural Cycle: 40
Control Type: Actuated-Uncoordinated

Splits and Phases: 7: Plaza Driveway/West Wrentham Rd & Mendon Rd (RI 122)

Ø1	Ø2
43 s	27 s

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	150	45	114	184	17	51	96	181	40	88	12
Future Volume (vph)	28	150	45	114	184	17	51	96	181	40	88	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	13	13	13	11	11	11
Total Lost time (s)		5.0			5.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.99			0.93			0.98	
Flt Protected		0.99			0.98			0.99			0.99	
Satd. Flow (prot)		1887			1840			1800			1748	
Flt Permitted		0.93			0.74			0.90			0.83	
Satd. Flow (perm)		1757			1382			1636			1469	
Peak-hour factor, PHF	0.78	0.63	0.75	0.73	0.75	0.71	0.49	0.62	0.56	0.71	0.63	0.43
Adj. Flow (vph)	36	238	60	156	245	24	104	155	323	56	140	28
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	334	0	0	421	0	0	582	0	0	224	0
Heavy Vehicles (%)	1%	1%	1%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		20.1			20.1			21.4			21.4	
Effective Green, g (s)		20.1			20.1			21.4			21.4	
Actuated g/C Ratio		0.40			0.40			0.42			0.42	
Clearance Time (s)		5.0			5.0			4.0			4.0	
Vehicle Extension (s)		2.8			2.8			2.6			2.6	
Lane Grp Cap (vph)		699			550			693			622	
v/s Ratio Prot												
v/s Ratio Perm		0.19			c0.30			c0.36			0.15	
v/c Ratio		0.48			0.77			0.84			0.36	
Uniform Delay, d1		11.3			13.2			13.0			9.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.5			6.2			8.7			0.3	
Delay (s)		11.8			19.3			21.7			10.2	
Level of Service		B			B			C			B	
Approach Delay (s)		11.8			19.3			21.7			10.2	
Approach LOS		B			B			C			B	

Intersection Summary			
HCM 2000 Control Delay	17.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	50.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	62.5%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

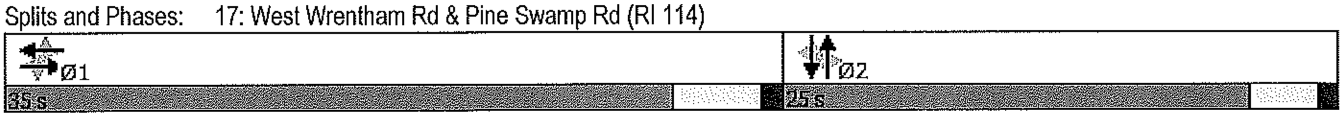
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	28	150	45	114	184	17	51	96	181	40	88	12
Future Volume (vph)	28	150	45	114	184	17	51	96	181	40	88	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	13	13	13	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			No
Link Speed (mph)		30			40			25			25	
Link Distance (ft)		3320			7947			1008			920	
Travel Time (s)		75.5			135.5			27.5			25.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.78	0.63	0.75	0.73	0.75	0.71	0.49	0.62	0.56	0.71	0.63	0.43
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	334	0	0	425	0	0	582	0	0	224	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Total Split (s)	35.0	35.0		35.0	35.0		25.0	25.0		25.0	25.0	
Total Split (%)	58.3%	58.3%		58.3%	58.3%		41.7%	41.7%		41.7%	41.7%	
Maximum Green (s)	30.0	30.0		30.0	30.0		21.0	21.0		21.0	21.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		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	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			4.0			4.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.48			0.77			0.84			0.36	
Control Delay		13.2			22.7			31.3			14.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		13.2			22.7			31.3			14.5	
Queue Length 50th (ft)		69			101			149			44	
Queue Length 95th (ft)		75			135			191			73	
Internal Link Dist (ft)		3240			7867			928			840	
Turn Bay Length (ft)												
Base Capacity (vph)		1058			835			690			619	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.32			0.51			0.84			0.36	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 50.7
Natural Cycle: 50
Control Type: Actuated-Uncoordinated

Splits and Phases: 17: West Wrentham Rd & Pine Swamp Rd (RI 114)



	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰	↱
Traffic Volume (veh/h)	293	198	256	115	149	478
Future Volume (Veh/h)	293	198	256	115	149	478
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.73	0.60	0.86	0.60	0.76	0.91
Hourly flow rate (vph)	401	330	298	192	196	525
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						10
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			401		1189	401
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			401		1189	401
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			74		0	19
cM capacity (veh/h)			1158		153	647

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	401	330	298	192	721
Volume Left	0	0	298	0	196
Volume Right	0	330	0	0	525
cSH	1700	1700	1158	1700	514
Volume to Capacity	0.24	0.19	0.26	0.11	1.40
Queue Length 95th (ft)	0	0	26	0	847
Control Delay (s)	0.0	0.0	9.2	0.0	215.1
Lane LOS			A		F
Approach Delay (s)	0.0		5.6		215.1
Approach LOS					F

Intersection Summary			
Average Delay	81.3		
Intersection Capacity Utilization	51.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	68	306	43	236	442	110	35	225	120	113	174	38
Future Volume (vph)	68	306	43	236	442	110	35	225	120	113	174	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.99			0.98			0.96			0.98	
Flt Protected		0.99			0.98			1.00			0.98	
Satd. Flow (prot)		1702			1791			1730			1730	
Flt Permitted		0.78			0.57			0.94			0.60	
Satd. Flow (perm)		1332			1033			1635			1065	
Peak-hour factor, PHF	0.74	0.70	0.77	0.70	0.79	0.86	0.88	0.69	0.77	0.69	0.73	0.63
Adj. Flow (vph)	92	437	56	337	559	128	40	326	156	164	238	60
RTOR Reduction (vph)	0	3	0	0	5	0	0	19	0	0	6	0
Lane Group Flow (vph)	0	582	0	0	1019	0	0	503	0	0	456	0
Heavy Vehicles (%)	13%	13%	13%	6%	6%	6%	5%	5%	5%	6%	6%	6%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		35.7			35.7			39.7			39.7	
Effective Green, g (s)		35.7			35.7			39.7			39.7	
Actuated g/C Ratio		0.42			0.42			0.47			0.47	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Vehicle Extension (s)		2.6			2.6			3.0			3.0	
Lane Grp Cap (vph)		563			436			769			500	
v/s Ratio Prot												
v/s Ratio Perm		0.44			c0.99			0.31			c0.43	
v/c Ratio		1.03			2.34			0.65			0.91	
Uniform Delay, d1		24.4			24.4			17.1			20.7	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		46.7			609.2			2.0			20.8	
Delay (s)		71.0			633.6			19.1			41.5	
Level of Service		E			F			B			D	
Approach Delay (s)		71.0			633.6			19.1			41.5	
Approach LOS		E			F			B			D	

Intersection Summary			
HCM 2000 Control Delay	277.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.58		
Actuated Cycle Length (s)	84.4	Sum of lost time (s)	9.0
Intersection Capacity Utilization	119.3%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

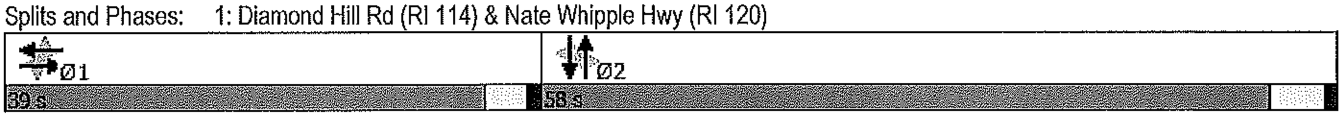
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	68	306	43	236	442	110	35	225	120	113	174	38
Future Volume (vph)	68	306	43	236	442	110	35	225	120	113	174	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		1854			4162			1592			454	
Travel Time (s)		31.6			70.9			36.2			10.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.74	0.70	0.77	0.70	0.79	0.86	0.88	0.69	0.77	0.69	0.73	0.63
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	13%	13%	13%	6%	6%	6%	5%	5%	5%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	585	0	0	1024	0	0	522	0	0	462	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	39.0	39.0		39.0	39.0		58.0	58.0		58.0	58.0	
Total Split (%)	40.2%	40.2%		40.2%	40.2%		59.8%	59.8%		59.8%	59.8%	
Maximum Green (s)	35.0	35.0		35.0	35.0		53.0	53.0		53.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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	
Total Lost Time (s)		4.0			4.0			5.0			5.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		1.04			2.33			0.66			0.91	
Control Delay		76.3			624.7			19.8			43.8	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		76.3			624.7			19.8			43.8	
Queue Length 50th (ft)		~348			~927			187			209	
Queue Length 95th (ft)		#435			#1145			185			236	
Internal Link Dist (ft)		1774			4082			1512			374	
Turn Bay Length (ft)												
Base Capacity (vph)		565			439			1056			684	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.04			2.33			0.49			0.68	

Intersection Summary

Area Type: Other
Cycle Length: 97
Actuated Cycle Length: 84.6
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)



Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	99	238	242	423	392	92
Future Volume (vph)	99	238	242	423	392	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	13	11	13	12	12
Total Lost time (s)	4.0		4.0	5.0	5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.90		1.00	1.00	1.00	0.85
Flt Protected	0.99		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1722		1728	1944	1881	1599
Flt Permitted	0.99		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1722		1728	1944	1881	1599
Peak-hour factor, PHF	0.99	0.72	0.93	0.94	0.86	0.79
Adj. Flow (vph)	100	331	260	450	456	116
RTOR Reduction (vph)	133	0	0	0	0	48
Lane Group Flow (vph)	298	0	260	450	456	68
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Actuated Green, G (s)	16.6		14.9	44.4	24.5	24.5
Effective Green, g (s)	16.6		14.9	44.4	24.5	24.5
Actuated g/C Ratio	0.24		0.22	0.64	0.36	0.36
Clearance Time (s)	4.0		4.0		5.0	5.0
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Lane Grp Cap (vph)	414		373	1250	667	567
v/s Ratio Prot	c0.17		c0.15	0.23	c0.24	0.04
v/s Ratio Perm						
v/c Ratio	0.72		0.70	0.36	0.68	0.12
Uniform Delay, d1	24.1		25.0	5.7	18.9	15.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	5.8		5.2	0.1	2.7	0.1
Delay (s)	29.8		30.2	5.8	21.7	15.1
Level of Service	C		C	A	C	B
Approach Delay (s)	29.8			14.8	20.3	
Approach LOS	C			B	C	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	69.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	99	238	242	423	392	92
Future Volume (vph)	99	238	242	423	392	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	11	13	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			80
Storage Lanes	1	0	1			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			35	35	
Link Distance (ft)	2348			381	2230	
Travel Time (s)	53.4			7.4	43.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.99	0.72	0.93	0.94	0.86	0.79
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	431	0	260	450	456	116
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Detector Phase	3		2	1 2	1	1
Switch Phase						
Minimum Initial (s)	10.0		5.0		10.0	10.0
Minimum Split (s)	14.0		9.0		15.0	15.0
Total Split (s)	26.0		20.0		44.0	44.0
Total Split (%)	28.9%		22.2%		48.9%	48.9%
Maximum Green (s)	22.0		16.0		39.0	39.0
Yellow Time (s)	3.0		3.0		4.0	4.0
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.0		4.0		5.0	5.0
Lead/Lag			Lag		Lead	Lead
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		None		Min	Min
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
v/c Ratio	0.79		0.70	0.37	0.69	0.19
Control Delay	28.2		41.4	7.6	25.7	8.0

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	28.2		41.4	7.6	25.7	8.0
Queue Length 50th (ft)	103		103	82	168	12
Queue Length 95th (ft)	#283		#276	152	264	35
Internal Link Dist (ft)	2268			301	2150	
Turn Bay Length (ft)						80
Base Capacity (vph)	691		419	1303	1113	977
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.62		0.62	0.35	0.41	0.12

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 69.7
Natural Cycle: 50
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Mendon Rd (RI 122) & Nate Whipple Hwy (RI 120)

Ø1	Ø2	Ø3
44 s	20 s	26 s

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	3	0	2	164	0	119	142	391	3	7	342	129
Future Volume (vph)	3	0	2	164	0	119	142	391	3	7	342	129
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	14	14	12	11	14	14
Total Lost time (s)		4.0			4.0			5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.93			0.95			1.00		1.00	0.96	
Flt Protected		0.98			0.97			0.99		0.95	1.00	
Satd. Flow (prot)		1959			1715			1954		1728	1927	
Flt Permitted		0.89			0.80			0.59		0.43	1.00	
Satd. Flow (perm)		1780			1424			1172		776	1927	
Peak-hour factor, PHF	0.75	0.92	0.50	0.79	0.92	0.96	0.77	0.94	0.36	0.44	0.86	0.90
Adj. Flow (vph)	4	0	4	208	0	124	184	416	8	16	398	143
RTOR Reduction (vph)	0	6	0	0	22	0	0	1	0	0	19	0
Lane Group Flow (vph)	0	2	0	0	310	0	0	607	0	16	522	0
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		20.3			20.3			39.3		39.3	39.3	
Effective Green, g (s)		20.3			20.3			39.3		39.3	39.3	
Actuated g/C Ratio		0.30			0.30			0.57		0.57	0.57	
Clearance Time (s)		4.0			4.0			5.0		5.0	5.0	
Vehicle Extension (s)		2.6			2.6			2.8		2.8	2.8	
Lane Grp Cap (vph)		526			421			671		444	1103	
v/s Ratio Prot											0.27	
v/s Ratio Perm		0.00			c0.22			c0.52		0.02		
v/c Ratio		0.00			0.74			0.90		0.04	0.47	
Uniform Delay, d1		17.0			21.7			13.0		6.4	8.6	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.0			6.3			15.7		0.0	0.3	
Delay (s)		17.0			28.0			28.7		6.4	8.9	
Level of Service		B			C			C		A	A	
Approach Delay (s)		17.0			28.0			28.7			8.8	
Approach LOS		B			C			C			A	

Intersection Summary			
HCM 2000 Control Delay	21.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	68.6	Sum of lost time (s)	9.0
Intersection Capacity Utilization	85.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		✥			✥			✥		↰	↱	
Traffic Volume (vph)	3	0	2	164	0	119	142	391	3	7	342	129
Future Volume (vph)	3	0	2	164	0	119	142	391	3	7	342	129
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	12	12	12	14	14	12	11	14	14
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			35			35			35	
Link Distance (ft)		209			662			1525			777	
Travel Time (s)		5.7			12.9			29.7			15.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.75	0.92	0.50	0.79	0.92	0.96	0.77	0.94	0.36	0.44	0.86	0.90
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	8	0	0	332	0	0	608	0	16	541	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Detector Phase	2	2		2	2		1	1		1	1	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	24.0	24.0		24.0	24.0		66.0	66.0		66.0	66.0	
Total Split (%)	26.7%	26.7%		26.7%	26.7%		73.3%	73.3%		73.3%	73.3%	
Maximum Green (s)	20.0	20.0		20.0	20.0		61.0	61.0		61.0	61.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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			5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		2.8	2.8		2.8	2.8	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.01			0.75			0.91		0.04	0.48	
Control Delay		3.4			37.3			31.8		5.6	8.8	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		3.4			37.3			31.8		5.6	8.8	
Queue Length 50th (ft)		0			113			201		3	108	
Queue Length 95th (ft)		4			#347			370		4	152	
Internal Link Dist (ft)		129			582			1445			697	
Turn Bay Length (ft)												
Base Capacity (vph)		557			454			1020		675	1681	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.01			0.73			0.60		0.02	0.32	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 68.9

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Plaza Driveway/West Wrentham Rd & Mendon Rd (RI 122)

Ø1	Ø2
66 s	24 s

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	16	133	28	122	305	25	37	63	124	25	120	22
Future Volume (vph)	16	133	28	122	305	25	37	63	124	25	120	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	13	13	13	11	11	11
Total Lost time (s)		5.0			5.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.99			0.92			0.98	
Flt Protected		0.99			0.99			0.99			0.99	
Satd. Flow (prot)		1904			1905			1798			1770	
Flt Permitted		0.91			0.84			0.92			0.93	
Satd. Flow (perm)		1743			1618			1675			1665	
Peak-hour factor, PHF	0.50	0.72	0.58	0.85	0.79	0.78	0.84	0.83	0.78	0.78	0.86	0.79
Adj. Flow (vph)	32	185	48	144	386	32	44	76	159	32	140	28
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	265	0	0	558	0	0	279	0	0	200	0
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		21.5			21.5			12.1			12.1	
Effective Green, g (s)		21.5			21.5			12.1			12.1	
Actuated g/C Ratio		0.50			0.50			0.28			0.28	
Clearance Time (s)		5.0			5.0			4.0			4.0	
Vehicle Extension (s)		2.8			2.8			2.6			2.6	
Lane Grp Cap (vph)		879			816			475			472	
v/s Ratio Prot												
v/s Ratio Perm		0.15			c0.34			c0.17			0.12	
v/c Ratio		0.30			0.68			0.59			0.42	
Uniform Delay, d1		6.2			8.0			13.1			12.4	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.2			2.3			1.6			0.5	
Delay (s)		6.3			10.3			14.7			12.9	
Level of Service		A			B			B			B	
Approach Delay (s)		6.3			10.3			14.7			12.9	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	10.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	42.6	Sum of lost time (s)	9.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

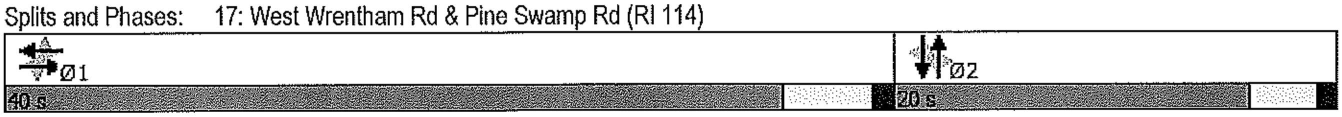
c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Volume (vph)	16	133	28	122	305	25	37	63	124	25	120	22
Future Volume (vph)	16	133	28	122	305	25	37	63	124	25	120	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	13	13	13	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			No
Link Speed (mph)		30			40			25			25	
Link Distance (ft)		3320			7947			1008			920	
Travel Time (s)		75.5			135.5			27.5			25.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.50	0.72	0.58	0.85	0.79	0.78	0.84	0.83	0.78	0.78	0.86	0.79
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	265	0	0	562	0	0	279	0	0	200	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Total Split (s)	40.0	40.0		40.0	40.0		20.0	20.0		20.0	20.0	
Total Split (%)	66.7%	66.7%		66.7%	66.7%		33.3%	33.3%		33.3%	33.3%	
Maximum Green (s)	35.0	35.0		35.0	35.0		16.0	16.0		16.0	16.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		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	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			4.0			4.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.31			0.70			0.60			0.43	
Control Delay		7.5			13.5			21.8			18.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		7.5			13.5			21.8			18.4	
Queue Length 50th (ft)		34			93			59			40	
Queue Length 95th (ft)		56			153			142			108	
Internal Link Dist (ft)		3240			7867			928			840	
Turn Bay Length (ft)												
Base Capacity (vph)		1410			1309			674			670	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.19			0.43			0.41			0.30	

Intersection Summary	
Area Type:	Other
Cycle Length: 60	
Actuated Cycle Length: 43.5	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 17: West Wrentham Rd & Pine Swamp Rd (RI 114)



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰	↱
Traffic Volume (veh/h)	165	188	524	326	195	223
Future Volume (Veh/h)	165	188	524	326	195	223
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.69	0.92	0.96	0.90	0.89	0.75
Hourly flow rate (vph)	239	204	546	362	219	297
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						10
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			239		1693	239
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			239		1693	239
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			59		0	63
cM capacity (veh/h)			1334		61	802

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	239	204	546	362	516
Volume Left	0	0	546	0	219
Volume Right	0	204	0	0	297
cSH	1700	1700	1334	1700	131
Volume to Capacity	0.14	0.12	0.41	0.21	3.93
Queue Length 95th (ft)	0	0	51	0	Err
Control Delay (s)	0.0	0.0	9.6	0.0	Err
Lane LOS			A		F
Approach Delay (s)	0.0		5.7		Err
Approach LOS					F

Intersection Summary			
Average Delay	2766.3		
Intersection Capacity Utilization	58.5%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)

03/22/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	83	119	42	17	117	129	49	205	30	176	225	76
Future Volume (vph)	83	119	42	17	117	129	49	205	30	176	225	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.97			0.94			0.98			0.98	
Flt Protected		0.98			1.00			0.99			0.98	
Satd. Flow (prot)		1792			1800			1813			1783	
Flt Permitted		0.74			0.95			0.82			0.73	
Satd. Flow (perm)		1340			1721			1496			1320	
Peak-hour factor, PHF	0.86	0.85	0.75	0.53	0.75	0.85	0.68	0.93	0.75	0.75	0.97	0.79
Adj. Flow (vph)	97	140	56	32	156	152	72	220	40	235	232	96
RTOR Reduction (vph)	0	9	0	0	32	0	0	7	0	0	10	0
Lane Group Flow (vph)	0	284	0	0	308	0	0	325	0	0	553	0
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		21.0			21.0			34.4			34.4	
Effective Green, g (s)		21.0			21.0			34.4			34.4	
Actuated g/C Ratio		0.33			0.33			0.53			0.53	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Vehicle Extension (s)		2.6			2.6			3.0			3.0	
Lane Grp Cap (vph)		436			561			799			705	
v/s Ratio Prot												
v/s Ratio Perm		c0.21			0.18			0.22			c0.42	
v/c Ratio		0.65			0.55			0.41			0.78	
Uniform Delay, d1		18.6			17.8			8.9			12.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		3.2			0.9			0.3			5.7	
Delay (s)		21.7			18.7			9.3			17.7	
Level of Service		C			B			A			B	
Approach Delay (s)		21.7			18.7			9.3			17.7	
Approach LOS		C			B			A			B	

Intersection Summary			
HCM 2000 Control Delay	16.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	64.4	Sum of lost time (s)	9.0
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

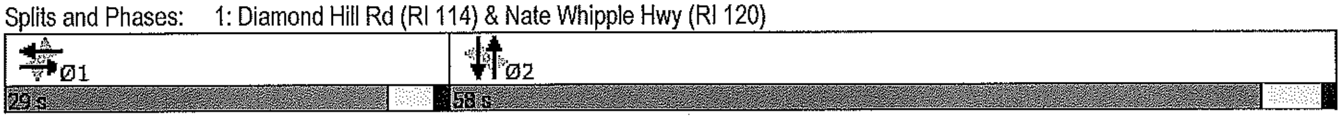
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	83	119	42	17	117	129	49	205	30	176	225	76
Future Volume (vph)	83	119	42	17	117	129	49	205	30	176	225	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		1854			4162			1592			454	
Travel Time (s)		31.6			70.9			36.2			10.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.86	0.85	0.75	0.53	0.75	0.85	0.68	0.93	0.75	0.75	0.97	0.79
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	293	0	0	340	0	0	332	0	0	563	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	29.0	29.0		29.0	29.0		58.0	58.0		58.0	58.0	
Total Split (%)	33.3%	33.3%		33.3%	33.3%		66.7%	66.7%		66.7%	66.7%	
Maximum Green (s)	25.0	25.0		25.0	25.0		53.0	53.0		53.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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	
Total Lost Time (s)		4.0			4.0			5.0			5.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.67			0.58			0.42			0.80	
Control Delay		30.2			23.0			10.5			21.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		30.2			23.0			10.5			21.7	
Queue Length 50th (ft)		95			96			77			179	
Queue Length 95th (ft)		#223			177			129			310	
Internal Link Dist (ft)		1774			4082			1512			374	
Turn Bay Length (ft)												
Base Capacity (vph)		569			748			1214			1070	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.51			0.45			0.27			0.53	

Intersection Summary

Area Type: Other
Cycle Length: 87
Actuated Cycle Length: 65.2
Natural Cycle: 45
Control Type: Actuated-Uncoordinated
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)



Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	87	196	158	406	393	79
Future Volume (vph)	87	196	158	406	393	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	13	11	13	12	12
Total Lost time (s)	4.0		4.0	5.0	5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.91		1.00	1.00	1.00	0.85
Flt Protected	0.98		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1735		1728	1944	1881	1599
Flt Permitted	0.98		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1735		1728	1944	1881	1599
Peak-hour factor, PHF	0.87	0.86	0.94	0.86	0.78	0.73
Adj. Flow (vph)	100	228	168	472	504	108
RTOR Reduction (vph)	103	0	0	0	0	44
Lane Group Flow (vph)	225	0	168	472	504	64
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Actuated Green, G (s)	13.5		10.9	39.5	23.6	23.6
Effective Green, g (s)	13.5		10.9	39.5	23.6	23.6
Actuated g/C Ratio	0.22		0.18	0.65	0.39	0.39
Clearance Time (s)	4.0		4.0		5.0	5.0
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Lane Grp Cap (vph)	383		308	1258	727	618
v/s Ratio Prot	c0.13		c0.10	0.24	c0.27	0.04
v/s Ratio Perm						
v/c Ratio	0.59		0.55	0.38	0.69	0.10
Uniform Delay, d1	21.3		22.8	5.0	15.7	11.9
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	2.0		1.6	0.1	2.7	0.1
Delay (s)	23.3		24.4	5.2	18.4	12.0
Level of Service	C		C	A	B	B
Approach Delay (s)	23.3			10.2	17.2	
Approach LOS	C			B	B	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	61.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	87	196	158	406	393	79
Future Volume (vph)	87	196	158	406	393	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	11	13	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			80
Storage Lanes	1	0	1			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			35	35	
Link Distance (ft)	2348			381	2230	
Travel Time (s)	53.4			7.4	43.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.87	0.86	0.94	0.86	0.78	0.73
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	328	0	168	472	504	108
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Detector Phase	3		2	1 2	1	1
Switch Phase						
Minimum Initial (s)	10.0		5.0		10.0	10.0
Minimum Split (s)	14.0		9.0		15.0	15.0
Total Split (s)	22.0		18.0		40.0	40.0
Total Split (%)	27.5%		22.5%		50.0%	50.0%
Maximum Green (s)	18.0		14.0		35.0	35.0
Yellow Time (s)	3.0		3.0		4.0	4.0
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.0		4.0		5.0	5.0
Lead/Lag			Lag		Lead	Lead
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		None		Min	Min
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
v/c Ratio	0.68		0.55	0.39	0.70	0.17
Control Delay	23.0		33.9	6.7	22.5	6.7

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	23.0		33.9	6.7	22.5	6.7
Queue Length 50th (ft)	67		58	68	152	8
Queue Length 95th (ft)	166		139	131	231	26
Internal Link Dist (ft)	2268			301	2150	
Turn Bay Length (ft)						80
Base Capacity (vph)	627		415	1377	1130	990
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.52		0.40	0.34	0.45	0.11

Intersection Summary	
Area Type:	Other
Cycle Length: 80	
Actuated Cycle Length: 61.8	
Natural Cycle: 50	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 6: Mendon Rd (RI 122) & Nate Whipple Hwy (RI 120)

Ø1	Ø2	Ø3
40 s	18 s	22 s

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	7	2	20	123	0	68	72	346	10	22	336	91
Future Volume (vph)	7	2	20	123	0	68	72	346	10	22	336	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	14	14	12	11	14	14
Total Lost time (s)		4.0			4.0			5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.91			0.95			0.99		1.00	0.97	
Flt Protected		0.99			0.97			0.99		0.95	1.00	
Satd. Flow (prot)		1935			1711			1980		1678	1891	
Flt Permitted		0.91			0.79			0.86		0.45	1.00	
Satd. Flow (perm)		1790			1389			1725		788	1891	
Peak-hour factor, PHF	0.58	0.50	0.62	0.93	0.92	0.77	0.82	0.74	0.42	0.50	0.81	0.88
Adj. Flow (vph)	12	4	32	132	0	88	88	468	24	44	415	103
RTOR Reduction (vph)	0	24	0	0	29	0	0	3	0	0	15	0
Lane Group Flow (vph)	0	24	0	0	191	0	0	577	0	44	503	0
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	1%	1%	1%	4%	4%	4%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		12.5			12.5			26.5		26.5	26.5	
Effective Green, g (s)		12.5			12.5			26.5		26.5	26.5	
Actuated g/C Ratio		0.26			0.26			0.55		0.55	0.55	
Clearance Time (s)		4.0			4.0			5.0		5.0	5.0	
Vehicle Extension (s)		2.6			2.6			2.8		2.8	2.8	
Lane Grp Cap (vph)		466			361			952		435	1043	
v/s Ratio Prot											0.27	
v/s Ratio Perm		0.01			c0.14			c0.33		0.06		
v/c Ratio		0.05			0.53			0.61		0.10	0.48	
Uniform Delay, d1		13.3			15.2			7.2		5.1	6.6	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.0			1.1			1.0		0.1	0.3	
Delay (s)		13.3			16.4			8.3		5.2	6.9	
Level of Service		B			B			A		A	A	
Approach Delay (s)		13.3			16.4			8.3			6.7	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM 2000 Control Delay	9.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	48.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		✥			✥			✥		↰	↱	
Traffic Volume (vph)	7	2	20	123	0	68	72	346	10	22	336	91
Future Volume (vph)	7	2	20	123	0	68	72	346	10	22	336	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	12	12	12	14	14	12	11	14	14
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			35			35			35	
Link Distance (ft)		209			662			1525			777	
Travel Time (s)		5.7			12.9			29.7			15.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.58	0.50	0.62	0.93	0.92	0.77	0.82	0.74	0.42	0.50	0.81	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	1%	1%	1%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	0	0	220	0	0	580	0	44	518	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Detector Phase	2	2		2	2		1	1		1	1	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	22.0	22.0		22.0	22.0		58.0	58.0		58.0	58.0	
Total Split (%)	27.5%	27.5%		27.5%	27.5%		72.5%	72.5%		72.5%	72.5%	
Maximum Green (s)	18.0	18.0		18.0	18.0		53.0	53.0		53.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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			5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		2.8	2.8		2.8	2.8	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.10			0.57			0.61		0.10	0.49	
Control Delay		9.9			20.7			10.8		6.1	8.2	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		9.9			20.7			10.8		6.1	8.2	
Queue Length 50th (ft)		3			39			83		5	62	
Queue Length 95th (ft)		10			127			149		10	132	
Internal Link Dist (ft)		129			582			1445			697	
Turn Bay Length (ft)												
Base Capacity (vph)		715			563			1651		755	1812	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.07			0.39			0.35		0.06	0.29	

Intersection Summary	
Area Type:	Other
Cycle Length: 80	
Actuated Cycle Length: 48.4	
Natural Cycle: 40	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 7: Plaza Driveway/West Wrentham Rd & Mendon Rd (RI 122)

Ø1	Ø2
58 s	22 s

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	14	200	42	60	176	12	42	33	51	20	46	11
Future Volume (vph)	14	200	42	60	176	12	42	33	51	20	46	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	13	13	13	11	11	11
Total Lost time (s)		5.0			5.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.97			0.99			0.96			0.98	
Flt Protected		1.00			0.99			0.98			0.99	
Satd. Flow (prot)		1887			1906			1849			1759	
Flt Permitted		0.97			0.85			0.82			0.89	
Satd. Flow (perm)		1839			1643			1543			1581	
Peak-hour factor, PHF	0.70	0.81	0.66	0.83	0.85	0.75	0.55	0.55	0.91	0.56	0.68	0.69
Adj. Flow (vph)	20	247	64	72	207	16	76	60	56	36	68	16
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	331	0	0	291	0	0	192	0	0	120	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	42	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		16.1			16.1			7.8			7.8	
Effective Green, g (s)		16.1			16.1			7.8			7.8	
Actuated g/C Ratio		0.49			0.49			0.24			0.24	
Clearance Time (s)		5.0			5.0			4.0			4.0	
Vehicle Extension (s)		2.8			2.8			2.6			2.6	
Lane Grp Cap (vph)		899			804			365			374	
v/s Ratio Prot												
v/s Ratio Perm		c0.18			0.18			c0.12			0.08	
v/c Ratio		0.37			0.36			0.53			0.32	
Uniform Delay, d1		5.2			5.2			10.9			10.4	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.2			0.2			1.1			0.4	
Delay (s)		5.5			5.5			12.0			10.8	
Level of Service		A			A			B			B	
Approach Delay (s)		5.5			5.5			12.0			10.8	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	7.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	32.9	Sum of lost time (s)	9.0
Intersection Capacity Utilization	49.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	14	200	42	60	176	12	42	33	51	20	46	11
Future Volume (vph)	14	200	42	60	176	12	42	33	51	20	46	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	13	13	13	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			No
Link Speed (mph)		30			40			25			25	
Link Distance (ft)		3320			7947			1008			920	
Travel Time (s)		75.5			135.5			27.5			25.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.70	0.81	0.66	0.83	0.85	0.75	0.55	0.55	0.91	0.56	0.68	0.69
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	42	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	331	0	0	295	0	0	192	0	0	120	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Total Split (s)	35.0	35.0		35.0	35.0		25.0	25.0		25.0	25.0	
Total Split (%)	58.3%	58.3%		58.3%	58.3%		41.7%	41.7%		41.7%	41.7%	
Maximum Green (s)	30.0	30.0		30.0	30.0		21.0	21.0		21.0	21.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		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	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			4.0			4.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.34			0.34			0.44			0.27	
Control Delay		7.9			7.9			13.3			11.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		7.9			7.9			13.3			11.0	
Queue Length 50th (ft)		32			28			22			13	
Queue Length 95th (ft)		82			79			41			35	
Internal Link Dist (ft)		3240			7867			928			840	
Turn Bay Length (ft)												
Base Capacity (vph)		1688			1510			1034			1059	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.20			0.20			0.19			0.11	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 32.3
Natural Cycle: 40
Control Type: Actuated-Uncoordinated

Splits and Phases: 17: West Wrentham Rd & Pine Swamp Rd (RI 114)

Ø1	Ø2
35 s	25 s

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰	↱
Traffic Volume (veh/h)	146	193	170	126	172	175
Future Volume (Veh/h)	146	193	170	126	172	175
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.91	0.79	0.88	0.88	0.89
Hourly flow rate (vph)	176	212	215	143	195	197
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						10
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			176		749	176
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			176		749	176
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			85		39	77
cM capacity (veh/h)			1406		321	867

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	176	212	215	143	392
Volume Left	0	0	215	0	195
Volume Right	0	212	0	0	197
cSH	1700	1700	1406	1700	646
Volume to Capacity	0.10	0.12	0.15	0.08	0.61
Queue Length 95th (ft)	0	0	13	0	102
Control Delay (s)	0.0	0.0	8.0	0.0	21.2
Lane LOS			A		C
Approach Delay (s)	0.0		4.8		21.2
Approach LOS					C

Intersection Summary			
Average Delay	8.8		
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	228	285	18	232	0	362	0	20	0	0	0
Future Volume (vph)	0	228	285	18	232	0	362	0	20	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			5.0				
Lane Util. Factor		1.00			1.00			1.00				
Frt		0.92			1.00			0.99				
Flt Protected		1.00			1.00			0.95				
Satd. Flow (prot)		1710			1864			1732				
Flt Permitted		1.00			0.89			0.74				
Satd. Flow (perm)		1710			1659			1337				
Peak-hour factor, PHF	0.80	0.84	0.80	0.90	0.82	0.84	0.82	0.82	0.83	0.81	0.82	0.81
Adj. Flow (vph)	0	271	356	20	283	0	441	0	24	0	0	0
RTOR Reduction (vph)	0	44	0	0	0	0	0	7	0	0	0	0
Lane Group Flow (vph)	0	583	0	0	303	0	0	458	0	0	0	0
Heavy Vehicles (%)	6%	6%	6%	5%	5%	5%	4%	4%	4%	3%	3%	3%
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		25.5			25.5			25.4				
Effective Green, g (s)		25.5			25.5			25.4				
Actuated g/C Ratio		0.43			0.43			0.42				
Clearance Time (s)		4.0			4.0			5.0				
Vehicle Extension (s)		2.6			2.6			3.0				
Lane Grp Cap (vph)		727			706			566				
v/s Ratio Prot		c0.34										
v/s Ratio Perm					0.18			c0.34				
v/c Ratio		0.80			0.43			0.81				
Uniform Delay, d1		15.0			12.1			15.1				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		6.2			0.3			8.3				
Delay (s)		21.2			12.4			23.4				
Level of Service		C			B			C				
Approach Delay (s)		21.2			12.4			23.4			0.0	
Approach LOS		C			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	20.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	59.9	Sum of lost time (s)	9.0
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	0	228	285	18	232	0	362	0	20	0	0	0
Future Volume (vph)	0	228	285	18	232	0	362	0	20	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		1854			4162			1592			454	
Travel Time (s)		31.6			70.9			36.2			10.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.80	0.84	0.80	0.90	0.82	0.84	0.82	0.82	0.83	0.81	0.82	0.81
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	5%	5%	5%	4%	4%	4%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	627	0	0	303	0	0	465	0	0	0	0
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	29.0	29.0		29.0	29.0		58.0	58.0		58.0	58.0	
Total Split (%)	33.3%	33.3%		33.3%	33.3%		66.7%	66.7%		66.7%	66.7%	
Maximum Green (s)	25.0	25.0		25.0	25.0		53.0	53.0		53.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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	
Total Lost Time (s)		4.0			4.0			5.0			5.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.81			0.43			0.81				
Control Delay		27.2			17.2			26.5				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0				
Total Delay		27.2			17.2			26.5				
Queue Length 50th (ft)		161			71			134				
Queue Length 95th (ft)		#424			166			196				
Internal Link Dist (ft)		1774			4082			1512			374	
Turn Bay Length (ft)												
Base Capacity (vph)		770			704			1183				
Starvation Cap Reductn		0			0			0				
Spillback Cap Reductn		0			0			0				
Storage Cap Reductn		0			0			0				
Reduced v/c Ratio		0.81			0.43			0.39				

Intersection Summary

Area Type: Other

Cycle Length: 87

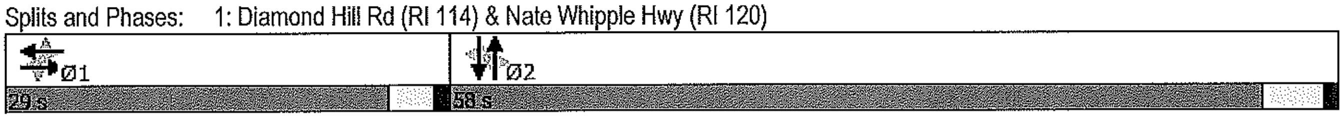
Actuated Cycle Length: 60.1

Natural Cycle: 50

Control Type: Actuated-Uncoordinated

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)



Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	64	668	524	312	418	73
Future Volume (vph)	64	668	524	312	418	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	13	11	13	12	12
Total Lost time (s)	4.0		4.0	5.0	5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.88		1.00	1.00	1.00	0.85
Flt Protected	0.99		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1669		1662	1870	1827	1553
Flt Permitted	0.99		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1669		1662	1870	1827	1553
Peak-hour factor, PHF	0.68	0.91	0.58	0.70	0.71	0.58
Adj. Flow (vph)	94	734	903	446	589	126
RTOR Reduction (vph)	321	0	0	0	0	49
Lane Group Flow (vph)	507	0	903	446	589	77
Heavy Vehicles (%)	3%	3%	5%	5%	4%	4%
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Actuated Green, G (s)	16.1		11.1	42.1	26.0	26.0
Effective Green, g (s)	16.1		11.1	42.1	26.0	26.0
Actuated g/C Ratio	0.24		0.17	0.64	0.39	0.39
Clearance Time (s)	4.0		4.0		5.0	5.0
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Lane Grp Cap (vph)	405		278	1189	717	609
v/s Ratio Prot	c0.30		c0.54	0.24	c0.32	0.05
v/s Ratio Perm						
v/c Ratio	1.25		3.25	0.38	0.82	0.13
Uniform Delay, d1	25.1		27.6	5.8	18.0	12.8
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	132.4		1021.0	0.2	7.4	0.1
Delay (s)	157.4		1048.5	5.9	25.4	12.9
Level of Service	F		F	A	C	B
Approach Delay (s)	157.4			703.8	23.2	
Approach LOS	F			F	C	

Intersection Summary			
HCM 2000 Control Delay	379.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.46		
Actuated Cycle Length (s)	66.2	Sum of lost time (s)	13.0
Intersection Capacity Utilization	106.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

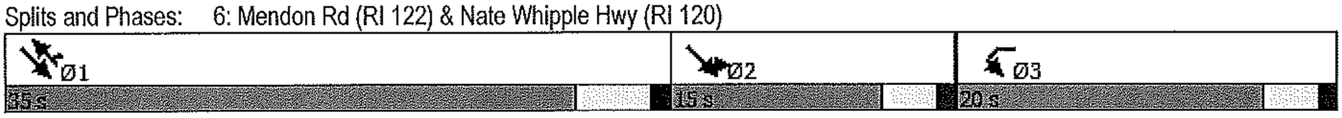
Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	64	668	524	312	418	73
Future Volume (vph)	64	668	524	312	418	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	11	13	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			80
Storage Lanes	1	0	1			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			35	35	
Link Distance (ft)	2348			381	2230	
Travel Time (s)	53.4			7.4	43.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.68	0.91	0.58	0.70	0.71	0.58
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	5%	5%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	828	0	903	446	589	126
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Detector Phase	3		2	1 2	1	1
Switch Phase						
Minimum Initial (s)	10.0		5.0		10.0	10.0
Minimum Split (s)	14.0		9.0		15.0	15.0
Total Split (s)	20.0		15.0		35.0	35.0
Total Split (%)	28.6%		21.4%		50.0%	50.0%
Maximum Green (s)	16.0		11.0		30.0	30.0
Yellow Time (s)	3.0		3.0		4.0	4.0
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.0		4.0		5.0	5.0
Lead/Lag			Lag		Lead	Lead
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		None		Min	Min
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
v/c Ratio	1.14		3.26	0.38	0.82	0.19
Control Delay	95.5		1039.5	7.2	28.9	6.3

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	95.5		1039.5	7.2	28.9	6.3
Queue Length 50th (ft)	~277		~705	77	206	11
Queue Length 95th (ft)	#247		#549	87	222	17
Internal Link Dist (ft)	2268			301	2150	
Turn Bay Length (ft)						80
Base Capacity (vph)	726		277	1134	833	751
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	1.14		3.26	0.39	0.71	0.17

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 66.2
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Mendon Rd (RI 122) & Nate Whipple Hwy (RI 120)



Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	3	1	6	453	0	150	95	100	13	7	292	566
Future Volume (vph)	3	1	6	453	0	150	95	100	13	7	292	566
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	14	14	12	11	14	14
Total Lost time (s)		4.0			4.0			5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.94			0.96			0.98		1.00	0.90	
Flt Protected		0.98			0.96			0.98		0.95	1.00	
Satd. Flow (prot)		1986			1700			1897		1694	1772	
Flt Permitted		0.90			0.76			0.15		0.60	1.00	
Satd. Flow (perm)		1835			1347			287		1079	1772	
Peak-hour factor, PHF	0.25	0.25	0.50	0.84	0.92	0.79	0.81	0.79	0.41	0.44	0.87	0.86
Adj. Flow (vph)	12	4	12	539	0	190	117	127	32	16	336	658
RTOR Reduction (vph)	0	8	0	0	21	0	0	7	0	0	101	0
Lane Group Flow (vph)	0	20	0	0	708	0	0	269	0	16	893	0
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	3%	3%	3%	3%	3%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		23.0			23.0			38.0		38.0	38.0	
Effective Green, g (s)		23.0			23.0			38.0		38.0	38.0	
Actuated g/C Ratio		0.33			0.33			0.54		0.54	0.54	
Clearance Time (s)		4.0			4.0			5.0		5.0	5.0	
Vehicle Extension (s)		2.6			2.6			2.8		2.8	2.8	
Lane Grp Cap (vph)		602			442			155		585	961	
v/s Ratio Prot											0.50	
v/s Ratio Perm		0.01			c0.53			c0.94		0.01		
v/c Ratio		0.03			1.60			1.74		0.03	0.93	
Uniform Delay, d1		16.0			23.5			16.0		7.4	14.8	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.0			281.4			356.8		0.0	14.7	
Delay (s)		16.0			304.9			372.8		7.4	29.5	
Level of Service		B			F			F		A	C	
Approach Delay (s)		16.0			304.9			372.8			29.2	
Approach LOS		B			F			F			C	

Intersection Summary			
HCM 2000 Control Delay	173.8	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.68		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	114.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

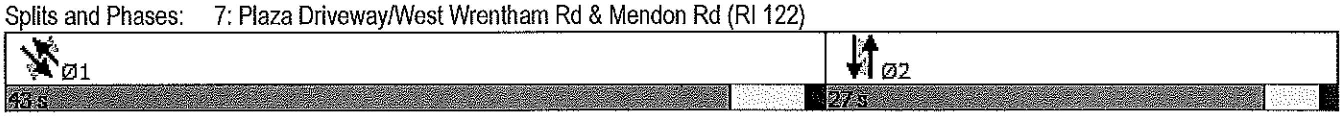
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	3	1	6	453	0	150	95	100	13	7	292	566
Future Volume (vph)	3	1	6	453	0	150	95	100	13	7	292	566
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	12	12	12	14	14	12	11	14	14
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			35			35			35	
Link Distance (ft)		209			662			1525			777	
Travel Time (s)		5.7			12.9			29.7			15.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.25	0.25	0.50	0.84	0.92	0.79	0.81	0.79	0.41	0.44	0.87	0.86
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	3%	3%	3%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	28	0	0	729	0	0	276	0	16	994	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Detector Phase	2	2		2	2		1	1		1	1	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	27.0	27.0		27.0	27.0		43.0	43.0		43.0	43.0	
Total Split (%)	38.6%	38.6%		38.6%	38.6%		61.4%	61.4%		61.4%	61.4%	
Maximum Green (s)	23.0	23.0		23.0	23.0		38.0	38.0		38.0	38.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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			5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		2.8	2.8		2.8	2.8	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.05			1.57			1.70		0.03	0.94	
Control Delay		11.9			291.5			361.7		7.7	29.5	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		11.9			291.5			361.7		7.7	29.5	
Queue Length 50th (ft)		5			~453			~178		3	298	
Queue Length 95th (ft)		3			#656			#202		5	#557	
Internal Link Dist (ft)		129			582			1445			697	
Turn Bay Length (ft)												
Base Capacity (vph)		610			463			162		585	1063	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.05			1.57			1.70		0.03	0.94	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 70
Natural Cycle: 100
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Plaza Driveway/West Wrentham Rd & Mendon Rd (RI 122)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	0	7	188	348	79	7	156	106	547	2	50	12
Future Volume (vph)	0	7	188	348	79	7	156	106	547	2	50	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	13	13	13	11	11	11
Total Lost time (s)		5.0			5.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.87			1.00			0.91			0.97	
Flt Protected		1.00			0.96			0.99			1.00	
Satd. Flow (prot)		1692			1811			1768			1736	
Flt Permitted		1.00			0.60			0.90			0.99	
Satd. Flow (perm)		1692			1135			1616			1717	
Peak-hour factor, PHF	0.78	0.63	0.75	0.73	0.75	0.71	0.49	0.62	0.56	0.71	0.63	0.43
Adj. Flow (vph)	0	11	251	477	105	10	318	171	977	3	79	28
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	262	0	0	591	0	0	1466	0	0	110	0
Heavy Vehicles (%)	1%	1%	1%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		30.0			30.0			21.0			21.0	
Effective Green, g (s)		30.0			30.0			21.0			21.0	
Actuated g/C Ratio		0.50			0.50			0.35			0.35	
Clearance Time (s)		5.0			5.0			4.0			4.0	
Vehicle Extension (s)		2.8			2.8			2.6			2.6	
Lane Grp Cap (vph)		846			567			565			600	
v/s Ratio Prot		0.15										
v/s Ratio Perm					c0.52			c0.91			0.06	
v/c Ratio		0.31			1.04			2.59			0.18	
Uniform Delay, d1		8.9			15.0			19.5			13.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.2			49.3			722.8			0.1	
Delay (s)		9.1			64.3			742.3			13.7	
Level of Service		A			E			F			B	
Approach Delay (s)		9.1			64.3			742.3			13.7	
Approach LOS		A			E			F			B	

Intersection Summary			
HCM 2000 Control Delay	465.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.68		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	102.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	0	7	188	348	79	7	156	106	547	2	50	12
Future Volume (vph)	0	7	188	348	79	7	156	106	547	2	50	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	13	13	13	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			No
Link Speed (mph)		30			40			25			25	
Link Distance (ft)		3320			7947			1008			920	
Travel Time (s)		75.5			135.5			27.5			25.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.78	0.63	0.75	0.73	0.75	0.71	0.49	0.62	0.56	0.71	0.63	0.43
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	262	0	0	592	0	0	1466	0	0	110	0
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Total Split (s)	35.0	35.0		35.0	35.0		25.0	25.0		25.0	25.0	
Total Split (%)	58.3%	58.3%		58.3%	58.3%		41.7%	41.7%		41.7%	41.7%	
Maximum Green (s)	30.0	30.0		30.0	30.0		21.0	21.0		21.0	21.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		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	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			4.0			4.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.31			1.04			2.59			0.18	
Control Delay		10.2			68.2			739.9			14.6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		10.2			68.2			739.9			14.6	
Queue Length 50th (ft)		52			~240			~921			27	
Queue Length 95th (ft)		60			#308			#722			39	
Internal Link Dist (ft)		3240			7867			928			840	
Turn Bay Length (ft)												
Base Capacity (vph)		846			569			565			600	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.31			1.04			2.59			0.18	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Natural Cycle: 150
Control Type: Actuated-Uncoordinated

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: West Wrentham Rd & Pine Swamp Rd (RI 114)

Ø1	Ø2
35 s	25 s

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	659	17	22	349	34	112
Future Volume (Veh/h)	659	17	22	349	34	112
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.73	0.60	0.86	0.60	0.76	0.91
Hourly flow rate (vph)	903	28	26	582	45	123
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						10
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			903		1537	903
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			903		1537	903
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		63	63
cM capacity (veh/h)			753		122	334

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	903	28	26	582	168
Volume Left	0	0	26	0	45
Volume Right	0	28	0	0	123
cSH	1700	1700	753	1700	457
Volume to Capacity	0.53	0.02	0.03	0.34	0.37
Queue Length 95th (ft)	0	0	3	0	42
Control Delay (s)	0.0	0.0	10.0	0.0	29.6
Lane LOS			A		D
Approach Delay (s)	0.0		0.4		29.6
Approach LOS					D

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	0	419	217	236	552	0	260	0	120	0	0	0
Future Volume (vph)	0	419	217	236	552	0	260	0	120	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			5.0				
Lane Util. Factor		1.00			1.00			1.00				
Frt		0.96			1.00			0.95				
Flt Protected		1.00			0.98			0.97				
Satd. Flow (prot)		1662			1823			1670				
Flt Permitted		1.00			0.09			0.80				
Satd. Flow (perm)		1662			159			1384				
Peak-hour factor, PHF	0.74	0.70	0.77	0.70	0.79	0.86	0.88	0.69	0.77	0.69	0.73	0.63
Adj. Flow (vph)	0	599	282	337	699	0	295	0	156	0	0	0
RTOR Reduction (vph)	0	14	0	0	0	0	0	27	0	0	0	0
Lane Group Flow (vph)	0	867	0	0	1036	0	0	424	0	0	0	0
Heavy Vehicles (%)	13%	13%	13%	6%	6%	6%	5%	5%	5%	6%	6%	6%
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		35.5			35.5			26.6				
Effective Green, g (s)		35.5			35.5			26.6				
Actuated g/C Ratio		0.50			0.50			0.37				
Clearance Time (s)		4.0			4.0			5.0				
Vehicle Extension (s)		2.6			2.6			3.0				
Lane Grp Cap (vph)		829			79			517				
v/s Ratio Prot		0.52										
v/s Ratio Perm					c6.50			c0.31				
v/c Ratio		1.05			13.11			0.82				
Uniform Delay, d1		17.8			17.8			20.1				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		44.1			5475.8			10.1				
Delay (s)		61.9			5493.6			30.2				
Level of Service		E			F			C				
Approach Delay (s)		61.9			5493.6			30.2			0.0	
Approach LOS		E			F			C			A	

Intersection Summary			
HCM 2000 Control Delay	2432.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	7.81		
Actuated Cycle Length (s)	71.1	Sum of lost time (s)	9.0
Intersection Capacity Utilization	110.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

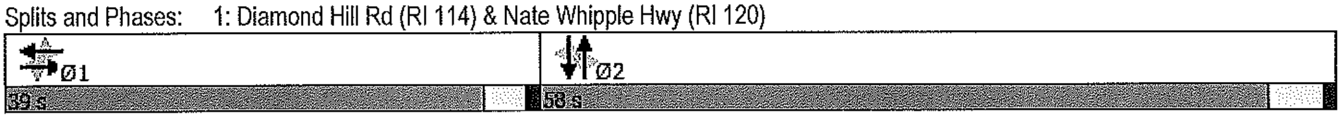
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	0	419	217	236	552	0	260	0	120	0	0	0
Future Volume (vph)	0	419	217	236	552	0	260	0	120	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		1854			4162			1592			454	
Travel Time (s)		31.6			70.9			36.2			10.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.74	0.70	0.77	0.70	0.79	0.86	0.88	0.69	0.77	0.69	0.73	0.63
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	13%	13%	13%	6%	6%	6%	5%	5%	5%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	881	0	0	1036	0	0	451	0	0	0	0
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	39.0	39.0		39.0	39.0		58.0	58.0		58.0	58.0	
Total Split (%)	40.2%	40.2%		40.2%	40.2%		59.8%	59.8%		59.8%	59.8%	
Maximum Green (s)	35.0	35.0		35.0	35.0		53.0	53.0		53.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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	
Total Lost Time (s)		4.0			4.0			5.0			5.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		1.05			13.11			0.83				
Control Delay		65.7			5480.1			31.7				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0				
Total Delay		65.7			5480.1			31.7				
Queue Length 50th (ft)		~413			~903			157				
Queue Length 95th (ft)		#548			#1189			167				
Internal Link Dist (ft)		1774			4082			1512			374	
Turn Bay Length (ft)												
Base Capacity (vph)		843			79			1055				
Starvation Cap Reductn		0			0			0				
Spillback Cap Reductn		0			0			0				
Storage Cap Reductn		0			0			0				
Reduced v/c Ratio		1.05			13.11			0.43				

Intersection Summary

Area Type: Other
Cycle Length: 97
Actuated Cycle Length: 71.2
Natural Cycle: 140
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)



Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	88	546	480	434	411	73
Future Volume (vph)	88	546	480	434	411	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	13	11	13	12	12
Total Lost time (s)	4.0		4.0	5.0	5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.88		1.00	1.00	1.00	0.85
Flt Protected	0.99		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1700		1728	1944	1881	1599
Flt Permitted	0.99		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1700		1728	1944	1881	1599
Peak-hour factor, PHF	0.99	0.72	0.93	0.94	0.86	0.79
Adj. Flow (vph)	89	758	516	462	478	92
RTOR Reduction (vph)	322	0	0	0	0	38
Lane Group Flow (vph)	525	0	516	462	478	54
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Actuated Green, G (s)	22.2		16.2	47.7	26.5	26.5
Effective Green, g (s)	22.2		16.2	47.7	26.5	26.5
Actuated g/C Ratio	0.28		0.21	0.61	0.34	0.34
Clearance Time (s)	4.0		4.0		5.0	5.0
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Lane Grp Cap (vph)	484		359	1190	639	543
v/s Ratio Prot	c0.31		c0.30	0.24	c0.25	0.03
v/s Ratio Perm						
v/c Ratio	1.08		1.44	0.39	0.75	0.10
Uniform Delay, d1	27.9		30.9	7.7	22.7	17.6
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	65.4		212.1	0.2	4.6	0.1
Delay (s)	93.3		242.9	7.8	27.3	17.6
Level of Service	F		F	A	C	B
Approach Delay (s)	93.3			131.9	25.8	
Approach LOS	F			F	C	

Intersection Summary			
HCM 2000 Control Delay	93.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	77.9	Sum of lost time (s)	13.0
Intersection Capacity Utilization	97.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	88	546	480	434	411	73
Future Volume (vph)	88	546	480	434	411	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	11	13	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			80
Storage Lanes	1	0	1			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			35	35	
Link Distance (ft)	2348			381	2230	
Travel Time (s)	53.4			7.4	43.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.99	0.72	0.93	0.94	0.86	0.79
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	847	0	516	462	478	92
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Detector Phase	3		2	1 2	1	1
Switch Phase						
Minimum Initial (s)	10.0		5.0		10.0	10.0
Minimum Split (s)	14.0		9.0		15.0	15.0
Total Split (s)	26.0		20.0		44.0	44.0
Total Split (%)	28.9%		22.2%		48.9%	48.9%
Maximum Green (s)	22.0		16.0		39.0	39.0
Yellow Time (s)	3.0		3.0		4.0	4.0
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.0		4.0		5.0	5.0
Lead/Lag			Lag		Lead	Lead
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		None		Min	Min
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
v/c Ratio	1.05		1.45	0.40	0.75	0.16
Control Delay	62.0		243.0	9.1	30.2	8.4

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	62.0		243.0	9.1	30.2	8.4
Queue Length 50th (ft)	~280		~344	105	200	11
Queue Length 95th (ft)	#580		#626	157	280	32
Internal Link Dist (ft)	2268			301	2150	
Turn Bay Length (ft)						80
Base Capacity (vph)	806		357	1180	949	835
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	1.05		1.45	0.39	0.50	0.11

Intersection Summary
Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 78.1
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Mendon Rd (RI 122) & Nate Whipple Hwy (RI 120)

Ø1	Ø2	Ø3
44 s	20 s	26 s

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		✣			✣			✣		↰	↱	
Traffic Volume (vph)	3	0	2	462	0	146	191	342	3	7	315	483
Future Volume (vph)	3	0	2	462	0	146	191	342	3	7	315	483
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	14	14	12	11	14	14
Total Lost time (s)		4.0			4.0			5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.93			0.97			1.00		1.00	0.91	
Flt Protected		0.98			0.96			0.98		0.95	1.00	
Satd. Flow (prot)		1959			1742			1945		1728	1828	
Flt Permitted		0.96			0.77			0.31		0.44	1.00	
Satd. Flow (perm)		1920			1385			610		792	1828	
Peak-hour factor, PHF	0.75	0.92	0.50	0.79	0.92	0.96	0.77	0.94	0.36	0.44	0.86	0.90
Adj. Flow (vph)	4	0	4	585	0	152	248	364	8	16	366	537
RTOR Reduction (vph)	0	6	0	0	19	0	0	1	0	0	59	0
Lane Group Flow (vph)	0	2	0	0	718	0	0	619	0	16	844	0
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		20.0			20.0			61.0		61.0	61.0	
Effective Green, g (s)		20.0			20.0			61.0		61.0	61.0	
Actuated g/C Ratio		0.22			0.22			0.68		0.68	0.68	
Clearance Time (s)		4.0			4.0			5.0		5.0	5.0	
Vehicle Extension (s)		2.6			2.6			2.8		2.8	2.8	
Lane Grp Cap (vph)		426			307			413		536	1238	
v/s Ratio Prot											0.46	
v/s Ratio Perm		0.00			c0.52			c1.01		0.02		
v/c Ratio		0.00			2.34			1.50		0.03	0.68	
Uniform Delay, d1		27.2			35.0			14.5		4.8	8.7	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.0			613.0			237.2		0.0	1.5	
Delay (s)		27.3			648.0			251.7		4.8	10.2	
Level of Service		C			F			F		A	B	
Approach Delay (s)		27.3			648.0			251.7			10.1	
Approach LOS		C			F			F			B	

Intersection Summary			
HCM 2000 Control Delay	281.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.70		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	127.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		✥			✥			✥		↰	↱	
Traffic Volume (vph)	3	0	2	462	0	146	191	342	3	7	315	483
Future Volume (vph)	3	0	2	462	0	146	191	342	3	7	315	483
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	12	12	12	14	14	12	11	14	14
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			35			35			35	
Link Distance (ft)		209			662			1525			777	
Travel Time (s)		5.7			12.9			29.7			15.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.75	0.92	0.50	0.79	0.92	0.96	0.77	0.94	0.36	0.44	0.86	0.90
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	8	0	0	737	0	0	620	0	16	903	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Detector Phase	2	2		2	2		1	1		1	1	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	24.0	24.0		24.0	24.0		66.0	66.0		66.0	66.0	
Total Split (%)	26.7%	26.7%		26.7%	26.7%		73.3%	73.3%		73.3%	73.3%	
Maximum Green (s)	20.0	20.0		20.0	20.0		61.0	61.0		61.0	61.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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			5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		2.8	2.8		2.8	2.8	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.02			2.26			1.50		0.03	0.70	
Control Delay		3.4			598.2			256.0		5.0	10.3	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		3.4			598.2			256.0		5.0	10.3	
Queue Length 50th (ft)		0			~685			~256		3	213	
Queue Length 95th (ft)		4			#905			#465		4	306	
Internal Link Dist (ft)		129			582			1445			697	
Turn Bay Length (ft)												
Base Capacity (vph)		445			326			414		537	1297	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.02			2.26			1.50		0.03	0.70	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 140
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Plaza Driveway/West Wrentham Rd & Mendon Rd (RI 122)

Ø1	Ø2
66 s	24 s

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	16	61	100	361	131	11	211	77	339	11	134	22
Future Volume (vph)	16	61	100	361	131	11	211	77	339	11	134	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	13	13	13	11	11	11
Total Lost time (s)		5.0			5.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.92			1.00			0.92			0.98	
Flt Protected		0.99			0.97			0.98			1.00	
Satd. Flow (prot)		1796			1872			1787			1777	
Flt Permitted		0.91			0.65			0.81			0.95	
Satd. Flow (perm)		1650			1261			1465			1693	
Peak-hour factor, PHF	0.50	0.72	0.58	0.85	0.79	0.78	0.84	0.83	0.78	0.78	0.86	0.79
Adj. Flow (vph)	32	85	172	425	166	14	251	93	435	14	156	28
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	289	0	0	604	0	0	779	0	0	198	0
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		29.8			29.8			16.3			16.3	
Effective Green, g (s)		29.8			29.8			16.3			16.3	
Actuated g/C Ratio		0.54			0.54			0.30			0.30	
Clearance Time (s)		5.0			5.0			4.0			4.0	
Vehicle Extension (s)		2.8			2.8			2.6			2.6	
Lane Grp Cap (vph)		892			681			433			500	
v/s Ratio Prot												
v/s Ratio Perm		0.18			c0.48			c0.53			0.12	
v/c Ratio		0.32			0.89			1.80			0.40	
Uniform Delay, d1		7.0			11.2			19.4			15.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.2			13.2			368.7			0.4	
Delay (s)		7.2			24.4			388.1			15.9	
Level of Service		A			C			F			B	
Approach Delay (s)		7.2			24.4			388.1			15.9	
Approach LOS		A			C			F			B	

Intersection Summary			
HCM 2000 Control Delay	172.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	55.1	Sum of lost time (s)	9.0
Intersection Capacity Utilization	98.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	16	61	100	361	131	11	211	77	339	11	134	22
Future Volume (vph)	16	61	100	361	131	11	211	77	339	11	134	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	13	13	13	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			No
Link Speed (mph)		30			40			25			25	
Link Distance (ft)		3320			7947			1008			920	
Travel Time (s)		75.5			135.5			27.5			25.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.50	0.72	0.58	0.85	0.79	0.78	0.84	0.83	0.78	0.78	0.86	0.79
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	289	0	0	605	0	0	779	0	0	198	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Total Split (s)	40.0	40.0		40.0	40.0		20.0	20.0		20.0	20.0	
Total Split (%)	66.7%	66.7%		66.7%	66.7%		33.3%	33.3%		33.3%	33.3%	
Maximum Green (s)	35.0	35.0		35.0	35.0		16.0	16.0		16.0	16.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		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	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			4.0			4.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.32			0.89			1.81			0.40	
Control Delay		7.8			28.5			393.9			20.5	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		7.8			28.5			393.9			20.5	
Queue Length 50th (ft)		46			153			~454			59	
Queue Length 95th (ft)		62			224			#581			106	
Internal Link Dist (ft)		3240			7867			928			840	
Turn Bay Length (ft)												
Base Capacity (vph)		1063			814			431			498	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.27			0.74			1.81			0.40	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 55.2
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: West Wrentham Rd & Pine Swamp Rd (RI 114)

Ø1	Ø2
40 s	20 s

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰	↱
Traffic Volume (veh/h)	380	102	285	565	7	8
Future Volume (Veh/h)	380	102	285	565	7	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.69	0.92	0.96	0.90	0.89	0.75
Hourly flow rate (vph)	551	111	297	628	8	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						10
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			551		1773	551
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			551		1773	551
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			71		88	98
cM capacity (veh/h)			1024		65	536

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	551	111	297	628	19
Volume Left	0	0	297	0	8
Volume Right	0	111	0	0	11
cSH	1700	1700	1024	1700	155
Volume to Capacity	0.32	0.07	0.29	0.37	0.12
Queue Length 95th (ft)	0	0	30	0	10
Control Delay (s)	0.0	0.0	9.9	0.0	35.4
Lane LOS			A		E
Approach Delay (s)	0.0		3.2		35.4
Approach LOS					E

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	0	295	267	17	246	0	254	0	30	0	0	0
Future Volume (vph)	0	295	267	17	246	0	254	0	30	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			5.0				
Lane Util. Factor		1.00			1.00			1.00				
Frt		0.93			1.00			0.99				
Flt Protected		1.00			1.00			0.96				
Satd. Flow (prot)		1742			1916			1759				
Flt Permitted		1.00			0.75			0.75				
Satd. Flow (perm)		1742			1451			1372				
Peak-hour factor, PHF	0.86	0.85	0.75	0.53	0.75	0.85	0.68	0.93	0.75	0.75	0.97	0.79
Adj. Flow (vph)	0	347	356	32	328	0	374	0	40	0	0	0
RTOR Reduction (vph)	0	33	0	0	0	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	670	0	0	360	0	0	406	0	0	0	0
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		25.4			25.4			21.4				
Effective Green, g (s)		25.4			25.4			21.4				
Actuated g/C Ratio		0.46			0.46			0.38				
Clearance Time (s)		4.0			4.0			5.0				
Vehicle Extension (s)		2.6			2.6			3.0				
Lane Grp Cap (vph)		792			660			526				
v/s Ratio Prot		c0.38										
v/s Ratio Perm					0.25			c0.30				
v/c Ratio		0.85			0.55			0.77				
Uniform Delay, d1		13.5			11.0			15.1				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		8.2			0.8			6.9				
Delay (s)		21.7			11.8			22.0				
Level of Service		C			B			C				
Approach Delay (s)		21.7			11.8			22.0			0.0	
Approach LOS		C			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	19.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	55.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

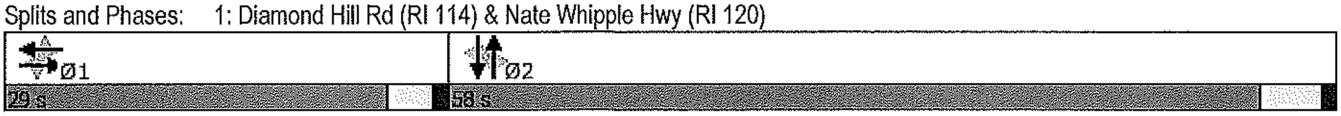
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		4			4			4			4	
Traffic Volume (vph)	0	295	267	17	246	0	254	0	30	0	0	0
Future Volume (vph)	0	295	267	17	246	0	254	0	30	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		1854			4162			1592			454	
Travel Time (s)		31.6			70.9			36.2			10.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.86	0.85	0.75	0.53	0.75	0.85	0.68	0.93	0.75	0.75	0.97	0.79
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	703	0	0	360	0	0	414	0	0	0	0
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	29.0	29.0		29.0	29.0		58.0	58.0		58.0	58.0	
Total Split (%)	33.3%	33.3%		33.3%	33.3%		66.7%	66.7%		66.7%	66.7%	
Maximum Green (s)	25.0	25.0		25.0	25.0		53.0	53.0		53.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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	
Total Lost Time (s)		4.0			4.0			5.0			5.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.85			0.55			0.78				
Control Delay		28.2			17.1			25.2				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0				
Total Delay		28.2			17.1			25.2				
Queue Length 50th (ft)		173			79			111				
Queue Length 95th (ft)		#445			158			198				
Internal Link Dist (ft)		1774			4082			1512			374	
Turn Bay Length (ft)												
Base Capacity (vph)		824			658			1277				
Starvation Cap Reductn		0			0			0				
Spillback Cap Reductn		0			0			0				
Storage Cap Reductn		0			0			0				
Reduced v/c Ratio		0.85			0.55			0.32				

Intersection Summary

Area Type: Other
Cycle Length: 87
Actuated Cycle Length: 55.9
Natural Cycle: 50
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)



Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	63	478	503	430	420	52
Future Volume (vph)	63	478	503	430	420	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	13	11	13	12	12
Total Lost time (s)	4.0		4.0	5.0	5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.88		1.00	1.00	1.00	0.85
Flt Protected	0.99		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1702		1728	1944	1881	1599
Flt Permitted	0.99		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1702		1728	1944	1881	1599
Peak-hour factor, PHF	0.87	0.86	0.94	0.86	0.78	0.73
Adj. Flow (vph)	72	556	535	500	538	71
RTOR Reduction (vph)	350	0	0	0	0	27
Lane Group Flow (vph)	278	0	535	500	538	44
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Actuated Green, G (s)	14.8		14.4	45.1	25.7	25.7
Effective Green, g (s)	14.8		14.4	45.1	25.7	25.7
Actuated g/C Ratio	0.22		0.21	0.66	0.38	0.38
Clearance Time (s)	4.0		4.0		5.0	5.0
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Lane Grp Cap (vph)	370		366	1291	711	605
v/s Ratio Prot	c0.16		c0.31	0.26	c0.29	0.03
v/s Ratio Perm						
v/c Ratio	0.75		1.46	0.39	0.76	0.07
Uniform Delay, d1	24.8		26.8	5.2	18.4	13.5
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	8.0		222.3	0.2	4.4	0.0
Delay (s)	32.8		249.1	5.3	22.8	13.5
Level of Service	C		F	A	C	B
Approach Delay (s)	32.8			131.3	21.7	
Approach LOS	C			F	C	

Intersection Summary			
HCM 2000 Control Delay	74.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	67.9	Sum of lost time (s)	13.0
Intersection Capacity Utilization	93.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	63	478	503	430	420	52
Future Volume (vph)	63	478	503	430	420	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	11	13	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			80
Storage Lanes	1	0	1			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			35	35	
Link Distance (ft)	2348			381	2230	
Travel Time (s)	53.4			7.4	43.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.87	0.86	0.94	0.86	0.78	0.73
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	628	0	535	500	538	71
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Detector Phase	3		2	1 2	1	1
Switch Phase						
Minimum Initial (s)	10.0		5.0		10.0	10.0
Minimum Split (s)	14.0		9.0		15.0	15.0
Total Split (s)	22.0		18.0		40.0	40.0
Total Split (%)	27.5%		22.5%		50.0%	50.0%
Maximum Green (s)	18.0		14.0		35.0	35.0
Yellow Time (s)	3.0		3.0		4.0	4.0
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.0		4.0		5.0	5.0
Lead/Lag			Lag		Lead	Lead
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		None		Min	Min
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
v/c Ratio	0.87		1.47	0.40	0.76	0.11
Control Delay	23.5		252.1	7.0	26.3	7.4

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	23.5		252.1	7.0	26.3	7.4
Queue Length 50th (ft)	69		~350	95	200	7
Queue Length 95th (ft)	#255		#591	140	250	22
Internal Link Dist (ft)	2268			301	2150	
Turn Bay Length (ft)						80
Base Capacity (vph)	787		364	1260	992	864
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.80		1.47	0.40	0.54	0.08

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 68.3
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Mendon Rd (RI 122) & Nate Whipple Hwy (RI 120)

Ø1	Ø2	Ø3
40 s	18 s	22 s

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		✥			✥			✥		↰	↱	
Traffic Volume (vph)	7	2	20	548	0	120	128	290	10	22	284	452
Future Volume (vph)	7	2	20	548	0	120	128	290	10	22	284	452
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	14	14	12	11	14	14
Total Lost time (s)		4.0			4.0			5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.91			0.97			0.99		1.00	0.91	
Flt Protected		0.99			0.96			0.99		0.95	1.00	
Satd. Flow (prot)		1935			1741			1968		1678	1775	
Flt Permitted		0.97			0.74			0.44		0.45	1.00	
Satd. Flow (perm)		1895			1337			881		794	1775	
Peak-hour factor, PHF	0.58	0.50	0.62	0.93	0.92	0.77	0.82	0.74	0.42	0.50	0.81	0.88
Adj. Flow (vph)	12	4	32	589	0	156	156	392	24	44	351	514
RTOR Reduction (vph)	0	25	0	0	21	0	0	2	0	0	66	0
Lane Group Flow (vph)	0	23	0	0	724	0	0	570	0	44	799	0
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	1%	1%	1%	4%	4%	4%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		18.0			18.0			52.8		52.8	52.8	
Effective Green, g (s)		18.0			18.0			52.8		52.8	52.8	
Actuated g/C Ratio		0.23			0.23			0.66		0.66	0.66	
Clearance Time (s)		4.0			4.0			5.0		5.0	5.0	
Vehicle Extension (s)		2.6			2.6			2.8		2.8	2.8	
Lane Grp Cap (vph)		427			301			582		525	1174	
v/s Ratio Prot											0.45	
v/s Ratio Perm		0.01			c0.54			c0.65		0.06		
v/c Ratio		0.05			2.41			0.98		0.08	0.68	
Uniform Delay, d1		24.2			30.9			13.0		4.8	8.3	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.0			642.6			31.7		0.1	1.6	
Delay (s)		24.3			673.5			44.6		4.9	9.9	
Level of Service		C			F			D		A	A	
Approach Delay (s)		24.3			673.5			44.6			9.7	
Approach LOS		C			F			D			A	

Intersection Summary			
HCM 2000 Control Delay	236.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.34		
Actuated Cycle Length (s)	79.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	121.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

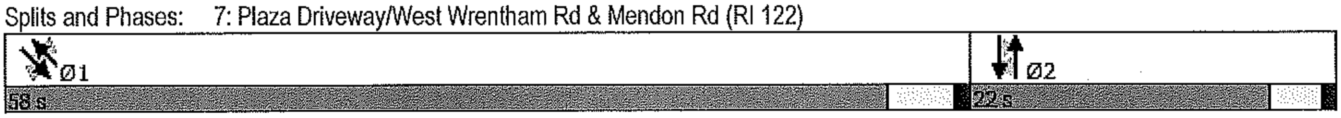
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	7	2	20	548	0	120	128	290	10	22	284	452
Future Volume (vph)	7	2	20	548	0	120	128	290	10	22	284	452
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	12	12	12	14	14	12	11	14	14
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			35			35			35	
Link Distance (ft)		209			662			1525			777	
Travel Time (s)		5.7			12.9			29.7			15.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.58	0.50	0.62	0.93	0.92	0.77	0.82	0.74	0.42	0.50	0.81	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	1%	1%	1%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	0	0	745	0	0	572	0	44	865	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Detector Phase	2	2		2	2		1	1		1	1	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	22.0	22.0		22.0	22.0		58.0	58.0		58.0	58.0	
Total Split (%)	27.5%	27.5%		27.5%	27.5%		72.5%	72.5%		72.5%	72.5%	
Maximum Green (s)	18.0	18.0		18.0	18.0		53.0	53.0		53.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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			5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		2.8	2.8		2.8	2.8	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.11			2.31			0.98		0.08	0.70	
Control Delay		13.4			621.5			48.3		5.3	10.0	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		13.4			621.5			48.3		5.3	10.0	
Queue Length 50th (ft)		6			~617			235		7	175	
Queue Length 95th (ft)		12			#829			#344		9	229	
Internal Link Dist (ft)		129			582			1445			697	
Turn Bay Length (ft)												
Base Capacity (vph)		452			322			587		526	1243	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.11			2.31			0.97		0.08	0.70	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 79.8
Natural Cycle: 120
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Plaza Driveway/West Wrentham Rd & Mendon Rd (RI 122)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	14	0	272	284	0	0	236	46	261	0	69	11
Future Volume (vph)	14	0	272	284	0	0	236	46	261	0	69	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	13	13	13	11	11	11
Total Lost time (s)		5.0			5.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.87			1.00			0.95			0.98	
Flt Protected		1.00			0.95			0.97			1.00	
Satd. Flow (prot)		1690			1847			1819			1785	
Flt Permitted		0.98			0.47			0.77			1.00	
Satd. Flow (perm)		1654			907			1438			1785	
Peak-hour factor, PHF	0.70	0.81	0.66	0.83	0.85	0.75	0.55	0.55	0.91	0.56	0.68	0.69
Adj. Flow (vph)	20	0	412	342	0	0	429	84	287	0	101	16
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	432	0	0	342	0	0	800	0	0	117	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	42	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		23.6			23.6			21.4			21.4	
Effective Green, g (s)		23.6			23.6			21.4			21.4	
Actuated g/C Ratio		0.44			0.44			0.40			0.40	
Clearance Time (s)		5.0			5.0			4.0			4.0	
Vehicle Extension (s)		2.8			2.8			2.6			2.6	
Lane Grp Cap (vph)		722			396			569			707	
v/s Ratio Prot											0.07	
v/s Ratio Perm		0.26			c0.38			c0.56				
v/c Ratio		0.60			0.86			1.41			0.17	
Uniform Delay, d1		11.6			13.7			16.3			10.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.3			17.3			193.1			0.1	
Delay (s)		12.8			31.1			209.4			10.6	
Level of Service		B			C			F			B	
Approach Delay (s)		12.8			31.1			209.4			10.6	
Approach LOS		B			C			F			B	

Intersection Summary			
HCM 2000 Control Delay	109.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	54.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	83.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	14	0	272	284	0	0	236	46	261	0	69	11
Future Volume (vph)	14	0	272	284	0	0	236	46	261	0	69	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	13	13	13	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			No
Link Speed (mph)		30			40			25			25	
Link Distance (ft)		3320			7947			1008			920	
Travel Time (s)		75.5			135.5			27.5			25.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.70	0.81	0.66	0.83	0.85	0.75	0.55	0.55	0.91	0.56	0.68	0.69
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	42	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	432	0	0	342	0	0	800	0	0	117	0
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Total Split (s)	35.0	35.0		35.0	35.0		25.0	25.0		25.0	25.0	
Total Split (%)	58.3%	58.3%		58.3%	58.3%		41.7%	41.7%		41.7%	41.7%	
Maximum Green (s)	30.0	30.0		30.0	30.0		21.0	21.0		21.0	21.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		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	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			4.0			4.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.60			0.86			1.41			0.17	
Control Delay		15.0			37.0			216.8			13.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		15.0			37.0			216.8			13.7	
Queue Length 50th (ft)		98			92			~396			26	
Queue Length 95th (ft)		143			#206			#301			44	
Internal Link Dist (ft)		3240			7867			928			840	
Turn Bay Length (ft)												
Base Capacity (vph)		932			512			567			705	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.46			0.67			1.41			0.17	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 54.1

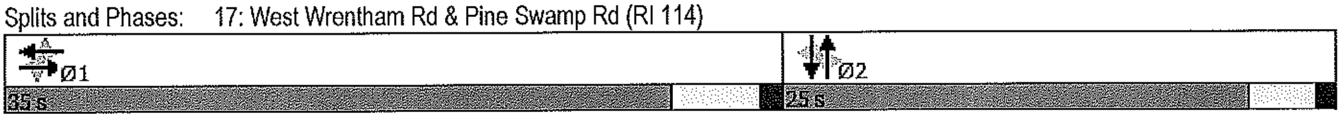
Natural Cycle: 110

Control Type: Actuated-Uncoordinated

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: West Wrentham Rd & Pine Swamp Rd (RI 114)



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	356	0	0	350	0	0
Future Volume (Veh/h)	356	0	0	350	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.91	0.79	0.88	0.88	0.89
Hourly flow rate (vph)	429	0	0	398	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						10
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			429		827	429
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			429		827	429
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1136		341	626

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	429	0	0	398	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.25	0.00	0.00	0.23	0.00
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					A
Approach Delay (s)	0.0		0.0		0.0
Approach LOS					A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	22.1%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)

03/22/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	0	228	285	18	232	0	362	0	20	0	0	0
Future Volume (vph)	0	228	285	18	232	0	362	0	20	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			5.0				
Lane Util. Factor		1.00			1.00			1.00				
Frt		0.92			1.00			0.99				
Flt Protected		1.00			1.00			0.95				
Satd. Flow (prot)		1710			1864			1732				
Flt Permitted		1.00			0.81			0.74				
Satd. Flow (perm)		1710			1515			1337				
Peak-hour factor, PHF	0.80	0.84	0.80	0.90	0.82	0.84	0.82	0.82	0.83	0.81	0.82	0.81
Adj. Flow (vph)	0	271	356	20	283	0	441	0	24	0	0	0
RTOR Reduction (vph)	0	97	0	0	0	0	0	13	0	0	0	0
Lane Group Flow (vph)	0	530	0	0	303	0	0	452	0	0	0	0
Heavy Vehicles (%)	6%	6%	6%	5%	5%	5%	4%	4%	4%	3%	3%	3%
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		17.1			17.1			18.3				
Effective Green, g (s)		17.1			17.1			18.3				
Actuated g/C Ratio		0.39			0.39			0.41				
Clearance Time (s)		4.0			4.0			5.0				
Vehicle Extension (s)		2.6			2.6			3.0				
Lane Grp Cap (vph)		658			583			551				
v/s Ratio Prot		c0.31										
v/s Ratio Perm					0.20			c0.34				
v/c Ratio		0.81			0.52			0.82				
Uniform Delay, d1		12.2			10.5			11.6				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		7.0			0.6			9.5				
Delay (s)		19.1			11.1			21.1				
Level of Service		B			B			C				
Approach Delay (s)		19.1			11.1			21.1			0.0	
Approach LOS		B			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	18.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	44.4	Sum of lost time (s)	9.0
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	0	228	285	18	232	0	362	0	20	0	0	0
Future Volume (vph)	0	228	285	18	232	0	362	0	20	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		1854			4162			1592			454	
Travel Time (s)		31.6			70.9			36.2			10.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.80	0.84	0.80	0.90	0.82	0.84	0.82	0.82	0.83	0.81	0.82	0.81
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	5%	5%	5%	4%	4%	4%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	627	0	0	303	0	0	465	0	0	0	0
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	24.0	24.0		24.0	24.0		26.0	26.0		26.0	26.0	
Total Split (%)	48.0%	48.0%		48.0%	48.0%		52.0%	52.0%		52.0%	52.0%	
Maximum Green (s)	20.0	20.0		20.0	20.0		21.0	21.0		21.0	21.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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	
Total Lost Time (s)		4.0			4.0			5.0			5.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.84			0.52			0.83				
Control Delay		22.3			15.0			28.1				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0				
Total Delay		22.3			15.0			28.1				
Queue Length 50th (ft)		113			63			107				
Queue Length 95th (ft)		#244			106			#215				
Internal Link Dist (ft)		1774			4082			1512			374	
Turn Bay Length (ft)												
Base Capacity (vph)		879			704			663				
Starvation Cap Reductn		0			0			0				
Spillback Cap Reductn		0			0			0				
Storage Cap Reductn		0			0			0				
Reduced v/c Ratio		0.71			0.43			0.70				

Intersection Summary

Area Type: Other
Cycle Length: 50
Actuated Cycle Length: 44.7
Natural Cycle: 50
Control Type: Actuated-Uncoordinated
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)

Ø1	Ø2
24 s	26 s

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	64	668	524	312	418	73
Future Volume (vph)	64	668	524	312	418	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	13	11	13	12	12
Total Lost time (s)	4.0		4.0	5.0	5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.88		1.00	1.00	1.00	0.85
Flt Protected	0.99		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1669		1662	1870	1827	1553
Flt Permitted	0.99		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1669		1662	1870	1827	1553
Peak-hour factor, PHF	0.68	0.91	0.58	0.70	0.71	0.58
Adj. Flow (vph)	94	734	903	446	589	126
RTOR Reduction (vph)	468	0	0	0	0	54
Lane Group Flow (vph)	360	0	903	446	589	72
Heavy Vehicles (%)	3%	3%	5%	5%	4%	4%
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Actuated Green, G (s)	10.0		23.0	42.0	14.0	14.0
Effective Green, g (s)	10.0		23.0	42.0	14.0	14.0
Actuated g/C Ratio	0.17		0.38	0.70	0.23	0.23
Clearance Time (s)	4.0		4.0		5.0	5.0
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Lane Grp Cap (vph)	278		637	1309	426	362
v/s Ratio Prot	c0.22		c0.54	0.24	c0.32	0.05
v/s Ratio Perm						
v/c Ratio	1.29		1.42	0.34	1.38	0.20
Uniform Delay, d1	25.0		18.5	3.5	23.0	18.5
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	156.3		197.1	0.1	186.3	0.2
Delay (s)	181.3		215.6	3.7	209.3	18.7
Level of Service	F		F	A	F	B
Approach Delay (s)	181.3			145.5	175.7	
Approach LOS	F			F	F	

Intersection Summary			
HCM 2000 Control Delay	163.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.38		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	106.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	64	668	524	312	418	73
Future Volume (vph)	64	668	524	312	418	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	11	13	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			80
Storage Lanes	1	0	1			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			35	35	
Link Distance (ft)	2348			381	2230	
Travel Time (s)	53.4			7.4	43.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.68	0.91	0.58	0.70	0.71	0.58
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	5%	5%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	828	0	903	446	589	126
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Detector Phase	3		2	1 2	1	1
Switch Phase						
Minimum Initial (s)	10.0		5.0		10.0	10.0
Minimum Split (s)	14.0		9.0		15.0	15.0
Total Split (s)	14.0		27.0		19.0	19.0
Total Split (%)	23.3%		45.0%		31.7%	31.7%
Maximum Green (s)	10.0		23.0		14.0	14.0
Yellow Time (s)	3.0		3.0		4.0	4.0
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.0		4.0		5.0	5.0
Lead/Lag			Lag		Lead	Lead
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		None		Min	Min
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
v/c Ratio	1.11		1.42	0.35	1.38	0.30
Control Delay	79.6		218.9	4.9	210.9	12.1

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	79.6		218.9	4.9	210.9	12.1
Queue Length 50th (ft)	~161		~455	53	~293	16
Queue Length 95th (ft)	#149		#333	62	#331	25
Internal Link Dist (ft)	2268			301	2150	
Turn Bay Length (ft)						80
Base Capacity (vph)	746		637	1277	426	416
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	1.11		1.42	0.35	1.38	0.30

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 60
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Mendon Rd (RI 122) & Nate Whipple Hwy (RI 120)

Ø1	Ø2	Ø3
19 s	27 s	14 s

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	3	1	6	453	0	150	95	100	13	7	292	566
Future Volume (vph)	3	1	6	453	0	150	95	100	13	7	292	566
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	14	14	12	11	14	14
Total Lost time (s)		4.0			4.0			5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.94			0.96			0.98		1.00	0.90	
Flt Protected		0.98			0.96			0.98		0.95	1.00	
Satd. Flow (prot)		1986			1700			1897		1694	1772	
Flt Permitted		0.89			0.76			0.17		0.59	1.00	
Satd. Flow (perm)		1807			1347			326		1055	1772	
Peak-hour factor, PHF	0.25	0.25	0.50	0.84	0.92	0.79	0.81	0.79	0.41	0.44	0.87	0.86
Adj. Flow (vph)	12	4	12	539	0	190	117	127	32	16	336	658
RTOR Reduction (vph)	0	8	0	0	15	0	0	5	0	0	71	0
Lane Group Flow (vph)	0	20	0	0	714	0	0	271	0	16	923	0
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	3%	3%	3%	3%	3%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		33.0			33.0			58.0		58.0	58.0	
Effective Green, g (s)		33.0			33.0			58.0		58.0	58.0	
Actuated g/C Ratio		0.33			0.33			0.58		0.58	0.58	
Clearance Time (s)		4.0			4.0			5.0		5.0	5.0	
Vehicle Extension (s)		2.6			2.6			2.8		2.8	2.8	
Lane Grp Cap (vph)		596			444			189		611	1027	
v/s Ratio Prot											0.52	
v/s Ratio Perm		0.01			c0.53			c0.83		0.02		
v/c Ratio		0.03			1.61			1.44		0.03	0.90	
Uniform Delay, d1		22.7			33.5			21.0		9.0	18.4	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.0			284.2			223.7		0.0	10.5	
Delay (s)		22.7			317.7			244.7		9.0	28.9	
Level of Service		C			F			F		A	C	
Approach Delay (s)		22.7			317.7			244.7			28.6	
Approach LOS		C			F			F			C	

Intersection Summary			
HCM 2000 Control Delay	160.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.50		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	114.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	3	1	6	453	0	150	95	100	13	7	292	566
Future Volume (vph)	3	1	6	453	0	150	95	100	13	7	292	566
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	12	12	12	14	14	12	11	14	14
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			35			35			35	
Link Distance (ft)		209			662			1525			777	
Travel Time (s)		5.7			12.9			29.7			15.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.25	0.25	0.50	0.84	0.92	0.79	0.81	0.79	0.41	0.44	0.87	0.86
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	3%	3%	3%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	28	0	0	729	0	0	276	0	16	994	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Detector Phase	2	2		2	2		1	1		1	1	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	37.0	37.0		37.0	37.0		63.0	63.0		63.0	63.0	
Total Split (%)	37.0%	37.0%		37.0%	37.0%		63.0%	63.0%		63.0%	63.0%	
Maximum Green (s)	33.0	33.0		33.0	33.0		58.0	58.0		58.0	58.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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			5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		2.8	2.8		2.8	2.8	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.05			1.59			1.43		0.03	0.91	
Control Delay		16.1			301.5			243.5		9.1	28.7	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		16.1			301.5			243.5		9.1	28.7	
Queue Length 50th (ft)		7			~663			~238		4	455	
Queue Length 95th (ft)		3			#891			#214		6	#733	
Internal Link Dist (ft)		129			582			1445			697	
Turn Bay Length (ft)												
Base Capacity (vph)		603			459			193		611	1098	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.05			1.59			1.43		0.03	0.91	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

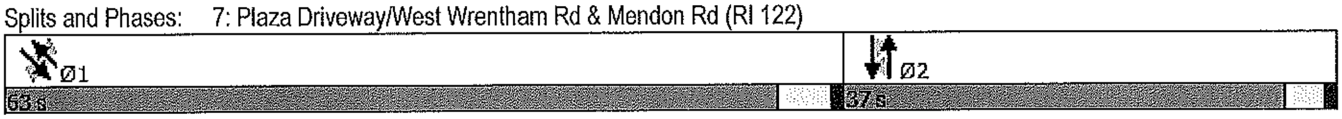
Natural Cycle: 100

Control Type: Actuated-Uncoordinated

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Plaza Driveway/West Wrentham Rd & Mendon Rd (RI 122)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	0	7	188	348	79	7	156	106	547	2	50	12
Future Volume (vph)	0	7	188	348	79	7	156	106	547	2	50	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	13	13	13	11	11	11
Total Lost time (s)		5.0			5.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.87			1.00			0.91			0.97	
Flt Protected		1.00			0.96			0.99			1.00	
Satd. Flow (prot)		1692			1811			1768			1736	
Flt Permitted		1.00			0.51			0.90			0.97	
Satd. Flow (perm)		1692			951			1604			1690	
Peak-hour factor, PHF	0.78	0.63	0.75	0.73	0.75	0.71	0.49	0.62	0.56	0.71	0.63	0.43
Adj. Flow (vph)	0	11	251	477	105	10	318	171	977	3	79	28
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	262	0	0	591	0	0	1466	0	0	110	0
Heavy Vehicles (%)	1%	1%	1%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		46.0			46.0			65.0			65.0	
Effective Green, g (s)		46.0			46.0			65.0			65.0	
Actuated g/C Ratio		0.38			0.38			0.54			0.54	
Clearance Time (s)		5.0			5.0			4.0			4.0	
Vehicle Extension (s)		2.8			2.8			2.6			2.6	
Lane Grp Cap (vph)		648			364			868			915	
v/s Ratio Prot		0.15										
v/s Ratio Perm					c0.62			c0.91			0.07	
v/c Ratio		0.40			1.62			1.69			0.12	
Uniform Delay, d1		27.0			37.0			27.5			13.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.4			293.4			315.0			0.0	
Delay (s)		27.4			330.4			342.5			13.5	
Level of Service		C			F			F			B	
Approach Delay (s)		27.4			330.4			342.5			13.5	
Approach LOS		C			F			F			B	

Intersection Summary			
HCM 2000 Control Delay	290.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.66		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	102.0%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

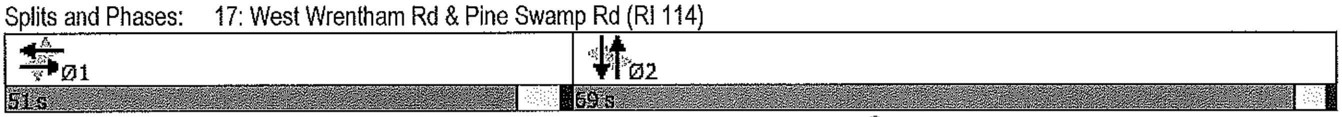
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	0	7	188	348	79	7	156	106	547	2	50	12
Future Volume (vph)	0	7	188	348	79	7	156	106	547	2	50	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	13	13	13	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			No
Link Speed (mph)		30			40			25			25	
Link Distance (ft)		3320			7947			1008			920	
Travel Time (s)		75.5			135.5			27.5			25.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.78	0.63	0.75	0.73	0.75	0.71	0.49	0.62	0.56	0.71	0.63	0.43
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	262	0	0	592	0	0	1466	0	0	110	0
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Total Split (s)	51.0	51.0		51.0	51.0		69.0	69.0		69.0	69.0	
Total Split (%)	42.5%	42.5%		42.5%	42.5%		57.5%	57.5%		57.5%	57.5%	
Maximum Green (s)	46.0	46.0		46.0	46.0		65.0	65.0		65.0	65.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		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	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			4.0			4.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.40			1.62			1.69			0.12	
Control Delay		29.4			320.4			339.1			14.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		29.4			320.4			339.1			14.0	
Queue Length 50th (ft)		146			~666			~1663			40	
Queue Length 95th (ft)		143			#692			#1110			48	
Internal Link Dist (ft)		3240			7867			928			840	
Turn Bay Length (ft)												
Base Capacity (vph)		648			365			868			915	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.40			1.62			1.69			0.12	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: West Wrentham Rd & Pine Swamp Rd (RI 114)



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	659	17	22	349	34	112
Future Volume (Veh/h)	659	17	22	349	34	112
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.73	0.60	0.86	0.60	0.76	0.91
Hourly flow rate (vph)	903	28	26	582	45	123
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						10
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			903		1537	903
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			903		1537	903
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		63	63
cM capacity (veh/h)			753		122	334

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	903	28	26	582	168
Volume Left	0	0	26	0	45
Volume Right	0	28	0	0	123
cSH	1700	1700	753	1700	457
Volume to Capacity	0.53	0.02	0.03	0.34	0.37
Queue Length 95th (ft)	0	0	3	0	42
Control Delay (s)	0.0	0.0	10.0	0.0	29.6
Lane LOS			A		D
Approach Delay (s)	0.0		0.4		29.6
Approach LOS					D

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	0	419	217	236	552	0	260	0	120	0	0	0
Future Volume (vph)	0	419	217	236	552	0	260	0	120	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			5.0				
Lane Util. Factor		1.00			1.00			1.00				
Frt		0.96			1.00			0.95				
Flt Protected		1.00			0.98			0.97				
Satd. Flow (prot)		1662			1823			1670				
Flt Permitted		1.00			0.37			0.80				
Satd. Flow (perm)		1662			692			1384				
Peak-hour factor, PHF	0.74	0.70	0.77	0.70	0.79	0.86	0.88	0.69	0.77	0.69	0.73	0.63
Adj. Flow (vph)	0	599	282	337	699	0	295	0	156	0	0	0
RTOR Reduction (vph)	0	12	0	0	0	0	0	13	0	0	0	0
Lane Group Flow (vph)	0	869	0	0	1036	0	0	438	0	0	0	0
Heavy Vehicles (%)	13%	13%	13%	6%	6%	6%	5%	5%	5%	6%	6%	6%
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		100.0			100.0			31.0				
Effective Green, g (s)		100.0			100.0			31.0				
Actuated g/C Ratio		0.71			0.71			0.22				
Clearance Time (s)		4.0			4.0			5.0				
Vehicle Extension (s)		2.6			2.6			3.0				
Lane Grp Cap (vph)		1187			494			306				
v/s Ratio Prot		0.52										
v/s Ratio Perm					c1.50			c0.32				
v/c Ratio		0.73			2.10			1.43				
Uniform Delay, d1		12.0			20.0			54.5				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		2.3			500.6			211.7				
Delay (s)		14.2			520.6			266.2				
Level of Service		B			F			F				
Approach Delay (s)		14.2			520.6			266.2			0.0	
Approach LOS		B			F			F			A	

Intersection Summary			
HCM 2000 Control Delay	283.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.94		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	110.0%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	0	419	217	236	552	0	260	0	120	0	0	0
Future Volume (vph)	0	419	217	236	552	0	260	0	120	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		1854			4162			1592			454	
Travel Time (s)		31.6			70.9			36.2			10.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.74	0.70	0.77	0.70	0.79	0.86	0.88	0.69	0.77	0.69	0.73	0.63
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	13%	13%	13%	6%	6%	6%	5%	5%	5%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	881	0	0	1036	0	0	451	0	0	0	0
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	104.0	104.0		104.0	104.0		36.0	36.0		36.0	36.0	
Total Split (%)	74.3%	74.3%		74.3%	74.3%		25.7%	25.7%		25.7%	25.7%	
Maximum Green (s)	100.0	100.0		100.0	100.0		31.0	31.0		31.0	31.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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	
Total Lost Time (s)		4.0			4.0			5.0			5.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.73			2.10			1.41				
Control Delay		16.0			522.0			242.0				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0				
Total Delay		16.0			522.0			242.0				
Queue Length 50th (ft)		418			~1045			~541				
Queue Length 95th (ft)		334			#1034			#507				
Internal Link Dist (ft)		1774			4082			1512			374	
Turn Bay Length (ft)												
Base Capacity (vph)		1199			493			319				
Starvation Cap Reductn		0			0			0				
Spillback Cap Reductn		0			0			0				
Storage Cap Reductn		0			0			0				
Reduced v/c Ratio		0.73			2.10			1.41				

Intersection Summary
Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 140
Natural Cycle: 140
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)

Ø1	Ø2
104 s	36 s

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	88	546	480	434	411	73
Future Volume (vph)	88	546	480	434	411	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	13	11	13	12	12
Total Lost time (s)	4.0		4.0	5.0	5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.88		1.00	1.00	1.00	0.85
Flt Protected	0.99		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1700		1728	1944	1881	1599
Flt Permitted	0.99		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1700		1728	1944	1881	1599
Peak-hour factor, PHF	0.99	0.72	0.93	0.94	0.86	0.79
Adj. Flow (vph)	89	758	516	462	478	92
RTOR Reduction (vph)	507	0	0	0	0	49
Lane Group Flow (vph)	340	0	516	462	478	43
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Actuated Green, G (s)	13.0		18.9	38.9	15.0	15.0
Effective Green, g (s)	13.0		18.9	38.9	15.0	15.0
Actuated g/C Ratio	0.22		0.32	0.65	0.25	0.25
Clearance Time (s)	4.0		4.0		5.0	5.0
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Lane Grp Cap (vph)	368		545	1262	471	400
v/s Ratio Prot	c0.20		c0.30	0.24	c0.25	0.03
v/s Ratio Perm						
v/c Ratio	0.93		0.95	0.37	1.01	0.11
Uniform Delay, d1	23.0		20.0	4.8	22.4	17.3
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	28.5		25.6	0.1	45.3	0.1
Delay (s)	51.5		45.7	5.0	67.7	17.4
Level of Service	D		D	A	E	B
Approach Delay (s)	51.5			26.4	59.6	
Approach LOS	D			C	E	

Intersection Summary			
HCM 2000 Control Delay	43.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	59.9	Sum of lost time (s)	13.0
Intersection Capacity Utilization	97.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

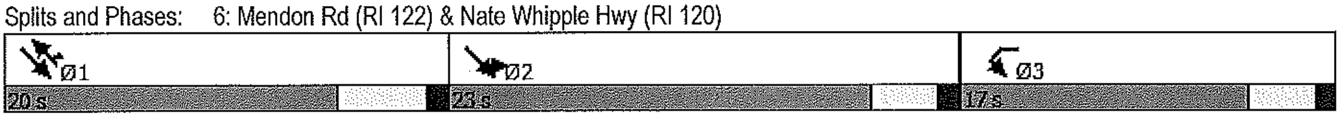
Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	88	546	480	434	411	73
Future Volume (vph)	88	546	480	434	411	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	11	13	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			80
Storage Lanes	1	0	1			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			35	35	
Link Distance (ft)	2348			381	2230	
Travel Time (s)	53.4			7.4	43.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.99	0.72	0.93	0.94	0.86	0.79
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	847	0	516	462	478	92
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Detector Phase	3		2	1 2	1	1
Switch Phase						
Minimum Initial (s)	10.0		5.0		10.0	10.0
Minimum Split (s)	14.0		9.0		15.0	15.0
Total Split (s)	17.0		23.0		20.0	20.0
Total Split (%)	28.3%		38.3%		33.3%	33.3%
Maximum Green (s)	13.0		19.0		15.0	15.0
Yellow Time (s)	3.0		3.0		4.0	4.0
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.0		4.0		5.0	5.0
Lead/Lag			Lag		Lead	Lead
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		None		Min	Min
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
v/c Ratio	0.97		0.95	0.38	1.01	0.20
Control Delay	32.5		51.0	6.4	72.1	9.4

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	32.5		51.0	6.4	72.1	9.4
Queue Length 50th (ft)	65		179	68	~178	7
Queue Length 95th (ft)	#308		#351	111	#324	30
Internal Link Dist (ft)	2268			301	2150	
Turn Bay Length (ft)						80
Base Capacity (vph)	875		548	1233	471	449
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.97		0.94	0.37	1.01	0.20

Intersection Summary	
Area Type:	Other
Cycle Length: 60	
Actuated Cycle Length: 59.9	
Natural Cycle: 60	
Control Type: Actuated-Uncoordinated	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Mendon Rd (RI 122) & Nate Whipple Hwy (RI 120)



Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	3	0	2	462	0	146	191	342	3	7	315	483
Future Volume (vph)	3	0	2	462	0	146	191	342	3	7	315	483
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	14	14	12	11	14	14
Total Lost time (s)		4.0			4.0			5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.93			0.97			1.00		1.00	0.91	
Flt Protected		0.98			0.96			0.98		0.95	1.00	
Satd. Flow (prot)		1959			1742			1945		1728	1828	
Flt Permitted		0.96			0.77			0.28		0.43	1.00	
Satd. Flow (perm)		1924			1385			562		789	1828	
Peak-hour factor, PHF	0.75	0.92	0.50	0.79	0.92	0.96	0.77	0.94	0.36	0.44	0.86	0.90
Adj. Flow (vph)	4	0	4	585	0	152	248	364	8	16	366	537
RTOR Reduction (vph)	0	6	0	0	18	0	0	1	0	0	59	0
Lane Group Flow (vph)	0	2	0	0	719	0	0	619	0	16	844	0
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		22.0			22.0			59.0		59.0	59.0	
Effective Green, g (s)		22.0			22.0			59.0		59.0	59.0	
Actuated g/C Ratio		0.24			0.24			0.66		0.66	0.66	
Clearance Time (s)		4.0			4.0			5.0		5.0	5.0	
Vehicle Extension (s)		2.6			2.6			2.8		2.8	2.8	
Lane Grp Cap (vph)		470			338			368		517	1198	
v/s Ratio Prot											0.46	
v/s Ratio Perm		0.00			c0.52			c1.10		0.02		
v/c Ratio		0.00			2.13			1.68		0.03	0.70	
Uniform Delay, d1		25.7			34.0			15.5		5.4	9.9	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.0			516.9			318.9		0.0	1.9	
Delay (s)		25.7			550.9			334.4		5.5	11.8	
Level of Service		C			F			F		A	B	
Approach Delay (s)		25.7			550.9			334.4			11.7	
Approach LOS		C			F			F			B	

Intersection Summary			
HCM 2000 Control Delay	273.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.80		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	127.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	3	0	2	462	0	146	191	342	3	7	315	483
Future Volume (vph)	3	0	2	462	0	146	191	342	3	7	315	483
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	12	12	12	14	14	12	11	14	14
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			35			35			35	
Link Distance (ft)		209			662			1525			777	
Travel Time (s)		5.7			12.9			29.7			15.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.75	0.92	0.50	0.79	0.92	0.96	0.77	0.94	0.36	0.44	0.86	0.90
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	8	0	0	737	0	0	620	0	16	903	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Detector Phase	2	2		2	2		1	1		1	1	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	26.0	26.0		26.0	26.0		64.0	64.0		64.0	64.0	
Total Split (%)	28.9%	28.9%		28.9%	28.9%		71.1%	71.1%		71.1%	71.1%	
Maximum Green (s)	22.0	22.0		22.0	22.0		59.0	59.0		59.0	59.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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			5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		2.8	2.8		2.8	2.8	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.02			2.07			1.68		0.03	0.72	
Control Delay		3.2			513.6			339.6		5.7	11.9	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		3.2			513.6			339.6		5.7	11.9	
Queue Length 50th (ft)		0			~667			~313		3	238	
Queue Length 95th (ft)		4			#887			#522		5	340	
Internal Link Dist (ft)		129			582			1445			697	
Turn Bay Length (ft)												
Base Capacity (vph)		488			356			368		517	1256	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.02			2.07			1.68		0.03	0.72	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 140
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Plaza Driveway/West Wrentham Rd & Mendon Rd (RI 122)

Ø1	Ø2
54 s	26 s

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	16	61	100	361	131	11	211	77	339	11	134	22
Future Volume (vph)	16	61	100	361	131	11	211	77	339	11	134	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	13	13	13	11	11	11
Total Lost time (s)		5.0			5.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.92			1.00			0.92			0.98	
Flt Protected		0.99			0.97			0.98			1.00	
Satd. Flow (prot)		1796			1872			1787			1777	
Flt Permitted		0.91			0.58			0.81			0.94	
Satd. Flow (perm)		1650			1129			1465			1683	
Peak-hour factor, PHF	0.50	0.72	0.58	0.85	0.79	0.78	0.84	0.83	0.78	0.78	0.86	0.79
Adj. Flow (vph)	32	85	172	425	166	14	251	93	435	14	156	28
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	289	0	0	604	0	0	779	0	0	198	0
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		39.0			39.0			42.0			42.0	
Effective Green, g (s)		39.0			39.0			42.0			42.0	
Actuated g/C Ratio		0.43			0.43			0.47			0.47	
Clearance Time (s)		5.0			5.0			4.0			4.0	
Vehicle Extension (s)		2.8			2.8			2.6			2.6	
Lane Grp Cap (vph)		715			489			683			785	
v/s Ratio Prot												
v/s Ratio Perm		0.18			c0.54			c0.53			0.12	
v/c Ratio		0.40			1.23			1.14			0.25	
Uniform Delay, d1		17.5			25.5			24.0			14.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.3			122.4			80.1			0.1	
Delay (s)		17.9			147.9			104.1			14.6	
Level of Service		B			F			F			B	
Approach Delay (s)		17.9			147.9			104.1			14.6	
Approach LOS		B			F			F			B	

Intersection Summary			
HCM 2000 Control Delay	95.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	98.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	16	61	100	361	131	11	211	77	339	11	134	22
Future Volume (vph)	16	61	100	361	131	11	211	77	339	11	134	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	13	13	13	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			No
Link Speed (mph)		30			40			25			25	
Link Distance (ft)		3320			7947			1008			920	
Travel Time (s)		75.5			135.5			27.5			25.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.50	0.72	0.58	0.85	0.79	0.78	0.84	0.83	0.78	0.78	0.86	0.79
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	289	0	0	605	0	0	779	0	0	198	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Total Split (s)	44.0	44.0		44.0	44.0		46.0	46.0		46.0	46.0	
Total Split (%)	48.9%	48.9%		48.9%	48.9%		51.1%	51.1%		51.1%	51.1%	
Maximum Green (s)	39.0	39.0		39.0	39.0		42.0	42.0		42.0	42.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		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	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			4.0			4.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.40			1.24			1.14			0.25	
Control Delay		19.7			149.7			105.0			15.6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		19.7			149.7			105.0			15.6	
Queue Length 50th (ft)		110			~433			~522			66	
Queue Length 95th (ft)		132			#524			#651			105	
Internal Link Dist (ft)		3240			7867			928			840	
Turn Bay Length (ft)												
Base Capacity (vph)		715			489			684			784	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.40			1.24			1.14			0.25	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: West Wrentham Rd & Pine Swamp Rd (RI 114)

Ø1	Ø2
44 s	46 s

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰	↱
Traffic Volume (veh/h)	380	102	285	565	7	8
Future Volume (Veh/h)	380	102	285	565	7	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.69	0.92	0.96	0.90	0.89	0.75
Hourly flow rate (vph)	551	111	297	628	8	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						10
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			551		1773	551
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			551		1773	551
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			71		88	98
cM capacity (veh/h)			1024		65	536

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	551	111	297	628	19
Volume Left	0	0	297	0	8
Volume Right	0	111	0	0	11
cSH	1700	1700	1024	1700	155
Volume to Capacity	0.32	0.07	0.29	0.37	0.12
Queue Length 95th (ft)	0	0	30	0	10
Control Delay (s)	0.0	0.0	9.9	0.0	35.4
Lane LOS			A		E
Approach Delay (s)	0.0		3.2		35.4
Approach LOS					E

Intersection Summary			
Average Delay	2.3		
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	0	295	267	17	246	0	254	0	30	0	0	0
Future Volume (vph)	0	295	267	17	246	0	254	0	30	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			5.0				
Lane Util. Factor		1.00			1.00			1.00				
Frt		0.93			1.00			0.99				
Flt Protected		1.00			1.00			0.96				
Satd. Flow (prot)		1742			1916			1759				
Flt Permitted		1.00			0.74			0.75				
Satd. Flow (perm)		1742			1426			1372				
Peak-hour factor, PHF	0.86	0.85	0.75	0.53	0.75	0.85	0.68	0.93	0.75	0.75	0.97	0.79
Adj. Flow (vph)	0	347	356	32	328	0	374	0	40	0	0	0
RTOR Reduction (vph)	0	77	0	0	0	0	0	14	0	0	0	0
Lane Group Flow (vph)	0	626	0	0	360	0	0	400	0	0	0	0
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		19.6			19.6			16.2				
Effective Green, g (s)		19.6			19.6			16.2				
Actuated g/C Ratio		0.44			0.44			0.36				
Clearance Time (s)		4.0			4.0			5.0				
Vehicle Extension (s)		2.6			2.6			3.0				
Lane Grp Cap (vph)		762			623			496				
v/s Ratio Prot		c0.36										
v/s Ratio Perm					0.25			c0.29				
v/c Ratio		0.82			0.58			0.81				
Uniform Delay, d1		11.1			9.5			12.9				
Progression Factor		1.00			1.00			1.00				
Incremental Delay, d2		7.0			1.1			9.3				
Delay (s)		18.1			10.6			22.2				
Level of Service		B			B			C				
Approach Delay (s)		18.1			10.6			22.2			0.0	
Approach LOS		B			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	17.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	44.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

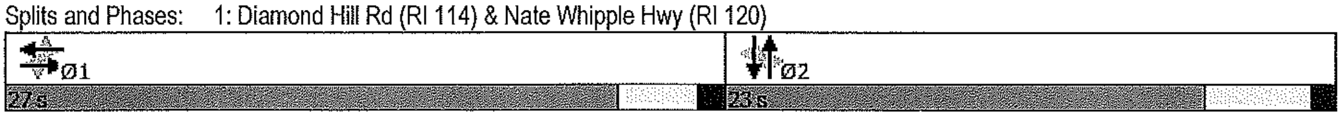
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	295	267	17	246	0	254	0	30	0	0	0
Future Volume (vph)	0	295	267	17	246	0	254	0	30	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		1854			4162			1592			454	
Travel Time (s)		31.6			70.9			36.2			10.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.86	0.85	0.75	0.53	0.75	0.85	0.68	0.93	0.75	0.75	0.97	0.79
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	703	0	0	360	0	0	414	0	0	0	0
Turn Type		NA		Perm	NA		Perm	NA				
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	27.0	27.0		27.0	27.0		23.0	23.0		23.0	23.0	
Total Split (%)	54.0%	54.0%		54.0%	54.0%		46.0%	46.0%		46.0%	46.0%	
Maximum Green (s)	23.0	23.0		23.0	23.0		18.0	18.0		18.0	18.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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	
Total Lost Time (s)		4.0			4.0			5.0			5.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.84			0.58			0.82				
Control Delay		21.1			14.3			30.0				

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0				
Total Delay		21.1			14.3			30.0				
Queue Length 50th (ft)		129			70			100				
Queue Length 95th (ft)		#252			102			#238				
Internal Link Dist (ft)		1774			4082			1512			374	
Turn Bay Length (ft)												
Base Capacity (vph)		984			752			580				
Starvation Cap Reductn		0			0			0				
Spillback Cap Reductn		0			0			0				
Storage Cap Reductn		0			0			0				
Reduced v/c Ratio		0.71			0.48			0.71				

Intersection Summary

Area Type: Other
Cycle Length: 50
Actuated Cycle Length: 45.1
Natural Cycle: 50
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)



Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	63	478	503	430	420	52
Future Volume (vph)	63	478	503	430	420	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	13	11	13	12	12
Total Lost time (s)	4.0		4.0	5.0	5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.88		1.00	1.00	1.00	0.85
Flt Protected	0.99		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1702		1728	1944	1881	1599
Flt Permitted	0.99		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1702		1728	1944	1881	1599
Peak-hour factor, PHF	0.87	0.86	0.94	0.86	0.78	0.73
Adj. Flow (vph)	72	556	535	500	538	71
RTOR Reduction (vph)	463	0	0	0	0	33
Lane Group Flow (vph)	165	0	535	500	538	38
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Actuated Green, G (s)	10.0		19.9	41.9	17.0	17.0
Effective Green, g (s)	10.0		19.9	41.9	17.0	17.0
Actuated g/C Ratio	0.17		0.33	0.70	0.28	0.28
Clearance Time (s)	4.0		4.0		5.0	5.0
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Lane Grp Cap (vph)	284		574	1359	533	453
v/s Ratio Prot	c0.10		c0.31	0.26	c0.29	0.02
v/s Ratio Perm						
v/c Ratio	0.58		0.93	0.37	1.01	0.08
Uniform Delay, d1	23.0		19.3	3.6	21.4	15.7
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	2.6		22.2	0.1	41.3	0.1
Delay (s)	25.6		41.5	3.8	62.8	15.8
Level of Service	C		D	A	E	B
Approach Delay (s)	25.6			23.3	57.3	
Approach LOS	C			C	E	

Intersection Summary			
HCM 2000 Control Delay	33.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	59.9	Sum of lost time (s)	13.0
Intersection Capacity Utilization	93.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	63	478	503	430	420	52
Future Volume (vph)	63	478	503	430	420	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	11	13	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			80
Storage Lanes	1	0	1			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			35	35	
Link Distance (ft)	2348			381	2230	
Travel Time (s)	53.4			7.4	43.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.87	0.86	0.94	0.86	0.78	0.73
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	628	0	535	500	538	71
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Detector Phase	3		2	1 2	1	1
Switch Phase						
Minimum Initial (s)	10.0		5.0		10.0	10.0
Minimum Split (s)	14.0		9.0		15.0	15.0
Total Split (s)	14.0		24.0		22.0	22.0
Total Split (%)	23.3%		40.0%		36.7%	36.7%
Maximum Green (s)	10.0		20.0		17.0	17.0
Yellow Time (s)	3.0		3.0		4.0	4.0
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.0		4.0		5.0	5.0
Lead/Lag			Lag		Lead	Lead
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		None		Min	Min
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
v/c Ratio	0.84		0.93	0.38	1.01	0.15
Control Delay	17.0		46.9	5.0	66.8	9.2

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	17.0		46.9	5.0	66.8	9.2
Queue Length 50th (ft)	23		183	61	~196	7
Queue Length 95th (ft)	#160		#357	94	#299	23
Internal Link Dist (ft)	2268			301	2150	
Turn Bay Length (ft)						80
Base Capacity (vph)	746		577	1331	533	487
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.84		0.93	0.38	1.01	0.15

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 59.9
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Mendon Rd (RI 122) & Nate Whipple Hwy (RI 120)

Ø1	Ø2	Ø3
22 s	24 s	14 s

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		✣			✣			✣		↰	↱	
Traffic Volume (vph)	7	2	20	548	0	120	128	290	10	22	284	452
Future Volume (vph)	7	2	20	548	0	120	128	290	10	22	284	452
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	14	14	12	11	14	14
Total Lost time (s)		4.0			4.0			5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.91			0.97			0.99		1.00	0.91	
Flt Protected		0.99			0.96			0.99		0.95	1.00	
Satd. Flow (prot)		1935			1741			1968		1678	1775	
Flt Permitted		0.93			0.76			0.28		0.42	1.00	
Satd. Flow (perm)		1813			1374			567		749	1775	
Peak-hour factor, PHF	0.58	0.50	0.62	0.93	0.92	0.77	0.82	0.74	0.42	0.50	0.81	0.88
Adj. Flow (vph)	12	4	32	589	0	156	156	392	24	44	351	514
RTOR Reduction (vph)	0	21	0	0	12	0	0	1	0	0	44	0
Lane Group Flow (vph)	0	27	0	0	733	0	0	571	0	44	821	0
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	1%	1%	1%	4%	4%	4%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		40.0			40.0			71.0		71.0	71.0	
Effective Green, g (s)		40.0			40.0			71.0		71.0	71.0	
Actuated g/C Ratio		0.33			0.33			0.59		0.59	0.59	
Clearance Time (s)		4.0			4.0			5.0		5.0	5.0	
Vehicle Extension (s)		2.6			2.6			2.8		2.8	2.8	
Lane Grp Cap (vph)		604			458			335		443	1050	
v/s Ratio Prot											0.46	
v/s Ratio Perm		0.01			c0.53			c1.01		0.06		
v/c Ratio		0.04			1.60			1.70		0.10	0.78	
Uniform Delay, d1		27.1			40.0			24.5		10.6	18.6	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.0			280.3			329.2		0.1	3.8	
Delay (s)		27.1			320.3			353.7		10.7	22.4	
Level of Service		C			F			F		B	C	
Approach Delay (s)		27.1			320.3			353.7			21.8	
Approach LOS		C			F			F			C	

Intersection Summary			
HCM 2000 Control Delay	203.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.67		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	121.6%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	7	2	20	548	0	120	128	290	10	22	284	452
Future Volume (vph)	7	2	20	548	0	120	128	290	10	22	284	452
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	12	12	12	14	14	12	11	14	14
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			35			35			35	
Link Distance (ft)		209			662			1525			777	
Travel Time (s)		5.7			12.9			29.7			15.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.58	0.50	0.62	0.93	0.92	0.77	0.82	0.74	0.42	0.50	0.81	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	1%	1%	1%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	0	0	745	0	0	572	0	44	865	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Detector Phase	2	2		2	2		1	1		1	1	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	44.0	44.0		44.0	44.0		76.0	76.0		76.0	76.0	
Total Split (%)	36.7%	36.7%		36.7%	36.7%		63.3%	63.3%		63.3%	63.3%	
Maximum Green (s)	40.0	40.0		40.0	40.0		71.0	71.0		71.0	71.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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			5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		2.8	2.8		2.8	2.8	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.08			1.59			1.70		0.10	0.79	
Control Delay		13.6			302.6			351.5		11.4	22.8	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		13.6			302.6			351.5		11.4	22.8	
Queue Length 50th (ft)		8			~820			~393		14	433	
Queue Length 95th (ft)		12			#1061			#409		17	488	
Internal Link Dist (ft)		129			582			1445			697	
Turn Bay Length (ft)												
Base Capacity (vph)		625			470			336		443	1094	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.08			1.59			1.70		0.10	0.79	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Natural Cycle: 120

Control Type: Actuated-Uncoordinated

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Plaza Driveway/West Wrentham Rd & Mendon Rd (RI 122)

Ø1 76 s

Ø2 44 s

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	14	0	272	284	0	0	236	46	261	0	69	11
Future Volume (vph)	14	0	272	284	0	0	236	46	261	0	69	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	13	13	13	11	11	11
Total Lost time (s)		5.0			5.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.87			1.00			0.95			0.98	
Flt Protected		1.00			0.95			0.97			1.00	
Satd. Flow (prot)		1690			1847			1819			1785	
Flt Permitted		0.98			0.39			0.77			1.00	
Satd. Flow (perm)		1652			758			1438			1785	
Peak-hour factor, PHF	0.70	0.81	0.66	0.83	0.85	0.75	0.55	0.55	0.91	0.56	0.68	0.69
Adj. Flow (vph)	20	0	412	342	0	0	429	84	287	0	101	16
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	432	0	0	342	0	0	800	0	0	117	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	42	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		45.0			45.0			56.0			56.0	
Effective Green, g (s)		45.0			45.0			56.0			56.0	
Actuated g/C Ratio		0.41			0.41			0.51			0.51	
Clearance Time (s)		5.0			5.0			4.0			4.0	
Vehicle Extension (s)		2.8			2.8			2.6			2.6	
Lane Grp Cap (vph)		675			310			732			908	
v/s Ratio Prot											0.07	
v/s Ratio Perm		0.26			c0.45			c0.56				
v/c Ratio		0.64			1.10			1.09			0.13	
Uniform Delay, d1		26.0			32.5			27.0			14.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.0			81.7			61.5			0.1	
Delay (s)		28.0			114.2			88.5			14.2	
Level of Service		C			F			F			B	
Approach Delay (s)		28.0			114.2			88.5			14.2	
Approach LOS		C			F			F			B	

Intersection Summary			
HCM 2000 Control Delay	73.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	83.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	14	0	272	284	0	0	236	46	261	0	69	11
Future Volume (vph)	14	0	272	284	0	0	236	46	261	0	69	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	13	13	13	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			No
Link Speed (mph)		30			40			25			25	
Link Distance (ft)		3320			7947			1008			920	
Travel Time (s)		75.5			135.5			27.5			25.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.70	0.81	0.66	0.83	0.85	0.75	0.55	0.55	0.91	0.56	0.68	0.69
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	42	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	432	0	0	342	0	0	800	0	0	117	0
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Total Split (s)	50.0	50.0		50.0	50.0		60.0	60.0		60.0	60.0	
Total Split (%)	45.5%	45.5%		45.5%	45.5%		54.5%	54.5%		54.5%	54.5%	
Maximum Green (s)	45.0	45.0		45.0	45.0		56.0	56.0		56.0	56.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		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	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			4.0			4.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.64			1.10			1.09			0.13	
Control Delay		31.3			114.4			89.2			14.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		31.3			114.4			89.2			14.7	
Queue Length 50th (ft)		240			~275			~639			42	
Queue Length 95th (ft)		301			#418			329			54	
Internal Link Dist (ft)		3240			7867			928			840	
Turn Bay Length (ft)												
Base Capacity (vph)		675			310			732			909	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.64			1.10			1.09			0.13	

Intersection Summary

Area Type: Other
Cycle Length: 110
Actuated Cycle Length: 110
Natural Cycle: 110
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: West Wrentham Rd & Pine Swamp Rd (RI 114)

Ø1	Ø2
50 s	60 s

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	356	0	0	350	0	0
Future Volume (Veh/h)	356	0	0	350	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.91	0.79	0.88	0.88	0.89
Hourly flow rate (vph)	429	0	0	398	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						10
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			429		827	429
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			429		827	429
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1136		341	626

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	429	0	0	398	0
Volume Left	0	0	0	0	0
Volume Right	0	0	0	0	0
cSH	1700	1700	1700	1700	1700
Volume to Capacity	0.25	0.00	0.00	0.23	0.00
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	0.0	0.0
Lane LOS					A
Approach Delay (s)	0.0		0.0		0.0
Approach LOS					A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	22.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	0	124	32	18	232	0	362	0	20	104	253	58
Future Volume (vph)	0	124	32	18	232	0	362	0	20	104	253	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.97			1.00			0.99			0.98	
Flt Protected		1.00			1.00			0.95			0.99	
Satd. Flow (prot)		1799			1864			1732			1787	
Flt Permitted		1.00			0.97			0.45			0.79	
Satd. Flow (perm)		1799			1820			817			1427	
Peak-hour factor, PHF	0.80	0.84	0.80	0.90	0.82	0.84	0.82	0.82	0.83	0.81	0.82	0.81
Adj. Flow (vph)	0	148	40	20	283	0	441	0	24	128	309	72
RTOR Reduction (vph)	0	12	0	0	0	0	0	5	0	0	6	0
Lane Group Flow (vph)	0	176	0	0	303	0	0	460	0	0	503	0
Heavy Vehicles (%)	6%	6%	6%	5%	5%	5%	4%	4%	4%	3%	3%	3%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		17.7			17.7			49.2			49.2	
Effective Green, g (s)		17.7			17.7			49.2			49.2	
Actuated g/C Ratio		0.23			0.23			0.65			0.65	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Vehicle Extension (s)		2.6			2.6			3.0			3.0	
Lane Grp Cap (vph)		419			424			529			925	
v/s Ratio Prot		0.10										
v/s Ratio Perm					c0.17			c0.56			0.35	
v/c Ratio		0.42			0.71			0.87			0.54	
Uniform Delay, d1		24.7			26.8			10.8			7.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.5			5.3			14.5			0.7	
Delay (s)		25.3			32.1			25.3			7.9	
Level of Service		C			C			C			A	
Approach Delay (s)		25.3			32.1			25.3			7.9	
Approach LOS		C			C			C			A	

Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	75.9	Sum of lost time (s)	9.0
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	0	124	32	18	232	0	362	0	20	104	253	58
Future Volume (vph)	0	124	32	18	232	0	362	0	20	104	253	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		1854			4162			1592			454	
Travel Time (s)		31.6			70.9			36.2			10.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.80	0.84	0.80	0.90	0.82	0.84	0.82	0.82	0.83	0.81	0.82	0.81
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	5%	5%	5%	4%	4%	4%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	188	0	0	303	0	0	465	0	0	509	0
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	29.0	29.0		29.0	29.0		58.0	58.0		58.0	58.0	
Total Split (%)	33.3%	33.3%		33.3%	33.3%		66.7%	66.7%		66.7%	66.7%	
Maximum Green (s)	25.0	25.0		25.0	25.0		53.0	53.0		53.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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	
Total Lost Time (s)		4.0			4.0			5.0			5.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.44			0.72			0.88			0.55	
Control Delay		27.0			38.1			33.0			10.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		27.0			38.1			33.0			10.7	
Queue Length 50th (ft)		74			141			152			110	
Queue Length 95th (ft)		121			199			#364			202	
Internal Link Dist (ft)		1774			4082			1512			374	
Turn Bay Length (ft)												
Base Capacity (vph)		619			617			589			1029	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.30			0.49			0.79			0.49	

Intersection Summary

Area Type: Other

Cycle Length: 87

Actuated Cycle Length: 76.1

Natural Cycle: 50

Control Type: Actuated-Uncoordinated

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)

Ø1	Ø2
29 s	58 s

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	76	714	167	299	418	73
Future Volume (vph)	76	714	167	299	418	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	13	11	13	12	12
Total Lost time (s)	4.0		4.0	5.0	5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.88		1.00	1.00	1.00	0.85
Flt Protected	0.99		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1671		1662	1870	1827	1553
Flt Permitted	0.99		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1671		1662	1870	1827	1553
Peak-hour factor, PHF	0.68	0.91	0.58	0.70	0.71	0.58
Adj. Flow (vph)	112	785	288	427	589	126
RTOR Reduction (vph)	321	0	0	0	0	49
Lane Group Flow (vph)	576	0	288	427	589	77
Heavy Vehicles (%)	3%	3%	5%	5%	4%	4%
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Actuated Green, G (s)	16.1		11.1	42.1	26.0	26.0
Effective Green, g (s)	16.1		11.1	42.1	26.0	26.0
Actuated g/C Ratio	0.24		0.17	0.64	0.39	0.39
Clearance Time (s)	4.0		4.0		5.0	5.0
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Lane Grp Cap (vph)	406		278	1189	717	609
v/s Ratio Prot	c0.34		c0.17	0.23	c0.32	0.05
v/s Ratio Perm						
v/c Ratio	1.42		1.04	0.36	0.82	0.13
Uniform Delay, d1	25.1		27.6	5.7	18.0	12.8
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	202.5		63.6	0.1	7.4	0.1
Delay (s)	227.6		91.2	5.8	25.4	12.9
Level of Service	F		F	A	C	B
Approach Delay (s)	227.6			40.2	23.2	
Approach LOS	F			D	C	

Intersection Summary			
HCM 2000 Control Delay	107.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	66.2	Sum of lost time (s)	13.0
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	76	714	167	299	418	73
Future Volume (vph)	76	714	167	299	418	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	11	13	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			80
Storage Lanes	1	0	1			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			35	35	
Link Distance (ft)	2348			381	2230	
Travel Time (s)	53.4			7.4	43.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.68	0.91	0.58	0.70	0.71	0.58
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	5%	5%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	897	0	288	427	589	126
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Detector Phase	3		2	1 2	1	1
Switch Phase						
Minimum Initial (s)	10.0		5.0		10.0	10.0
Minimum Split (s)	14.0		9.0		15.0	15.0
Total Split (s)	20.0		15.0		35.0	35.0
Total Split (%)	28.6%		21.4%		50.0%	50.0%
Maximum Green (s)	16.0		11.0		30.0	30.0
Yellow Time (s)	3.0		3.0		4.0	4.0
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.0		4.0		5.0	5.0
Lead/Lag			Lag		Lead	Lead
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		None		Min	Min
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
v/c Ratio	1.23		1.04	0.37	0.82	0.19
Control Delay	133.9		97.6	7.1	28.9	6.3

Lanes, Volumes, Timings
6: Mendon Rd (RI 122) & Nate Whipple Hwy (RI 120)

03/22/2020

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	133.9		97.6	7.1	28.9	6.3
Queue Length 50th (ft)	~342		~143	73	206	11
Queue Length 95th (ft)	#299		#140	83	222	17
Internal Link Dist (ft)	2268			301	2150	
Turn Bay Length (ft)						80
Base Capacity (vph)	727		277	1134	833	751
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	1.23		1.04	0.38	0.71	0.17

Intersection Summary	
Area Type:	Other
Cycle Length: 70	
Actuated Cycle Length: 66.2	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Mendon Rd (RI 122) & Nate Whipple Hwy (RI 120)

Ø1	Ø2	Ø3
35 s	15 s	20 s

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		✥			✥			✥		↰	↱	
Traffic Volume (vph)	3	1	6	84	0	104	95	100	13	7	338	566
Future Volume (vph)	3	1	6	84	0	104	95	100	13	7	338	566
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	14	14	12	11	14	14
Total Lost time (s)		4.0			4.0			5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.94			0.92			0.98		1.00	0.91	
Flt Protected		0.98			0.98			0.98		0.95	1.00	
Satd. Flow (prot)		1986			1651			1897		1694	1782	
Flt Permitted		0.89			0.85			0.32		0.63	1.00	
Satd. Flow (perm)		1809			1430			612		1117	1782	
Peak-hour factor, PHF	0.25	0.25	0.50	0.84	0.92	0.79	0.81	0.79	0.41	0.44	0.87	0.86
Adj. Flow (vph)	12	4	12	100	0	132	117	127	32	16	389	658
RTOR Reduction (vph)	0	10	0	0	81	0	0	5	0	0	66	0
Lane Group Flow (vph)	0	18	0	0	151	0	0	271	0	16	981	0
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	3%	3%	3%	3%	3%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		12.2			12.2			40.2		40.2	40.2	
Effective Green, g (s)		12.2			12.2			40.2		40.2	40.2	
Actuated g/C Ratio		0.20			0.20			0.65		0.65	0.65	
Clearance Time (s)		4.0			4.0			5.0		5.0	5.0	
Vehicle Extension (s)		2.6			2.6			2.8		2.8	2.8	
Lane Grp Cap (vph)		359			284			400		731	1166	
v/s Ratio Prot											c0.55	
v/s Ratio Perm		0.01			c0.11			0.44		0.01		
v/c Ratio		0.05			0.53			0.68		0.02	0.84	
Uniform Delay, d1		19.9			22.0			6.6		3.7	8.2	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.0			1.6			4.3		0.0	5.6	
Delay (s)		20.0			23.6			10.9		3.7	13.8	
Level of Service		B			C			B		A	B	
Approach Delay (s)		20.0			23.6			10.9			13.6	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	61.4	Sum of lost time (s)	9.0
Intersection Capacity Utilization	92.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

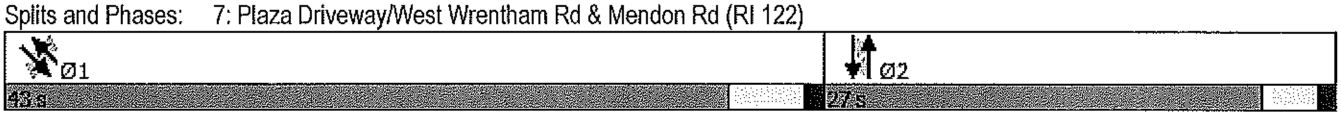
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		✥			✥			✥		↰	↱	
Traffic Volume (vph)	3	1	6	84	0	104	95	100	13	7	338	566
Future Volume (vph)	3	1	6	84	0	104	95	100	13	7	338	566
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	12	12	12	14	14	12	11	14	14
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			35			35			35	
Link Distance (ft)		209			662			1525			777	
Travel Time (s)		5.7			12.9			29.7			15.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.25	0.25	0.50	0.84	0.92	0.79	0.81	0.79	0.41	0.44	0.87	0.86
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	3%	3%	3%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	28	0	0	232	0	0	276	0	16	1047	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Detector Phase	2	2		2	2		1	1		1	1	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	27.0	27.0		27.0	27.0		43.0	43.0		43.0	43.0	
Total Split (%)	38.6%	38.6%		38.6%	38.6%		61.4%	61.4%		61.4%	61.4%	
Maximum Green (s)	23.0	23.0		23.0	23.0		38.0	38.0		38.0	38.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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			5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		2.8	2.8		2.8	2.8	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.08			0.64			0.68		0.02	0.85	
Control Delay		14.0			20.6			19.3		4.9	16.8	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		14.0			20.6			19.3		4.9	16.8	
Queue Length 50th (ft)		5			41			43		2	175	
Queue Length 95th (ft)		3			101			#148		4	#550	
Internal Link Dist (ft)		129			582			1445			697	
Turn Bay Length (ft)												
Base Capacity (vph)		688			601			406		730	1232	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.04			0.39			0.68		0.02	0.85	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 61.4
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Plaza Driveway/West Wrentham Rd & Mendon Rd (RI 122)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✢			✢			✢			✢	
Traffic Volume (vph)	28	150	45	114	79	7	156	106	547	40	88	12
Future Volume (vph)	28	150	45	114	79	7	156	106	547	40	88	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	13	13	13	11	11	11
Total Lost time (s)		5.0			5.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			1.00			0.91			0.98	
Flt Protected		0.99			0.97			0.99			0.99	
Satd. Flow (prot)		1887			1826			1768			1748	
Flt Permitted		0.94			0.63			0.87			0.71	
Satd. Flow (perm)		1784			1192			1563			1261	
Peak-hour factor, PHF	0.78	0.63	0.75	0.73	0.75	0.71	0.49	0.62	0.56	0.71	0.63	0.43
Adj. Flow (vph)	36	238	60	156	105	10	318	171	977	56	140	28
RTOR Reduction (vph)	0	0	0	0	3	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	334	0	0	268	0	0	1466	0	0	224	0
Heavy Vehicles (%)	1%	1%	1%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		15.7			15.7			21.3			21.3	
Effective Green, g (s)		15.7			15.7			21.3			21.3	
Actuated g/C Ratio		0.34			0.34			0.46			0.46	
Clearance Time (s)		5.0			5.0			4.0			4.0	
Vehicle Extension (s)		2.8			2.8			2.6			2.6	
Lane Grp Cap (vph)		608			406			723			583	
v/s Ratio Prot												
v/s Ratio Perm		0.19			c0.22			c0.94			0.18	
v/c Ratio		0.55			0.66			2.03			0.38	
Uniform Delay, d1		12.3			12.9			12.3			8.1	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.9			3.7			467.3			0.3	
Delay (s)		13.2			16.6			479.7			8.4	
Level of Service		B			B			F			A	
Approach Delay (s)		13.2			16.6			479.7			8.4	
Approach LOS		B			B			F			A	

Intersection Summary			
HCM 2000 Control Delay	311.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.45		
Actuated Cycle Length (s)	46.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	150	45	114	79	7	156	106	547	40	88	12
Future Volume (vph)	28	150	45	114	79	7	156	106	547	40	88	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	13	13	13	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			No
Link Speed (mph)		30			40			25			25	
Link Distance (ft)		3320			7947			1008			920	
Travel Time (s)		75.5			135.5			27.5			25.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.78	0.63	0.75	0.73	0.75	0.71	0.49	0.62	0.56	0.71	0.63	0.43
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	334	0	0	271	0	0	1466	0	0	224	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Total Split (s)	35.0	35.0		35.0	35.0		25.0	25.0		25.0	25.0	
Total Split (%)	58.3%	58.3%		58.3%	58.3%		41.7%	41.7%		41.7%	41.7%	
Maximum Green (s)	30.0	30.0		30.0	30.0		21.0	21.0		21.0	21.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		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	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			4.0			4.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.55			0.66			2.03			0.38	
Control Delay		15.6			20.8			487.4			12.6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		15.6			20.8			487.4			12.6	
Queue Length 50th (ft)		69			57			~624			34	
Queue Length 95th (ft)		76			87			#669			67	
Internal Link Dist (ft)		3240			7867			928			840	
Turn Bay Length (ft)												
Base Capacity (vph)		1176			788			721			582	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.28			0.34			2.03			0.38	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 46.1
Natural Cycle: 140
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: West Wrentham Rd & Pine Swamp Rd (RI 114)

Ø1	Ø2
35 s	25 s

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰	↱
Traffic Volume (veh/h)	659	198	256	115	34	112
Future Volume (Veh/h)	659	198	256	115	34	112
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.73	0.60	0.86	0.60	0.76	0.91
Hourly flow rate (vph)	903	330	298	192	45	123
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						10
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			903		1691	903
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			903		1691	903
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			60		27	63
cM capacity (veh/h)			753		62	334

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	903	330	298	192	168
Volume Left	0	0	298	0	45
Volume Right	0	330	0	0	123
cSH	1700	1700	753	1700	230
Volume to Capacity	0.53	0.19	0.40	0.11	0.73
Queue Length 95th (ft)	0	0	48	0	124
Control Delay (s)	0.0	0.0	12.9	0.0	57.3
Lane LOS			B		F
Approach Delay (s)	0.0		7.8		57.3
Approach LOS					F

Intersection Summary			
Average Delay	7.1		
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	0	306	43	236	552	0	260	0	120	113	174	38
Future Volume (vph)	0	306	43	236	552	0	260	0	120	113	174	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			1.00			0.95			0.98	
Flt Protected		1.00			0.98			0.97			0.98	
Satd. Flow (prot)		1711			1823			1670			1730	
Flt Permitted		1.00			0.39			0.54			0.74	
Satd. Flow (perm)		1711			714			940			1297	
Peak-hour factor, PHF	0.74	0.70	0.77	0.70	0.79	0.86	0.88	0.69	0.77	0.69	0.73	0.63
Adj. Flow (vph)	0	437	56	337	699	0	295	0	156	164	238	60
RTOR Reduction (vph)	0	4	0	0	0	0	0	22	0	0	6	0
Lane Group Flow (vph)	0	489	0	0	1036	0	0	429	0	0	456	0
Heavy Vehicles (%)	13%	13%	13%	6%	6%	6%	5%	5%	5%	6%	6%	6%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		35.5			35.5			44.3			44.3	
Effective Green, g (s)		35.5			35.5			44.3			44.3	
Actuated g/C Ratio		0.40			0.40			0.50			0.50	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Vehicle Extension (s)		2.6			2.6			3.0			3.0	
Lane Grp Cap (vph)		684			285			468			647	
v/s Ratio Prot		0.29										
v/s Ratio Perm					c1.45			c0.46			0.35	
v/c Ratio		0.71			3.64			0.92			0.70	
Uniform Delay, d1		22.4			26.6			20.6			17.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		3.4			1194.4			22.7			3.5	
Delay (s)		25.8			1221.1			43.3			20.7	
Level of Service		C			F			D			C	
Approach Delay (s)		25.8			1221.1			43.3			20.7	
Approach LOS		C			F			D			C	

Intersection Summary			
HCM 2000 Control Delay	535.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	2.12		
Actuated Cycle Length (s)	88.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	111.9%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	0	306	43	236	552	0	260	0	120	113	174	38
Future Volume (vph)	0	306	43	236	552	0	260	0	120	113	174	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		1854			4162			1592			454	
Travel Time (s)		31.6			70.9			36.2			10.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.74	0.70	0.77	0.70	0.79	0.86	0.88	0.69	0.77	0.69	0.73	0.63
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	13%	13%	13%	6%	6%	6%	5%	5%	5%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	493	0	0	1036	0	0	451	0	0	462	0
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	39.0	39.0		39.0	39.0		58.0	58.0		58.0	58.0	
Total Split (%)	40.2%	40.2%		40.2%	40.2%		59.8%	59.8%		59.8%	59.8%	
Maximum Green (s)	35.0	35.0		35.0	35.0		53.0	53.0		53.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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	
Total Lost Time (s)		4.0			4.0			5.0			5.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.72			3.64			0.92			0.71	
Control Delay		31.9			1210.7			44.9			23.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		31.9			1210.7			44.9			23.1	
Queue Length 50th (ft)		260			~1024			204			184	
Queue Length 95th (ft)		271			#1090			210			205	
Internal Link Dist (ft)		1774			4082			1512			374	
Turn Bay Length (ft)												
Base Capacity (vph)		687			285			585			789	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.72			3.64			0.77			0.59	

Intersection Summary

Area Type: Other
Cycle Length: 97
Actuated Cycle Length: 88.9
Natural Cycle: 150
Control Type: Actuated-Uncoordinated

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)

Ø1	Ø2
39 s	58 s

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	99	573	193	423	411	73
Future Volume (vph)	99	573	193	423	411	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	13	11	13	12	12
Total Lost time (s)	4.0		4.0	5.0	5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.88		1.00	1.00	1.00	0.85
Flt Protected	0.99		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1701		1728	1944	1881	1599
Flt Permitted	0.99		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1701		1728	1944	1881	1599
Peak-hour factor, PHF	0.99	0.72	0.93	0.94	0.86	0.79
Adj. Flow (vph)	100	796	208	450	478	92
RTOR Reduction (vph)	294	0	0	0	0	37
Lane Group Flow (vph)	602	0	208	450	478	55
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Actuated Green, G (s)	22.5		13.2	44.2	26.0	26.0
Effective Green, g (s)	22.5		13.2	44.2	26.0	26.0
Actuated g/C Ratio	0.30		0.18	0.59	0.35	0.35
Clearance Time (s)	4.0		4.0		5.0	5.0
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Lane Grp Cap (vph)	512		305	1150	654	556
v/s Ratio Prot	c0.35		c0.12	0.23	c0.25	0.03
v/s Ratio Perm						
v/c Ratio	1.18		0.68	0.39	0.73	0.10
Uniform Delay, d1	26.1		28.8	8.1	21.3	16.4
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	97.9		5.8	0.2	4.0	0.1
Delay (s)	124.0		34.5	8.3	25.3	16.5
Level of Service	F		C	A	C	B
Approach Delay (s)	124.0			16.6	23.9	
Approach LOS	F			B	C	

Intersection Summary			
HCM 2000 Control Delay	63.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	74.7	Sum of lost time (s)	13.0
Intersection Capacity Utilization	84.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	99	573	193	423	411	73
Future Volume (vph)	99	573	193	423	411	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	11	13	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			80
Storage Lanes	1	0	1			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			35	35	
Link Distance (ft)	2348			381	2230	
Travel Time (s)	53.4			7.4	43.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.99	0.72	0.93	0.94	0.86	0.79
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	896	0	208	450	478	92
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Detector Phase	3		2	1 2	1	1
Switch Phase						
Minimum Initial (s)	10.0		5.0		10.0	10.0
Minimum Split (s)	14.0		9.0		15.0	15.0
Total Split (s)	26.0		20.0		44.0	44.0
Total Split (%)	28.9%		22.2%		48.9%	48.9%
Maximum Green (s)	22.0		16.0		39.0	39.0
Yellow Time (s)	3.0		3.0		4.0	4.0
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.0		4.0		5.0	5.0
Lead/Lag			Lag		Lead	Lead
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		None		Min	Min
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
v/c Ratio	1.11		0.69	0.40	0.73	0.16
Control Delay	85.2		43.6	9.3	28.6	8.4

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	85.2		43.6	9.3	28.6	8.4
Queue Length 50th (ft)	~348		91	102	196	11
Queue Length 95th (ft)	#670		#201	152	280	32
Internal Link Dist (ft)	2268			301	2150	
Turn Bay Length (ft)						80
Base Capacity (vph)	805		377	1231	1001	878
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	1.11		0.55	0.37	0.48	0.10

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 75

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Mendon Rd (RI 122) & Nate Whipple Hwy (RI 120)

Ø1	Ø2	Ø3
44 s	20 s	26 s

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	3	0	2	164	0	119	191	342	3	7	342	483
Future Volume (vph)	3	0	2	164	0	119	191	342	3	7	342	483
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	14	14	12	11	14	14
Total Lost time (s)		4.0			4.0			5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.93			0.95			1.00		1.00	0.91	
Flt Protected		0.98			0.97			0.98		0.95	1.00	
Satd. Flow (prot)		1959			1715			1945		1728	1834	
Flt Permitted		0.91			0.80			0.28		0.44	1.00	
Satd. Flow (perm)		1827			1424			563		792	1834	
Peak-hour factor, PHF	0.75	0.92	0.50	0.79	0.92	0.96	0.77	0.94	0.36	0.44	0.86	0.90
Adj. Flow (vph)	4	0	4	208	0	124	248	364	8	16	398	537
RTOR Reduction (vph)	0	6	0	0	24	0	0	1	0	0	54	0
Lane Group Flow (vph)	0	2	0	0	308	0	0	619	0	16	881	0
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		20.0			20.0			61.0		61.0	61.0	
Effective Green, g (s)		20.0			20.0			61.0		61.0	61.0	
Actuated g/C Ratio		0.22			0.22			0.68		0.68	0.68	
Clearance Time (s)		4.0			4.0			5.0		5.0	5.0	
Vehicle Extension (s)		2.6			2.6			2.8		2.8	2.8	
Lane Grp Cap (vph)		406			316			381		536	1243	
v/s Ratio Prot											0.48	
v/s Ratio Perm		0.00			c0.22			c1.10		0.02		
v/c Ratio		0.00			0.97			1.63		0.03	0.71	
Uniform Delay, d1		27.2			34.7			14.5		4.8	9.0	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.0			43.3			293.3		0.0	1.8	
Delay (s)		27.3			78.1			307.8		4.8	10.8	
Level of Service		C			E			F		A	B	
Approach Delay (s)		27.3			78.1			307.8			10.7	
Approach LOS		C			E			F			B	

Intersection Summary			
HCM 2000 Control Delay	118.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.46		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	107.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	3	0	2	164	0	119	191	342	3	7	342	483
Future Volume (vph)	3	0	2	164	0	119	191	342	3	7	342	483
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	12	12	12	14	14	12	11	14	14
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			35			35			35	
Link Distance (ft)		209			662			1525			777	
Travel Time (s)		5.7			12.9			29.7			15.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.75	0.92	0.50	0.79	0.92	0.96	0.77	0.94	0.36	0.44	0.86	0.90
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	8	0	0	332	0	0	620	0	16	935	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Detector Phase	2	2		2	2		1	1		1	1	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	24.0	24.0		24.0	24.0		66.0	66.0		66.0	66.0	
Total Split (%)	26.7%	26.7%		26.7%	26.7%		73.3%	73.3%		73.3%	73.3%	
Maximum Green (s)	20.0	20.0		20.0	20.0		61.0	61.0		61.0	61.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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			5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		2.8	2.8		2.8	2.8	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.02			0.98			1.62		0.03	0.72	
Control Delay		3.4			77.1			311.8		5.0	11.2	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		3.4			77.1			311.8		5.0	11.2	
Queue Length 50th (ft)		0			173			~296		3	236	
Queue Length 95th (ft)		4			#347			#505		4	337	
Internal Link Dist (ft)		129			582			1445			697	
Turn Bay Length (ft)												
Base Capacity (vph)		424			340			382		537	1296	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.02			0.98			1.62		0.03	0.72	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 140
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Plaza Driveway/West Wrentham Rd & Mendon Rd (RI 122)

Ø1	Ø2
56 s	24 s

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	16	133	28	122	131	11	211	77	339	25	120	22
Future Volume (vph)	16	133	28	122	131	11	211	77	339	25	120	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	13	13	13	11	11	11
Total Lost time (s)		5.0			5.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.99			0.92			0.98	
Flt Protected		0.99			0.98			0.98			0.99	
Satd. Flow (prot)		1904			1891			1787			1770	
Flt Permitted		0.93			0.77			0.84			0.89	
Satd. Flow (perm)		1780			1491			1525			1584	
Peak-hour factor, PHF	0.50	0.72	0.58	0.85	0.79	0.78	0.84	0.83	0.78	0.78	0.86	0.79
Adj. Flow (vph)	32	185	48	144	166	14	251	93	435	32	140	28
RTOR Reduction (vph)	0	0	0	0	4	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	265	0	0	320	0	0	779	0	0	200	0
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		14.6			14.6			16.2			16.2	
Effective Green, g (s)		14.6			14.6			16.2			16.2	
Actuated g/C Ratio		0.37			0.37			0.41			0.41	
Clearance Time (s)		5.0			5.0			4.0			4.0	
Vehicle Extension (s)		2.8			2.8			2.6			2.6	
Lane Grp Cap (vph)		652			546			620			644	
v/s Ratio Prot												
v/s Ratio Perm		0.15			c0.21			c0.51			0.13	
v/c Ratio		0.41			0.59			1.26			0.31	
Uniform Delay, d1		9.4			10.2			11.8			8.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.4			1.5			128.2			0.2	
Delay (s)		9.7			11.7			140.0			8.2	
Level of Service		A			B			F			A	
Approach Delay (s)		9.7			11.7			140.0			8.2	
Approach LOS		A			B			F			A	

Intersection Summary			
HCM 2000 Control Delay	74.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	39.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

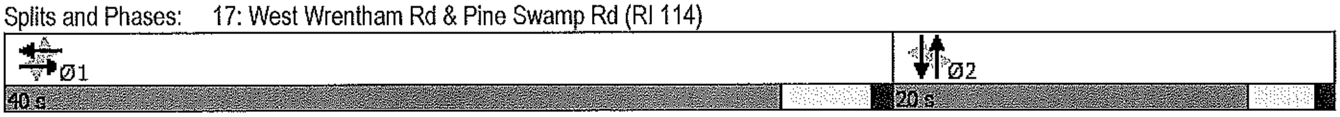
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	16	133	28	122	131	11	211	77	339	25	120	22
Future Volume (vph)	16	133	28	122	131	11	211	77	339	25	120	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	13	13	13	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			No
Link Speed (mph)		30			40			25			25	
Link Distance (ft)		3320			7947			1008			920	
Travel Time (s)		75.5			135.5			27.5			25.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.50	0.72	0.58	0.85	0.79	0.78	0.84	0.83	0.78	0.78	0.86	0.79
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	265	0	0	324	0	0	779	0	0	200	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Total Split (s)	40.0	40.0		40.0	40.0		20.0	20.0		20.0	20.0	
Total Split (%)	66.7%	66.7%		66.7%	66.7%		33.3%	33.3%		33.3%	33.3%	
Maximum Green (s)	35.0	35.0		35.0	35.0		16.0	16.0		16.0	16.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		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	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			4.0			4.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.41			0.59			1.26			0.31	
Control Delay		11.0			14.5			148.5			11.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		11.0			14.5			148.5			11.3	
Queue Length 50th (ft)		41			53			~226			27	
Queue Length 95th (ft)		59			86			#437			79	
Internal Link Dist (ft)		3240			7867			928			840	
Turn Bay Length (ft)												
Base Capacity (vph)		1581			1324			619			643	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.17			0.24			1.26			0.31	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 39.9
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: West Wrentham Rd & Pine Swamp Rd (RI 114)



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰	↱
Traffic Volume (veh/h)	380	188	524	326	7	8
Future Volume (Veh/h)	380	188	524	326	7	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.69	0.92	0.96	0.90	0.89	0.75
Hourly flow rate (vph)	551	204	546	362	8	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						10
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			551		2005	551
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			551		2005	551
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			47		74	98
cM capacity (veh/h)			1024		31	536

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	551	204	546	362	19
Volume Left	0	0	546	0	8
Volume Right	0	204	0	0	11
cSH	1700	1700	1024	1700	73
Volume to Capacity	0.32	0.12	0.53	0.21	0.26
Queue Length 95th (ft)	0	0	81	0	23
Control Delay (s)	0.0	0.0	12.5	0.0	74.0
Lane LOS			B		F
Approach Delay (s)	0.0		7.5		74.0
Approach LOS					F

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120) 03/22/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	0	119	42	17	246	0	254	0	30	176	225	76
Future Volume (vph)	0	119	42	17	246	0	254	0	30	176	225	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.96			1.00			0.99			0.98	
Flt Protected		1.00			1.00			0.96			0.98	
Satd. Flow (prot)		1798			1916			1759			1783	
Flt Permitted		1.00			0.96			0.45			0.71	
Satd. Flow (perm)		1798			1849			825			1295	
Peak-hour factor, PHF	0.86	0.85	0.75	0.53	0.75	0.85	0.68	0.93	0.75	0.75	0.97	0.79
Adj. Flow (vph)	0	140	56	32	328	0	374	0	40	235	232	96
RTOR Reduction (vph)	0	17	0	0	0	0	0	5	0	0	9	0
Lane Group Flow (vph)	0	179	0	0	360	0	0	409	0	0	554	0
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		18.7			18.7			40.3			40.3	
Effective Green, g (s)		18.7			18.7			40.3			40.3	
Actuated g/C Ratio		0.27			0.27			0.59			0.59	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Vehicle Extension (s)		2.6			2.6			3.0			3.0	
Lane Grp Cap (vph)		494			508			488			767	
v/s Ratio Prot		0.10										
v/s Ratio Perm					c0.19			c0.50			0.43	
v/c Ratio		0.36			0.71			0.84			0.72	
Uniform Delay, d1		19.9			22.2			11.2			9.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.4			4.2			11.9			3.4	
Delay (s)		20.2			26.4			23.1			13.2	
Level of Service		C			C			C			B	
Approach Delay (s)		20.2			26.4			23.1			13.2	
Approach LOS		C			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	19.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	68.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	0	119	42	17	246	0	254	0	30	176	225	76
Future Volume (vph)	0	119	42	17	246	0	254	0	30	176	225	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		1854			4162			1592			454	
Travel Time (s)		31.6			70.9			36.2			10.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.86	0.85	0.75	0.53	0.75	0.85	0.68	0.93	0.75	0.75	0.97	0.79
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	196	0	0	360	0	0	414	0	0	563	0
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	29.0	29.0		29.0	29.0		58.0	58.0		58.0	58.0	
Total Split (%)	33.3%	33.3%		33.3%	33.3%		66.7%	66.7%		66.7%	66.7%	
Maximum Green (s)	25.0	25.0		25.0	25.0		53.0	53.0		53.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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	
Total Lost Time (s)		4.0			4.0			5.0			5.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.39			0.72			0.85			0.73	
Control Delay		23.0			34.1			30.9			17.1	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		23.0			34.1			30.9			17.1	
Queue Length 50th (ft)		66			153			128			152	
Queue Length 95th (ft)		124			212			#359			316	
Internal Link Dist (ft)		1774			4082			1512			374	
Turn Bay Length (ft)												
Base Capacity (vph)		730			737			640			1006	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.27			0.49			0.65			0.56	

Intersection Summary

Area Type: Other
Cycle Length: 87
Actuated Cycle Length: 68.9
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)

Ø1	Ø2
29 s	58 s

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	87	530	102	406	420	52
Future Volume (vph)	87	530	102	406	420	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	13	11	13	12	12
Total Lost time (s)	4.0		4.0	5.0	5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.88		1.00	1.00	1.00	0.85
Flt Protected	0.99		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1706		1728	1944	1881	1599
Flt Permitted	0.99		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1706		1728	1944	1881	1599
Peak-hour factor, PHF	0.87	0.86	0.94	0.86	0.78	0.73
Adj. Flow (vph)	100	616	109	472	538	71
RTOR Reduction (vph)	258	0	0	0	0	27
Lane Group Flow (vph)	458	0	109	472	538	44
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Actuated Green, G (s)	18.5		9.7	40.0	25.3	25.3
Effective Green, g (s)	18.5		9.7	40.0	25.3	25.3
Actuated g/C Ratio	0.28		0.15	0.60	0.38	0.38
Clearance Time (s)	4.0		4.0		5.0	5.0
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Lane Grp Cap (vph)	474		252	1169	715	608
v/s Ratio Prot	c0.27		0.06	c0.24	c0.29	0.03
v/s Ratio Perm						
v/c Ratio	0.97		0.43	0.40	0.75	0.07
Uniform Delay, d1	23.7		25.9	7.0	17.9	13.1
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	32.3		0.9	0.2	4.3	0.0
Delay (s)	56.0		26.8	7.2	22.2	13.2
Level of Service	E		C	A	C	B
Approach Delay (s)	56.0			10.8	21.1	
Approach LOS	E			B	C	

Intersection Summary			
HCM 2000 Control Delay	31.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	66.5	Sum of lost time (s)	13.0
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	87	530	102	406	420	52
Future Volume (vph)	87	530	102	406	420	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	11	13	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			80
Storage Lanes	1	0	1			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			35	35	
Link Distance (ft)	2348			381	2230	
Travel Time (s)	53.4			7.4	43.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.87	0.86	0.94	0.86	0.78	0.73
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	716	0	109	472	538	71
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Detector Phase	3		2	1 2	1	1
Switch Phase						
Minimum Initial (s)	10.0		5.0		10.0	10.0
Minimum Split (s)	14.0		9.0		15.0	15.0
Total Split (s)	22.0		18.0		40.0	40.0
Total Split (%)	27.5%		22.5%		50.0%	50.0%
Maximum Green (s)	18.0		14.0		35.0	35.0
Yellow Time (s)	3.0		3.0		4.0	4.0
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.0		4.0		5.0	5.0
Lead/Lag			Lag		Lead	Lead
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		None		Min	Min
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
v/c Ratio	0.98		0.43	0.42	0.76	0.11
Control Delay	45.4		33.8	8.3	25.6	7.2

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	45.4		33.8	8.3	25.6	7.2
Queue Length 50th (ft)	~164		42	91	184	7
Queue Length 95th (ft)	#432		95	131	250	22
Internal Link Dist (ft)	2268			301	2150	
Turn Bay Length (ft)						80
Base Capacity (vph)	730		371	1276	1010	879
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.98		0.29	0.37	0.53	0.08

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 66.8
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Mendon Rd (RI 122) & Nate Whipple Hwy (RI 120)

Ø1	Ø2	Ø3
40 s	18 s	22 s

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		✥			✥			✥		↰	↱	
Traffic Volume (vph)	7	2	20	123	0	68	128	290	10	22	336	452
Future Volume (vph)	7	2	20	123	0	68	128	290	10	22	336	452
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	14	14	12	11	14	14
Total Lost time (s)		4.0			4.0			5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.91			0.95			0.99		1.00	0.92	
Flt Protected		0.99			0.97			0.99		0.95	1.00	
Satd. Flow (prot)		1935			1711			1968		1678	1787	
Flt Permitted		0.93			0.80			0.44		0.46	1.00	
Satd. Flow (perm)		1821			1412			884		806	1787	
Peak-hour factor, PHF	0.58	0.50	0.62	0.93	0.92	0.77	0.82	0.74	0.42	0.50	0.81	0.88
Adj. Flow (vph)	12	4	32	132	0	88	156	392	24	44	415	514
RTOR Reduction (vph)	0	26	0	0	32	0	0	2	0	0	49	0
Lane Group Flow (vph)	0	22	0	0	188	0	0	570	0	44	880	0
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	1%	1%	1%	4%	4%	4%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		14.6			14.6			55.2		55.2	55.2	
Effective Green, g (s)		14.6			14.6			55.2		55.2	55.2	
Actuated g/C Ratio		0.19			0.19			0.70		0.70	0.70	
Clearance Time (s)		4.0			4.0			5.0		5.0	5.0	
Vehicle Extension (s)		2.6			2.6			2.8		2.8	2.8	
Lane Grp Cap (vph)		337			261			619		564	1251	
v/s Ratio Prot											0.49	
v/s Ratio Perm		0.01			c0.13			c0.65		0.05		
v/c Ratio		0.07			0.72			0.92		0.08	0.70	
Uniform Delay, d1		26.5			30.2			10.0		3.7	7.0	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.1			9.0			19.2		0.1	1.8	
Delay (s)		26.5			39.2			29.2		3.8	8.7	
Level of Service		C			D			C		A	A	
Approach Delay (s)		26.5			39.2			29.2			8.5	
Approach LOS		C			D			C			A	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	78.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	97.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		✥			✥			✥		↰	↱	
Traffic Volume (vph)	7	2	20	123	0	68	128	290	10	22	336	452
Future Volume (vph)	7	2	20	123	0	68	128	290	10	22	336	452
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	12	12	12	14	14	12	11	14	14
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			35			35			35	
Link Distance (ft)		209			662			1525			777	
Travel Time (s)		5.7			12.9			29.7			15.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.58	0.50	0.62	0.93	0.92	0.77	0.82	0.74	0.42	0.50	0.81	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	1%	1%	1%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	0	0	220	0	0	572	0	44	929	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Detector Phase	2	2		2	2		1	1		1	1	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	22.0	22.0		22.0	22.0		58.0	58.0		58.0	58.0	
Total Split (%)	27.5%	27.5%		27.5%	27.5%		72.5%	72.5%		72.5%	72.5%	
Maximum Green (s)	18.0	18.0		18.0	18.0		53.0	53.0		53.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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			5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		2.8	2.8		2.8	2.8	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.13			0.75			0.92		0.08	0.71	
Control Delay		13.9			40.7			36.0		5.0	10.2	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		13.9			40.7			36.0		5.0	10.2	
Queue Length 50th (ft)		6			82			201		6	186	
Queue Length 95th (ft)		12			156			#343		9	279	
Internal Link Dist (ft)		129			582			1445			697	
Turn Bay Length (ft)												
Base Capacity (vph)		440			352			620		563	1300	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.11			0.63			0.92		0.08	0.71	

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 78.8
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Plaza Driveway/West Wrentham Rd & Mendon Rd (RI 122)

Ø1	Ø2
58 s	22 s

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	14	200	42	60	0	0	236	46	51	20	46	11
Future Volume (vph)	14	200	42	60	0	0	236	46	51	20	46	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	13	13	13	11	11	11
Total Lost time (s)		5.0			5.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.97			1.00			0.99			0.98	
Flt Protected		1.00			0.95			0.96			0.99	
Satd. Flow (prot)		1887			1847			1867			1759	
Flt Permitted		0.98			0.52			0.70			0.82	
Satd. Flow (perm)		1857			1016			1360			1466	
Peak-hour factor, PHF	0.70	0.81	0.66	0.83	0.85	0.75	0.55	0.55	0.91	0.56	0.68	0.69
Adj. Flow (vph)	20	247	64	72	0	0	429	84	56	36	68	16
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	331	0	0	72	0	0	569	0	0	120	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	42	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		13.3			13.3			21.1			21.1	
Effective Green, g (s)		13.3			13.3			21.1			21.1	
Actuated g/C Ratio		0.31			0.31			0.49			0.49	
Clearance Time (s)		5.0			5.0			4.0			4.0	
Vehicle Extension (s)		2.8			2.8			2.6			2.6	
Lane Grp Cap (vph)		569			311			661			712	
v/s Ratio Prot												
v/s Ratio Perm		c0.18			0.07			c0.42			0.08	
v/c Ratio		0.58			0.23			0.86			0.17	
Uniform Delay, d1		12.7			11.2			9.9			6.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		1.4			0.3			11.0			0.1	
Delay (s)		14.1			11.6			20.9			6.3	
Level of Service		B			B			C			A	
Approach Delay (s)		14.1			11.6			20.9			6.3	
Approach LOS		B			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	16.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	43.4	Sum of lost time (s)	9.0
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	14	200	42	60	0	0	236	46	51	20	46	11
Future Volume (vph)	14	200	42	60	0	0	236	46	51	20	46	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	13	13	13	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			No
Link Speed (mph)		30			40			25			25	
Link Distance (ft)		3320			7947			1008			920	
Travel Time (s)		75.5			135.5			27.5			25.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.70	0.81	0.66	0.83	0.85	0.75	0.55	0.55	0.91	0.56	0.68	0.69
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	42	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	331	0	0	72	0	0	569	0	0	120	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Total Split (s)	35.0	35.0		35.0	35.0		25.0	25.0		25.0	25.0	
Total Split (%)	58.3%	58.3%		58.3%	58.3%		41.7%	41.7%		41.7%	41.7%	
Maximum Green (s)	30.0	30.0		30.0	30.0		21.0	21.0		21.0	21.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		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	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			4.0			4.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.58			0.23			0.86			0.17	
Control Delay		17.1			12.8			29.6			8.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		17.1			12.8			29.6			8.3	
Queue Length 50th (ft)		67			13			104			14	
Queue Length 95th (ft)		107			32			123			33	
Internal Link Dist (ft)		3240			7867			928			840	
Turn Bay Length (ft)												
Base Capacity (vph)		1288			704			660			712	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.26			0.10			0.86			0.17	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 43.5
Natural Cycle: 55
Control Type: Actuated-Uncoordinated

Splits and Phases: 17: West Wrentham Rd & Pine Swamp Rd (RI 114)

Ø1	Ø2
35 s	25 s

HCM Unsignalized Intersection Capacity Analysis
20: Diamond Hill Rd (RI 114) & Pine Swamp Rd (RI 114)/Wrentham Rd (RI 121)

03/22/2020

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰	↱
Traffic Volume (veh/h)	356	193	170	126	0	0
Future Volume (Veh/h)	356	193	170	126	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.91	0.79	0.88	0.88	0.89
Hourly flow rate (vph)	429	212	215	143	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						10
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			429		1002	429
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			429		1002	429
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			81		100	100
cM capacity (veh/h)			1136		218	626

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	429	212	215	143	0
Volume Left	0	0	215	0	0
Volume Right	0	212	0	0	0
cSH	1700	1700	1136	1700	1700
Volume to Capacity	0.25	0.12	0.19	0.08	0.00
Queue Length 95th (ft)	0	0	17	0	0
Control Delay (s)	0.0	0.0	8.9	0.0	0.0
Lane LOS			A		A
Approach Delay (s)	0.0		5.3		0.0
Approach LOS					A

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	34.8%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)

03/22/2020

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	124	32	18	232	0	362	0	20	104	253	58
Future Volume (vph)	0	124	32	18	232	0	362	0	20	104	253	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.97			1.00			0.99			0.98	
Flt Protected		1.00			1.00			0.95			0.99	
Satd. Flow (prot)		1799			1864			1732			1787	
Flt Permitted		1.00			0.97			0.47			0.79	
Satd. Flow (perm)		1799			1813			859			1438	
Peak-hour factor, PHF	0.80	0.84	0.80	0.90	0.82	0.84	0.82	0.82	0.83	0.81	0.82	0.81
Adj. Flow (vph)	0	148	40	20	283	0	441	0	24	128	309	72
RTOR Reduction (vph)	0	19	0	0	0	0	0	9	0	0	13	0
Lane Group Flow (vph)	0	169	0	0	303	0	0	456	0	0	496	0
Heavy Vehicles (%)	6%	6%	6%	5%	5%	5%	4%	4%	4%	3%	3%	3%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		10.1			10.1			28.2			28.2	
Effective Green, g (s)		10.1			10.1			28.2			28.2	
Actuated g/C Ratio		0.21			0.21			0.60			0.60	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Vehicle Extension (s)		2.6			2.6			3.0			3.0	
Lane Grp Cap (vph)		384			387			512			857	
v/s Ratio Prot		0.09										
v/s Ratio Perm					c0.17			c0.53			0.35	
v/c Ratio		0.44			0.78			0.89			0.58	
Uniform Delay, d1		16.1			17.6			8.2			5.9	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.6			9.7			17.4			1.0	
Delay (s)		16.8			27.2			25.7			6.8	
Level of Service		B			C			C			A	
Approach Delay (s)		16.8			27.2			25.7			6.8	
Approach LOS		B			C			C			A	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	47.3	Sum of lost time (s)	9.0
Intersection Capacity Utilization	80.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

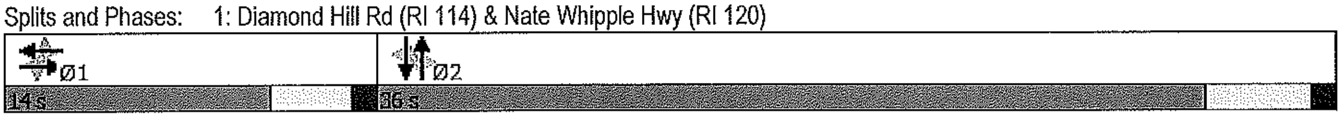
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	124	32	18	232	0	362	0	20	104	253	58
Future Volume (vph)	0	124	32	18	232	0	362	0	20	104	253	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		1854			4162			1592			454	
Travel Time (s)		31.6			70.9			36.2			10.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.80	0.84	0.80	0.90	0.82	0.84	0.82	0.82	0.83	0.81	0.82	0.81
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	5%	5%	5%	4%	4%	4%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	188	0	0	303	0	0	465	0	0	509	0
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	14.0	14.0		14.0	14.0		36.0	36.0		36.0	36.0	
Total Split (%)	28.0%	28.0%		28.0%	28.0%		72.0%	72.0%		72.0%	72.0%	
Maximum Green (s)	10.0	10.0		10.0	10.0		31.0	31.0		31.0	31.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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	
Total Lost Time (s)		4.0			4.0			5.0			5.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.47			0.78			0.89			0.59	
Control Delay		19.9			37.6			32.4			8.7	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		19.9			37.6			32.4			8.7	
Queue Length 50th (ft)		43			86			85			65	
Queue Length 95th (ft)		83			#171			#228			107	
Internal Link Dist (ft)		1774			4082			1512			374	
Turn Bay Length (ft)												
Base Capacity (vph)		402			387			576			962	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.47			0.78			0.81			0.53	

Intersection Summary

Area Type: Other
Cycle Length: 50
Actuated Cycle Length: 47.4
Natural Cycle: 50
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)



Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	76	714	167	299	418	73
Future Volume (vph)	76	714	167	299	418	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	13	11	13	12	12
Total Lost time (s)	4.0		4.0	5.0	5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.88		1.00	1.00	1.00	0.85
Flt Protected	0.99		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1671		1662	1870	1827	1553
Flt Permitted	0.99		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1671		1662	1870	1827	1553
Peak-hour factor, PHF	0.68	0.91	0.58	0.70	0.71	0.58
Adj. Flow (vph)	112	785	288	427	589	126
RTOR Reduction (vph)	308	0	0	0	0	41
Lane Group Flow (vph)	589	0	288	427	589	85
Heavy Vehicles (%)	3%	3%	5%	5%	4%	4%
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Actuated Green, G (s)	27.0		15.0	45.0	25.0	25.0
Effective Green, g (s)	27.0		15.0	45.0	25.0	25.0
Actuated g/C Ratio	0.34		0.19	0.56	0.31	0.31
Clearance Time (s)	4.0		4.0		5.0	5.0
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Lane Grp Cap (vph)	563		311	1051	570	485
v/s Ratio Prot	c0.35		c0.17	0.23	c0.32	0.06
v/s Ratio Perm						
v/c Ratio	1.05		0.93	0.41	1.03	0.18
Uniform Delay, d1	26.5		32.0	9.9	27.5	20.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	50.5		32.1	0.2	46.5	0.1
Delay (s)	77.0		64.1	10.1	74.0	20.1
Level of Service	E		E	B	E	C
Approach Delay (s)	77.0			31.9	64.5	
Approach LOS	E			C	E	

Intersection Summary			
HCM 2000 Control Delay	59.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	90.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	76	714	167	299	418	73
Future Volume (vph)	76	714	167	299	418	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	11	13	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			80
Storage Lanes	1	0	1			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			35	35	
Link Distance (ft)	2348			381	2230	
Travel Time (s)	53.4			7.4	43.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.68	0.91	0.58	0.70	0.71	0.58
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	3%	3%	5%	5%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	897	0	288	427	589	126
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Detector Phase	3		2	1 2	1	1
Switch Phase						
Minimum Initial (s)	10.0		5.0		10.0	10.0
Minimum Split (s)	14.0		9.0		15.0	15.0
Total Split (s)	31.0		19.0		30.0	30.0
Total Split (%)	38.8%		23.8%		37.5%	37.5%
Maximum Green (s)	27.0		15.0		25.0	25.0
Yellow Time (s)	3.0		3.0		4.0	4.0
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.0		4.0		5.0	5.0
Lead/Lag			Lag		Lead	Lead
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		None		Min	Min
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
v/c Ratio	1.03		0.93	0.42	1.03	0.24
Control Delay	53.2		70.0	12.1	76.2	13.0

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	53.2		70.0	12.1	76.2	13.0
Queue Length 50th (ft)	~316		143	115	~321	24
Queue Length 95th (ft)	202		136	127	#341	31
Internal Link Dist (ft)	2268			301	2150	
Turn Bay Length (ft)						80
Base Capacity (vph)	872		311	1028	570	525
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	1.03		0.93	0.42	1.03	0.24

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Mendon Rd (RI 122) & Nate Whipple Hwy (RI 120)

Ø1	Ø2	Ø3
30 s	19 s	31 s

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		✥			✥			✥		↰	↱	
Traffic Volume (vph)	3	1	6	84	0	104	95	100	13	7	338	566
Future Volume (vph)	3	1	6	84	0	104	95	100	13	7	338	566
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	14	14	12	11	14	14
Total Lost time (s)		4.0			4.0			5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.94			0.92			0.98		1.00	0.91	
Flt Protected		0.98			0.98			0.98		0.95	1.00	
Satd. Flow (prot)		1986			1651			1897		1694	1782	
Flt Permitted		0.89			0.85			0.30		0.63	1.00	
Satd. Flow (perm)		1812			1430			583		1129	1782	
Peak-hour factor, PHF	0.25	0.25	0.50	0.84	0.92	0.79	0.81	0.79	0.41	0.44	0.87	0.86
Adj. Flow (vph)	12	4	12	100	0	132	117	127	32	16	389	658
RTOR Reduction (vph)	0	10	0	0	79	0	0	8	0	0	106	0
Lane Group Flow (vph)	0	18	0	0	153	0	0	268	0	16	941	0
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	3%	3%	3%	3%	3%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		11.0			11.0			34.8		34.8	34.8	
Effective Green, g (s)		11.0			11.0			34.8		34.8	34.8	
Actuated g/C Ratio		0.20			0.20			0.64		0.64	0.64	
Clearance Time (s)		4.0			4.0			5.0		5.0	5.0	
Vehicle Extension (s)		2.6			2.6			2.8		2.8	2.8	
Lane Grp Cap (vph)		363			287			370		716	1131	
v/s Ratio Prot											c0.53	
v/s Ratio Perm		0.01			c0.11			0.46		0.01		
v/c Ratio		0.05			0.53			0.72		0.02	0.83	
Uniform Delay, d1		17.7			19.6			6.8		3.7	7.7	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.0			1.6			6.7		0.0	5.3	
Delay (s)		17.7			21.2			13.5		3.7	13.1	
Level of Service		B			C			B		A	B	
Approach Delay (s)		17.7			21.2			13.5			12.9	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	54.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	92.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

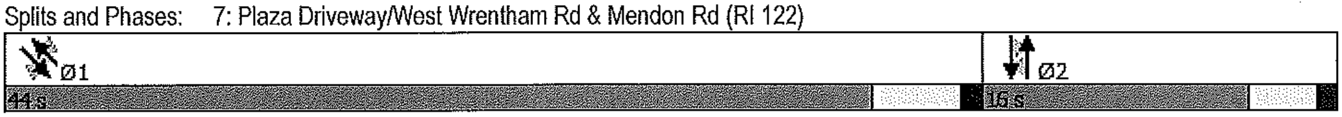
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	3	1	6	84	0	104	95	100	13	7	338	566
Future Volume (vph)	3	1	6	84	0	104	95	100	13	7	338	566
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	12	12	12	14	14	12	11	14	14
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			35			35			35	
Link Distance (ft)		209			662			1525			777	
Travel Time (s)		5.7			12.9			29.7			15.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.25	0.25	0.50	0.84	0.92	0.79	0.81	0.79	0.41	0.44	0.87	0.86
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	4%	4%	4%	3%	3%	3%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	28	0	0	232	0	0	276	0	16	1047	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Detector Phase	2	2		2	2		1	1		1	1	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	16.0	16.0		16.0	16.0		44.0	44.0		44.0	44.0	
Total Split (%)	26.7%	26.7%		26.7%	26.7%		73.3%	73.3%		73.3%	73.3%	
Maximum Green (s)	12.0	12.0		12.0	12.0		39.0	39.0		39.0	39.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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			5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		2.8	2.8		2.8	2.8	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.08			0.64			0.73		0.02	0.85	
Control Delay		15.4			21.8			21.3		3.9	14.2	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		15.4			21.8			21.3		3.9	14.2	
Queue Length 50th (ft)		5			41			45		2	147	
Queue Length 95th (ft)		4			#124			110		3	#326	
Internal Link Dist (ft)		129			582			1445			697	
Turn Bay Length (ft)												
Base Capacity (vph)		409			393			425		811	1363	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.07			0.59			0.65		0.02	0.77	

Intersection Summary

Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 54.9
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Plaza Driveway/West Wrentham Rd & Mendon Rd (RI 122)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	28	150	45	114	79	7	156	106	547	40	88	12
Future Volume (vph)	28	150	45	114	79	7	156	106	547	40	88	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	13	13	13	11	11	11
Total Lost time (s)		5.0			5.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			1.00			0.91			0.98	
Flt Protected		0.99			0.97			0.99			0.99	
Satd. Flow (prot)		1887			1826			1768			1748	
Flt Permitted		0.94			0.42			0.86			0.60	
Satd. Flow (perm)		1782			784			1543			1065	
Peak-hour factor, PHF	0.78	0.63	0.75	0.73	0.75	0.71	0.49	0.62	0.56	0.71	0.63	0.43
Adj. Flow (vph)	36	238	60	156	105	10	318	171	977	56	140	28
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	334	0	0	270	0	0	1466	0	0	224	0
Heavy Vehicles (%)	1%	1%	1%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		30.0			30.0			81.0			81.0	
Effective Green, g (s)		30.0			30.0			81.0			81.0	
Actuated g/C Ratio		0.25			0.25			0.68			0.68	
Clearance Time (s)		5.0			5.0			4.0			4.0	
Vehicle Extension (s)		2.8			2.8			2.6			2.6	
Lane Grp Cap (vph)		445			196			1041			718	
v/s Ratio Prot												
v/s Ratio Perm		0.19			c0.34			c0.95			0.21	
v/c Ratio		0.75			1.38			1.41			0.31	
Uniform Delay, d1		41.5			45.0			19.5			8.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		6.9			197.5			189.5			0.2	
Delay (s)		48.4			242.5			209.0			8.2	
Level of Service		D			F			F			A	
Approach Delay (s)		48.4			242.5			209.0			8.2	
Approach LOS		D			F			F			A	

Intersection Summary			
HCM 2000 Control Delay	170.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.40		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

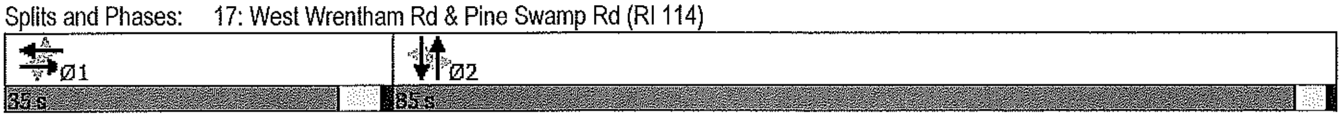
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	28	150	45	114	79	7	156	106	547	40	88	12
Future Volume (vph)	28	150	45	114	79	7	156	106	547	40	88	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	13	13	13	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			No
Link Speed (mph)		30			40			25			25	
Link Distance (ft)		3320			7947			1008			920	
Travel Time (s)		75.5			135.5			27.5			25.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.78	0.63	0.75	0.73	0.75	0.71	0.49	0.62	0.56	0.71	0.63	0.43
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	4%	4%	4%	0%	0%	0%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	334	0	0	271	0	0	1466	0	0	224	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Total Split (s)	35.0	35.0		35.0	35.0		85.0	85.0		85.0	85.0	
Total Split (%)	29.2%	29.2%		29.2%	29.2%		70.8%	70.8%		70.8%	70.8%	
Maximum Green (s)	30.0	30.0		30.0	30.0		81.0	81.0		81.0	81.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		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	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			4.0			4.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.75			1.38			1.41			0.31	
Control Delay		53.4			233.2			211.1			9.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		53.4			233.2			211.1			9.4	
Queue Length 50th (ft)		240			~279			~1523			65	
Queue Length 95th (ft)		222			#349			#970			66	
Internal Link Dist (ft)		3240			7867			928			840	
Turn Bay Length (ft)												
Base Capacity (vph)		445			197			1042			719	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.75			1.38			1.41			0.31	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Natural Cycle: 140
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: West Wrentham Rd & Pine Swamp Rd (RI 114)



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰	↱
Traffic Volume (veh/h)	659	198	256	115	34	112
Future Volume (Veh/h)	659	198	256	115	34	112
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.73	0.60	0.86	0.60	0.76	0.91
Hourly flow rate (vph)	903	330	298	192	45	123
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						10
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			903		1691	903
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			903		1691	903
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			60		27	63
cM capacity (veh/h)			753		62	334

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	903	330	298	192	168
Volume Left	0	0	298	0	45
Volume Right	0	330	0	0	123
cSH	1700	1700	753	1700	230
Volume to Capacity	0.53	0.19	0.40	0.11	0.73
Queue Length 95th (ft)	0	0	48	0	124
Control Delay (s)	0.0	0.0	12.9	0.0	57.3
Lane LOS			B		F
Approach Delay (s)	0.0		7.8		57.3
Approach LOS					F

Intersection Summary			
Average Delay	7.1		
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	0	306	43	236	552	0	260	0	120	113	174	38
Future Volume (vph)	0	306	43	236	552	0	260	0	120	113	174	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			1.00			0.95			0.98	
Flt Protected		1.00			0.98			0.97			0.98	
Satd. Flow (prot)		1711			1823			1670			1730	
Flt Permitted		1.00			0.57			0.50			0.78	
Satd. Flow (perm)		1711			1051			871			1368	
Peak-hour factor, PHF	0.74	0.70	0.77	0.70	0.79	0.86	0.88	0.69	0.77	0.69	0.73	0.63
Adj. Flow (vph)	0	437	56	337	699	0	295	0	156	164	238	60
RTOR Reduction (vph)	0	4	0	0	0	0	0	16	0	0	5	0
Lane Group Flow (vph)	0	489	0	0	1036	0	0	435	0	0	457	0
Heavy Vehicles (%)	13%	13%	13%	6%	6%	6%	5%	5%	5%	6%	6%	6%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		72.0			72.0			39.0			39.0	
Effective Green, g (s)		72.0			72.0			39.0			39.0	
Actuated g/C Ratio		0.60			0.60			0.32			0.32	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Vehicle Extension (s)		2.6			2.6			3.0			3.0	
Lane Grp Cap (vph)		1026			630			283			444	
v/s Ratio Prot		0.29										
v/s Ratio Perm					c0.99			c0.50			0.33	
v/c Ratio		0.48			1.64			1.54			1.03	
Uniform Delay, d1		13.4			24.0			40.5			40.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.3			297.1			258.4			50.6	
Delay (s)		13.7			321.1			298.9			91.1	
Level of Service		B			F			F			F	
Approach Delay (s)		13.7			321.1			298.9			91.1	
Approach LOS		B			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	211.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.61		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	111.9%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	0	306	43	236	552	0	260	0	120	113	174	38
Future Volume (vph)	0	306	43	236	552	0	260	0	120	113	174	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		1854			4162			1592			454	
Travel Time (s)		31.6			70.9			36.2			10.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.74	0.70	0.77	0.70	0.79	0.86	0.88	0.69	0.77	0.69	0.73	0.63
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	13%	13%	13%	6%	6%	6%	5%	5%	5%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	493	0	0	1036	0	0	451	0	0	462	0
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	76.0	76.0		76.0	76.0		44.0	44.0		44.0	44.0	
Total Split (%)	63.3%	63.3%		63.3%	63.3%		36.7%	36.7%		36.7%	36.7%	
Maximum Green (s)	72.0	72.0		72.0	72.0		39.0	39.0		39.0	39.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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	
Total Lost Time (s)		4.0			4.0			5.0			5.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.48			1.64			1.51			1.03	
Control Delay		15.1			320.3			275.2			89.9	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		15.1			320.3			275.2			89.9	
Queue Length 50th (ft)		198			~1162			~476			~379	
Queue Length 95th (ft)		193			#1181			#463			#407	
Internal Link Dist (ft)		1774			4082			1512			374	
Turn Bay Length (ft)												
Base Capacity (vph)		1030			630			299			449	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.48			1.64			1.51			1.03	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)

Ø1	Ø2
76 s	44 s

Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	99	573	193	423	411	73
Future Volume (vph)	99	573	193	423	411	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	13	11	13	12	12
Total Lost time (s)	4.0		4.0	5.0	5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.88		1.00	1.00	1.00	0.85
Flt Protected	0.99		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1701		1728	1944	1881	1599
Flt Permitted	0.99		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1701		1728	1944	1881	1599
Peak-hour factor, PHF	0.99	0.72	0.93	0.94	0.86	0.79
Adj. Flow (vph)	100	796	208	450	478	92
RTOR Reduction (vph)	307	0	0	0	0	32
Lane Group Flow (vph)	589	0	208	450	478	60
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Actuated Green, G (s)	30.6		13.7	42.9	24.2	24.2
Effective Green, g (s)	30.6		13.7	42.9	24.2	24.2
Actuated g/C Ratio	0.38		0.17	0.53	0.30	0.30
Clearance Time (s)	4.0		4.0		5.0	5.0
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Lane Grp Cap (vph)	638		290	1023	558	474
v/s Ratio Prot	c0.35		c0.12	0.23	c0.25	0.04
v/s Ratio Perm						
v/c Ratio	0.92		0.72	0.44	0.86	0.13
Uniform Delay, d1	24.3		32.1	11.9	27.0	20.9
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	19.1		7.8	0.2	12.2	0.1
Delay (s)	43.5		39.8	12.1	39.2	21.0
Level of Service	D		D	B	D	C
Approach Delay (s)	43.5			20.9	36.3	
Approach LOS	D			C	D	

Intersection Summary			
HCM 2000 Control Delay	34.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	81.5	Sum of lost time (s)	13.0
Intersection Capacity Utilization	84.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	99	573	193	423	411	73
Future Volume (vph)	99	573	193	423	411	73
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	11	13	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			80
Storage Lanes	1	0	1			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			35	35	
Link Distance (ft)	2348			381	2230	
Travel Time (s)	53.4			7.4	43.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.99	0.72	0.93	0.94	0.86	0.79
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	896	0	208	450	478	92
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Detector Phase	3		2	1 2	1	1
Switch Phase						
Minimum Initial (s)	10.0		5.0		10.0	10.0
Minimum Split (s)	14.0		9.0		15.0	15.0
Total Split (s)	39.0		20.0		31.0	31.0
Total Split (%)	43.3%		22.2%		34.4%	34.4%
Maximum Green (s)	35.0		16.0		26.0	26.0
Yellow Time (s)	3.0		3.0		4.0	4.0
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.0		4.0		5.0	5.0
Lead/Lag			Lag		Lead	Lead
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		None		Min	Min
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
v/c Ratio	0.95		0.72	0.45	0.86	0.18
Control Delay	32.6		49.3	15.1	46.0	15.1

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	32.6		49.3	15.1	46.0	15.1
Queue Length 50th (ft)	249		112	155	258	20
Queue Length 95th (ft)	#540		#201	231	#400	46
Internal Link Dist (ft)	2268			301	2150	
Turn Bay Length (ft)						80
Base Capacity (vph)	1024		348	1064	616	553
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.88		0.60	0.42	0.78	0.17

Intersection Summary
Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 81.9
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Mendon Rd (RI 122) & Nate Whipple Hwy (RI 120)

Ø1	Ø2	Ø3
31 s	20 s	39 s

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	3	0	2	164	0	119	191	342	3	7	342	483
Future Volume (vph)	3	0	2	164	0	119	191	342	3	7	342	483
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	14	14	12	11	14	14
Total Lost time (s)		4.0			4.0			5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.93			0.95			1.00		1.00	0.91	
Flt Protected		0.98			0.97			0.98		0.95	1.00	
Satd. Flow (prot)		1959			1715			1945		1728	1834	
Flt Permitted		0.91			0.80			0.33		0.43	1.00	
Satd. Flow (perm)		1821			1424			657		788	1834	
Peak-hour factor, PHF	0.75	0.92	0.50	0.79	0.92	0.96	0.77	0.94	0.36	0.44	0.86	0.90
Adj. Flow (vph)	4	0	4	208	0	124	248	364	8	16	398	537
RTOR Reduction (vph)	0	6	0	0	18	0	0	0	0	0	41	0
Lane Group Flow (vph)	0	2	0	0	314	0	0	620	0	16	894	0
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		23.0			23.0			88.0		88.0	88.0	
Effective Green, g (s)		23.0			23.0			88.0		88.0	88.0	
Actuated g/C Ratio		0.19			0.19			0.73		0.73	0.73	
Clearance Time (s)		4.0			4.0			5.0		5.0	5.0	
Vehicle Extension (s)		2.6			2.6			2.8		2.8	2.8	
Lane Grp Cap (vph)		349			272			481		577	1344	
v/s Ratio Prot											0.49	
v/s Ratio Perm		0.00			c0.22			c0.94		0.02		
v/c Ratio		0.00			1.16			1.29		0.03	0.67	
Uniform Delay, d1		39.2			48.5			16.0		4.4	8.3	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.0			103.2			144.8		0.0	1.2	
Delay (s)		39.2			151.7			160.8		4.4	9.5	
Level of Service		D			F			F		A	A	
Approach Delay (s)		39.2			151.7			160.8			9.5	
Approach LOS		D			F			F			A	

Intersection Summary			
HCM 2000 Control Delay	83.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	107.4%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

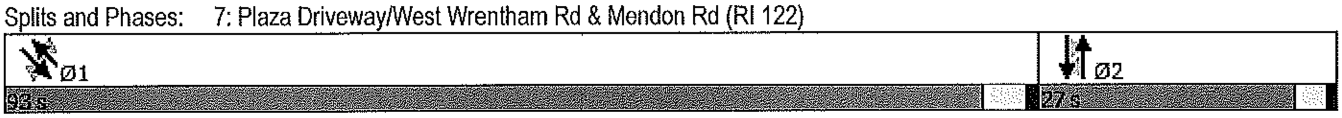
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations												
Traffic Volume (vph)	3	0	2	164	0	119	191	342	3	7	342	483
Future Volume (vph)	3	0	2	164	0	119	191	342	3	7	342	483
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	12	12	12	14	14	12	11	14	14
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			35			35			35	
Link Distance (ft)		209			662			1525			777	
Travel Time (s)		5.7			12.9			29.7			15.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.75	0.92	0.50	0.79	0.92	0.96	0.77	0.94	0.36	0.44	0.86	0.90
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	8	0	0	332	0	0	620	0	16	935	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Detector Phase	2	2		2	2		1	1		1	1	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	27.0	27.0		27.0	27.0		93.0	93.0		93.0	93.0	
Total Split (%)	22.5%	22.5%		22.5%	22.5%		77.5%	77.5%		77.5%	77.5%	
Maximum Green (s)	23.0	23.0		23.0	23.0		88.0	88.0		88.0	88.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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			5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		2.8	2.8		2.8	2.8	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.02			1.14			1.29		0.03	0.68	
Control Delay		7.6			138.8			165.1		4.6	9.7	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		7.6			138.8			165.1		4.6	9.7	
Queue Length 50th (ft)		0			~287			~615		3	276	
Queue Length 95th (ft)		8			#474			#462		4	357	
Internal Link Dist (ft)		129			582			1445			697	
Turn Bay Length (ft)												
Base Capacity (vph)		363			290			481		577	1385	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.02			1.14			1.29		0.03	0.68	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Natural Cycle: 140
Control Type: Actuated-Uncoordinated
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Plaza Driveway/West Wrentham Rd & Mendon Rd (RI 122)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	16	133	28	122	131	11	211	77	339	25	120	22
Future Volume (vph)	16	133	28	122	131	11	211	77	339	25	120	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	13	13	13	11	11	11
Total Lost time (s)		5.0			5.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.99			0.92			0.98	
Flt Protected		0.99			0.98			0.98			0.99	
Satd. Flow (prot)		1904			1891			1787			1770	
Flt Permitted		0.94			0.68			0.83			0.86	
Satd. Flow (perm)		1795			1318			1502			1541	
Peak-hour factor, PHF	0.50	0.72	0.58	0.85	0.79	0.78	0.84	0.83	0.78	0.78	0.86	0.79
Adj. Flow (vph)	32	185	48	144	166	14	251	93	435	32	140	28
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	265	0	0	322	0	0	779	0	0	200	0
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		17.3			17.3			34.7			34.7	
Effective Green, g (s)		17.3			17.3			34.7			34.7	
Actuated g/C Ratio		0.28			0.28			0.57			0.57	
Clearance Time (s)		5.0			5.0			4.0			4.0	
Vehicle Extension (s)		2.8			2.8			2.6			2.6	
Lane Grp Cap (vph)		509			373			854			876	
v/s Ratio Prot												
v/s Ratio Perm		0.15			c0.24			c0.52			0.13	
v/c Ratio		0.52			0.86			0.91			0.23	
Uniform Delay, d1		18.4			20.7			11.8			6.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.9			18.1			13.9			0.1	
Delay (s)		19.2			38.9			25.7			6.6	
Level of Service		B			D			C			A	
Approach Delay (s)		19.2			38.9			25.7			6.6	
Approach LOS		B			D			C			A	

Intersection Summary			
HCM 2000 Control Delay	24.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	61.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	133	28	122	131	11	211	77	339	25	120	22
Future Volume (vph)	16	133	28	122	131	11	211	77	339	25	120	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	13	13	13	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			No
Link Speed (mph)		30			40			25			25	
Link Distance (ft)		3320			7947			1008			920	
Travel Time (s)		75.5			135.5			27.5			25.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.50	0.72	0.58	0.85	0.79	0.78	0.84	0.83	0.78	0.78	0.86	0.79
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	265	0	0	324	0	0	779	0	0	200	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Total Split (s)	23.0	23.0		23.0	23.0		42.0	42.0		42.0	42.0	
Total Split (%)	35.4%	35.4%		35.4%	35.4%		64.6%	64.6%		64.6%	64.6%	
Maximum Green (s)	18.0	18.0		18.0	18.0		38.0	38.0		38.0	38.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		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	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			4.0			4.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.52			0.87			0.91			0.23	
Control Delay		23.9			47.9			29.8			7.3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		23.9			47.9			29.8			7.3	
Queue Length 50th (ft)		89			121			236			34	
Queue Length 95th (ft)		117			#210			#416			59	
Internal Link Dist (ft)		3240			7867			928			840	
Turn Bay Length (ft)												
Base Capacity (vph)		537			397			951			974	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.49			0.82			0.82			0.21	

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 61.1
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 17: West Wrentham Rd & Pine Swamp Rd (RI 114)

Ø1	Ø2
23 s	42 s

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	380	188	524	326	7	8
Future Volume (Veh/h)	380	188	524	326	7	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.69	0.92	0.96	0.90	0.89	0.75
Hourly flow rate (vph)	551	204	546	362	8	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						10
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			551		2005	551
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			551		2005	551
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			47		74	98
cM capacity (veh/h)			1024		31	536

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	551	204	546	362	19
Volume Left	0	0	546	0	8
Volume Right	0	204	0	0	11
cSH	1700	1700	1024	1700	73
Volume to Capacity	0.32	0.12	0.53	0.21	0.26
Queue Length 95th (ft)	0	0	81	0	23
Control Delay (s)	0.0	0.0	12.5	0.0	74.0
Lane LOS			B		F
Approach Delay (s)	0.0		7.5		74.0
Approach LOS					F

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	0	119	42	17	246	0	254	0	30	176	225	76
Future Volume (vph)	0	119	42	17	246	0	254	0	30	176	225	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.96			1.00			0.99			0.98	
Flt Protected		1.00			1.00			0.96			0.98	
Satd. Flow (prot)		1798			1916			1759			1783	
Flt Permitted		1.00			0.96			0.46			0.71	
Satd. Flow (perm)		1798			1846			843			1296	
Peak-hour factor, PHF	0.86	0.85	0.75	0.53	0.75	0.85	0.68	0.93	0.75	0.75	0.97	0.79
Adj. Flow (vph)	0	140	56	32	328	0	374	0	40	235	232	96
RTOR Reduction (vph)	0	24	0	0	0	0	0	8	0	0	13	0
Lane Group Flow (vph)	0	172	0	0	360	0	0	406	0	0	550	0
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		13.8			13.8			30.1			30.1	
Effective Green, g (s)		13.8			13.8			30.1			30.1	
Actuated g/C Ratio		0.26			0.26			0.57			0.57	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Vehicle Extension (s)		2.6			2.6			3.0			3.0	
Lane Grp Cap (vph)		469			481			479			737	
v/s Ratio Prot		0.10										
v/s Ratio Perm					c0.19			c0.48			0.42	
v/c Ratio		0.37			0.75			0.85			0.75	
Uniform Delay, d1		16.0			18.0			9.5			8.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.4			6.0			13.1			4.1	
Delay (s)		16.4			24.0			22.6			12.7	
Level of Service		B			C			C			B	
Approach Delay (s)		16.4			24.0			22.6			12.7	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	18.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	52.9	Sum of lost time (s)	9.0
Intersection Capacity Utilization	67.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✥			✥			✥			✥	
Traffic Volume (vph)	0	119	42	17	246	0	254	0	30	176	225	76
Future Volume (vph)	0	119	42	17	246	0	254	0	30	176	225	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		1854			4162			1592			454	
Travel Time (s)		31.6			70.9			36.2			10.3	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.86	0.85	0.75	0.53	0.75	0.85	0.68	0.93	0.75	0.75	0.97	0.79
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	196	0	0	360	0	0	414	0	0	563	0
Turn Type		NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	19.0	19.0		19.0	19.0		41.0	41.0		41.0	41.0	
Total Split (%)	31.7%	31.7%		31.7%	31.7%		68.3%	68.3%		68.3%	68.3%	
Maximum Green (s)	15.0	15.0		15.0	15.0		36.0	36.0		36.0	36.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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	
Total Lost Time (s)		4.0			4.0			5.0			5.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.40			0.75			0.86			0.75	
Control Delay		18.3			32.6			29.5			16.0	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		18.3			32.6			29.5			16.0	
Queue Length 50th (ft)		49			121			96			116	
Queue Length 95th (ft)		93			162			#271			232	
Internal Link Dist (ft)		1774			4082			1512			374	
Turn Bay Length (ft)												
Base Capacity (vph)		550			542			598			919	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.36			0.66			0.69			0.61	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 53.2

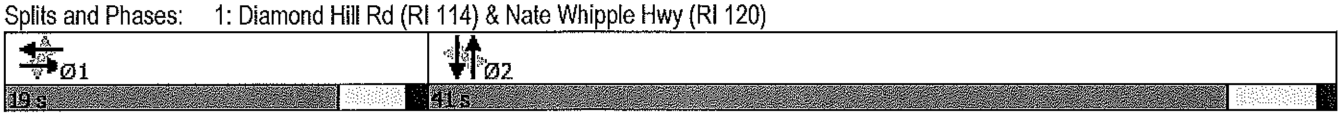
Natural Cycle: 60

Control Type: Actuated-Uncoordinated

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

Splits and Phases: 1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)



Movement	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	87	530	102	406	420	52
Future Volume (vph)	87	530	102	406	420	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	13	13	11	13	12	12
Total Lost time (s)	4.0		4.0	5.0	5.0	5.0
Lane Util. Factor	1.00		1.00	1.00	1.00	1.00
Frt	0.88		1.00	1.00	1.00	0.85
Flt Protected	0.99		0.95	1.00	1.00	1.00
Satd. Flow (prot)	1706		1728	1944	1881	1599
Flt Permitted	0.99		0.95	1.00	1.00	1.00
Satd. Flow (perm)	1706		1728	1944	1881	1599
Peak-hour factor, PHF	0.87	0.86	0.94	0.86	0.78	0.73
Adj. Flow (vph)	100	616	109	472	538	71
RTOR Reduction (vph)	269	0	0	0	0	30
Lane Group Flow (vph)	447	0	109	472	538	41
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Actuated Green, G (s)	18.2		7.5	32.7	20.2	20.2
Effective Green, g (s)	18.2		7.5	32.7	20.2	20.2
Actuated g/C Ratio	0.31		0.13	0.56	0.34	0.34
Clearance Time (s)	4.0		4.0		5.0	5.0
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Lane Grp Cap (vph)	527		220	1079	645	548
v/s Ratio Prot	c0.26		0.06	c0.24	c0.29	0.03
v/s Ratio Perm						
v/c Ratio	0.85		0.50	0.44	0.83	0.07
Uniform Delay, d1	19.1		23.9	7.7	17.8	13.0
Progression Factor	1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2	12.0		1.4	0.2	9.0	0.0
Delay (s)	31.0		25.3	7.9	26.8	13.1
Level of Service	C		C	A	C	B
Approach Delay (s)	31.0			11.2	25.2	
Approach LOS	C			B	C	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	58.9	Sum of lost time (s)	13.0
Intersection Capacity Utilization	76.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Lane Configurations						
Traffic Volume (vph)	87	530	102	406	420	52
Future Volume (vph)	87	530	102	406	420	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	11	13	12	12
Grade (%)	0%			0%	0%	
Storage Length (ft)	0	0	0			80
Storage Lanes	1	0	1			1
Taper Length (ft)	25		25			
Right Turn on Red		Yes				Yes
Link Speed (mph)	30			35	35	
Link Distance (ft)	2348			381	2230	
Travel Time (s)	53.4			7.4	43.4	
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.87	0.86	0.94	0.86	0.78	0.73
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Shared Lane Traffic (%)						
Lane Group Flow (vph)	716	0	109	472	538	71
Turn Type	Prot		Prot	NA	NA	Prot
Protected Phases	3		2	1 2	1	1
Permitted Phases						
Detector Phase	3		2	1 2	1	1
Switch Phase						
Minimum Initial (s)	10.0		5.0		10.0	10.0
Minimum Split (s)	14.0		9.0		15.0	15.0
Total Split (s)	26.0		12.0		27.0	27.0
Total Split (%)	40.0%		18.5%		41.5%	41.5%
Maximum Green (s)	22.0		8.0		22.0	22.0
Yellow Time (s)	3.0		3.0		4.0	4.0
All-Red Time (s)	1.0		1.0		1.0	1.0
Lost Time Adjust (s)	0.0		0.0		0.0	0.0
Total Lost Time (s)	4.0		4.0		5.0	5.0
Lead/Lag			Lag		Lead	Lead
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	2.6		2.6		2.6	2.6
Minimum Gap (s)	3.0		3.0		3.0	3.0
Time Before Reduce (s)	0.0		0.0		0.0	0.0
Time To Reduce (s)	0.0		0.0		0.0	0.0
Recall Mode	None		None		Min	Min
Walk Time (s)						
Flash Dont Walk (s)						
Pedestrian Calls (#/hr)						
v/c Ratio	0.90		0.50	0.45	0.84	0.12
Control Delay	26.1		35.1	10.9	33.4	8.2

Lane Group	WBL	WBR	SEL	SET	NWT	NWR
Queue Delay	0.0		0.0	0.0	0.0	0.0
Total Delay	26.1		35.1	10.9	33.4	8.2
Queue Length 50th (ft)	117		41	108	194	7
Queue Length 95th (ft)	#302		#86	164	#253	22
Internal Link Dist (ft)	2268			301	2150	
Turn Bay Length (ft)						80
Base Capacity (vph)	891		239	1039	718	639
Starvation Cap Reductn	0		0	0	0	0
Spillback Cap Reductn	0		0	0	0	0
Storage Cap Reductn	0		0	0	0	0
Reduced v/c Ratio	0.80		0.46	0.45	0.75	0.11

Intersection Summary

Area Type: Other
Cycle Length: 65
Actuated Cycle Length: 59.2
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Mendon Rd (RI 122) & Nate Whipple Hwy (RI 120)

Ø1	Ø2	Ø3
27 s	12 s	26 s

Movement	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		✥			✥			✥		↰	↱	
Traffic Volume (vph)	7	2	20	123	0	68	128	290	10	22	336	452
Future Volume (vph)	7	2	20	123	0	68	128	290	10	22	336	452
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	16	16	16	12	12	12	14	14	12	11	14	14
Total Lost time (s)		4.0			4.0			5.0		5.0	5.0	
Lane Util. Factor		1.00			1.00			1.00		1.00	1.00	
Frt		0.91			0.95			0.99		1.00	0.92	
Flt Protected		0.99			0.97			0.99		0.95	1.00	
Satd. Flow (prot)		1935			1711			1968		1678	1787	
Flt Permitted		0.93			0.79			0.46		0.46	1.00	
Satd. Flow (perm)		1814			1389			914		818	1787	
Peak-hour factor, PHF	0.58	0.50	0.62	0.93	0.92	0.77	0.82	0.74	0.42	0.50	0.81	0.88
Adj. Flow (vph)	12	4	32	132	0	88	156	392	24	44	415	514
RTOR Reduction (vph)	0	27	0	0	34	0	0	2	0	0	65	0
Lane Group Flow (vph)	0	21	0	0	186	0	0	570	0	44	864	0
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	1%	1%	1%	4%	4%	4%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Actuated Green, G (s)		11.6			11.6			46.9		46.9	46.9	
Effective Green, g (s)		11.6			11.6			46.9		46.9	46.9	
Actuated g/C Ratio		0.17			0.17			0.69		0.69	0.69	
Clearance Time (s)		4.0			4.0			5.0		5.0	5.0	
Vehicle Extension (s)		2.6			2.6			2.8		2.8	2.8	
Lane Grp Cap (vph)		311			238			635		568	1241	
v/s Ratio Prot											0.48	
v/s Ratio Perm		0.01			c0.13			c0.62		0.05		
v/c Ratio		0.07			0.78			0.90		0.08	0.70	
Uniform Delay, d1		23.4			26.7			8.3		3.3	6.1	
Progression Factor		1.00			1.00			1.00		1.00	1.00	
Incremental Delay, d2		0.1			14.9			15.3		0.1	1.7	
Delay (s)		23.5			41.6			23.6		3.4	7.8	
Level of Service		C			D			C		A	A	
Approach Delay (s)		23.5			41.6			23.6			7.6	
Approach LOS		C			D			C			A	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	67.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	97.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Lane Configurations		✥			✥			✥		↰	↱	
Traffic Volume (vph)	7	2	20	123	0	68	128	290	10	22	336	452
Future Volume (vph)	7	2	20	123	0	68	128	290	10	22	336	452
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	16	16	16	12	12	12	14	14	12	11	14	14
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			35			35			35	
Link Distance (ft)		209			662			1525			777	
Travel Time (s)		5.7			12.9			29.7			15.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.58	0.50	0.62	0.93	0.92	0.77	0.82	0.74	0.42	0.50	0.81	0.88
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	1%	1%	1%	4%	4%	4%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	48	0	0	220	0	0	572	0	44	929	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		2			2			1			1	
Permitted Phases	2			2			1			1		
Detector Phase	2	2		2	2		1	1		1	1	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	16.0	16.0		16.0	16.0		54.0	54.0		54.0	54.0	
Total Split (%)	22.9%	22.9%		22.9%	22.9%		77.1%	77.1%		77.1%	77.1%	
Maximum Green (s)	12.0	12.0		12.0	12.0		49.0	49.0		49.0	49.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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			5.0		5.0	5.0	
Lead/Lag	Lag	Lag		Lag	Lag		Lead	Lead		Lead	Lead	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.6	2.6		2.6	2.6		2.8	2.8		2.8	2.8	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.14			0.81			0.90		0.08	0.71	
Control Delay		14.3			47.3			29.5		3.7	8.3	

Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	SEL	SET	SER	NWL	NWT	NWR
Queue Delay		0.0			0.0			0.0		0.0	0.0	
Total Delay		14.3			47.3			29.5		3.7	8.3	
Queue Length 50th (ft)		6			75			156		5	138	
Queue Length 95th (ft)		12			#188			210		7	188	
Internal Link Dist (ft)		129			582			1445			697	
Turn Bay Length (ft)												
Base Capacity (vph)		349			281			667		595	1358	
Starvation Cap Reductn		0			0			0		0	0	
Spillback Cap Reductn		0			0			0		0	0	
Storage Cap Reductn		0			0			0		0	0	
Reduced v/c Ratio		0.14			0.78			0.86		0.07	0.68	

Intersection Summary

Area Type: Other

Cycle Length: 70

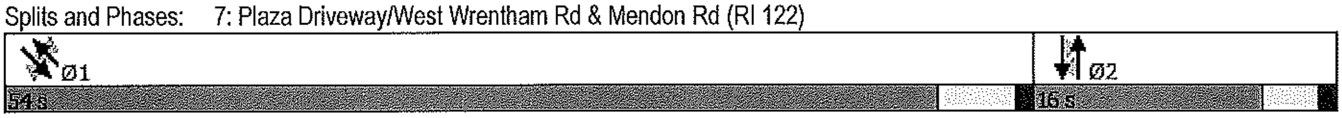
Actuated Cycle Length: 67.5

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 7: Plaza Driveway/West Wrentham Rd & Mendon Rd (RI 122)



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	200	42	60	0	0	236	46	51	20	46	11
Future Volume (vph)	14	200	42	60	0	0	236	46	51	20	46	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	13	13	13	11	11	11
Total Lost time (s)		5.0			5.0			4.0			4.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.97			1.00			0.99			0.98	
Flt Protected		1.00			0.95			0.96			0.99	
Satd. Flow (prot)		1887			1847			1867			1759	
Flt Permitted		0.98			0.49			0.70			0.82	
Satd. Flow (perm)		1856			961			1360			1471	
Peak-hour factor, PHF	0.70	0.81	0.66	0.83	0.85	0.75	0.55	0.55	0.91	0.56	0.68	0.69
Adj. Flow (vph)	20	247	64	72	0	0	429	84	56	36	68	16
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	331	0	0	72	0	0	569	0	0	120	0
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	42	0	0	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Actuated Green, G (s)		13.0			13.0			23.5			23.5	
Effective Green, g (s)		13.0			13.0			23.5			23.5	
Actuated g/C Ratio		0.29			0.29			0.52			0.52	
Clearance Time (s)		5.0			5.0			4.0			4.0	
Vehicle Extension (s)		2.8			2.8			2.6			2.6	
Lane Grp Cap (vph)		530			274			702			759	
v/s Ratio Prot												
v/s Ratio Perm		c0.18			0.07			c0.42			0.08	
v/c Ratio		0.62			0.26			0.81			0.16	
Uniform Delay, d1		14.1			12.5			9.1			5.8	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		2.2			0.5			6.9			0.1	
Delay (s)		16.3			13.0			16.1			5.9	
Level of Service		B			B			B			A	
Approach Delay (s)		16.3			13.0			16.1			5.9	
Approach LOS		B			B			B			A	

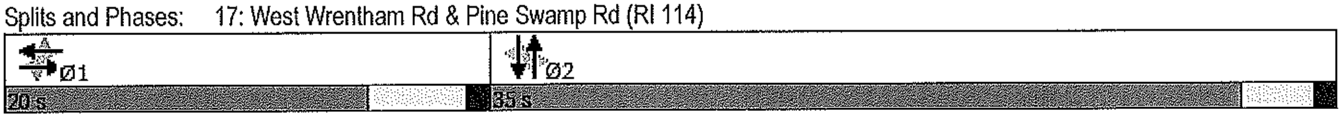
Intersection Summary			
HCM 2000 Control Delay	14.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	45.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Traffic Volume (vph)	14	200	42	60	0	0	236	46	51	20	46	11
Future Volume (vph)	14	200	42	60	0	0	236	46	51	20	46	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	13	13	13	11	11	11
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			Yes			No			No
Link Speed (mph)		30			40			25			25	
Link Distance (ft)		3320			7947			1008			920	
Travel Time (s)		75.5			135.5			27.5			25.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.70	0.81	0.66	0.83	0.85	0.75	0.55	0.55	0.91	0.56	0.68	0.69
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	42	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	331	0	0	72	0	0	569	0	0	120	0
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		1			1			2			2	
Permitted Phases	1			1			2			2		
Detector Phase	1	1		1	1		2	2		2	2	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	15.0	15.0		15.0	15.0		9.0	9.0		9.0	9.0	
Total Split (s)	20.0	20.0		20.0	20.0		35.0	35.0		35.0	35.0	
Total Split (%)	36.4%	36.4%		36.4%	36.4%		63.6%	63.6%		63.6%	63.6%	
Maximum Green (s)	15.0	15.0		15.0	15.0		31.0	31.0		31.0	31.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		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	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			4.0			4.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag		Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.8	2.8		2.8	2.8		2.6	2.6		2.6	2.6	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Min	Min		Min	Min		None	None		None	None	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		0.63			0.27			0.82			0.16	
Control Delay		22.8			18.3			20.9			6.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			0.0	
Total Delay		22.8			18.3			20.9			6.4	
Queue Length 50th (ft)		83			16			114			15	
Queue Length 95th (ft)		146			44			95			26	
Internal Link Dist (ft)		3240			7867			928			840	
Turn Bay Length (ft)												
Base Capacity (vph)		635			329			963			1042	
Starvation Cap Reductn		0			0			0			0	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		0.52			0.22			0.59			0.12	

Intersection Summary	
Area Type:	Other
Cycle Length: 55	
Actuated Cycle Length: 45.9	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 17: West Wrentham Rd & Pine Swamp Rd (RI 114)



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↱	↰	↑	↰	↱
Traffic Volume (veh/h)	356	193	170	126	0	0
Future Volume (Veh/h)	356	193	170	126	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.83	0.91	0.79	0.88	0.88	0.89
Hourly flow rate (vph)	429	212	215	143	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						10
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			429		1002	429
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			429		1002	429
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			81		100	100
cM capacity (veh/h)			1136		218	626

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	429	212	215	143	0
Volume Left	0	0	215	0	0
Volume Right	0	212	0	0	0
cSH	1700	1700	1136	1700	1700
Volume to Capacity	0.25	0.12	0.19	0.08	0.00
Queue Length 95th (ft)	0	0	17	0	0
Control Delay (s)	0.0	0.0	8.9	0.0	0.0
Lane LOS			A		A
Approach Delay (s)	0.0		5.3		0.0
Approach LOS					A

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	34.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑			↑
Traffic Volume (vph)	0	0	481	0	0	415
Future Volume (vph)	0	0	481	0	0	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0			13.5
Lane Util. Factor			1.00			1.00
Frt			1.00			1.00
Flt Protected			1.00			1.00
Satd. Flow (prot)			1863			950
Flt Permitted			1.00			1.00
Satd. Flow (perm)			1863			950
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	523	0	0	451
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	523	0	0	451
Heavy Vehicles (%)	2%	2%	2%	2%	2%	100%
Turn Type			NA			NA
Protected Phases			Free			4
Permitted Phases						
Actuated Green, G (s)			120.0			33.5
Effective Green, g (s)			120.0			33.5
Actuated g/C Ratio			1.00			0.28
Clearance Time (s)						13.5
Lane Grp Cap (vph)			1863			265
v/s Ratio Prot			0.28			c0.47
v/s Ratio Perm						
v/c Ratio			0.28			1.70
Uniform Delay, d1			0.0			43.2
Progression Factor			1.00			1.00
Incremental Delay, d2			0.3			331.5
Delay (s)			0.3			374.8
Level of Service			A			F
Approach Delay (s)	0.0		0.3			374.8
Approach LOS	A		A			F

Intersection Summary			
HCM 2000 Control Delay	173.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	36.0
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø2	Ø3	Ø5	Ø6	Ø7
Lane Configurations											
Traffic Volume (vph)	0	0	481	0	0	415					
Future Volume (vph)	0	0	481	0	0	415					
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900					
Lane Width (ft)	12	12	12	12	12	12					
Grade (%)	0%		0%			0%					
Storage Length (ft)	0	0		0	0						
Storage Lanes	0	0		0	0						
Taper Length (ft)	25				25						
Right Turn on Red		Yes		Yes							
Link Speed (mph)	20		20			20					
Link Distance (ft)	281		227			8671					
Travel Time (s)	9.6		7.7			295.6					
Confl. Peds. (#/hr)											
Confl. Bikes (#/hr)											
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92					
Growth Factor	100%	100%	100%	100%	100%	100%					
Heavy Vehicles (%)	2%	2%	2%	2%	2%	100%					
Bus Blockages (#/hr)	0	0	0	0	0	0					
Parking (#/hr)											
Mid-Block Traffic (%)	0%		0%			0%					
Shared Lane Traffic (%)											
Lane Group Flow (vph)	0	0	523	0	0	451					
Turn Type			NA			NA					
Protected Phases			Free			4	2	3	5	6	7
Permitted Phases											
Detector Phase						4					
Switch Phase											
Minimum Initial (s)						5.0	10.0	5.0	10.0	10.0	10.0
Minimum Split (s)						18.5	23.0	18.5	14.0	15.0	15.0
Total Split (s)						47.0	54.5	18.5	27.0	27.5	65.5
Total Split (%)						39.2%	45%	15%	23%	23%	55%
Maximum Green (s)						33.5	50.5	5.0	23.0	22.5	60.5
Yellow Time (s)						3.5	3.0	3.5	3.0	4.0	4.0
All-Red Time (s)						10.0	1.0	10.0	1.0	1.0	1.0
Lost Time Adjust (s)						0.0					
Total Lost Time (s)						13.5					
Lead/Lag						Lag		Lead	Lead	Lag	
Lead-Lag Optimize?						Yes		Yes	Yes	Yes	
Vehicle Extension (s)						3.0	2.6	3.0	2.6	3.0	3.0
Minimum Gap (s)						3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)						0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)						0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode						Max	None	Max	None	Min	Min
Walk Time (s)											
Flash Dont Walk (s)											
Pedestrian Calls (#/hr)											
v/c Ratio			0.28			1.70					
Control Delay			0.3			361.0					

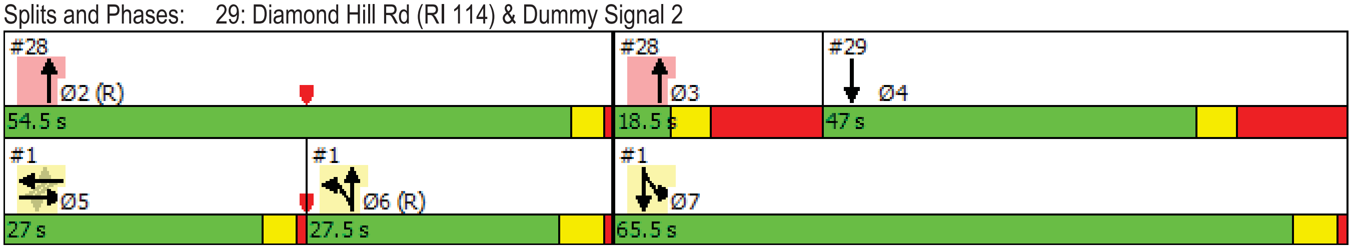
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø2	Ø3	Ø5	Ø6	Ø7
Queue Delay			0.0			0.0					
Total Delay			0.3			361.0					
Queue Length 50th (ft)			0			~513					
Queue Length 95th (ft)			0			#718					
Internal Link Dist (ft)	201		147			8591					
Turn Bay Length (ft)											
Base Capacity (vph)			1863			265					
Starvation Cap Reductn			0			0					
Spillback Cap Reductn			0			0					
Storage Cap Reductn			0			0					
Reduced v/c Ratio			0.28			1.70					

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:, Start of Green	
Natural Cycle: 150	
Control Type: Pretimed	

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 29: Diamond Hill Rd (RI 114) & Dummy Signal 2



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	481	0	0	415
Future Volume (vph)	0	0	481	0	0	415
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0			4.0
Lane Util. Factor			1.00			1.00
Frt			1.00			1.00
Flt Protected			1.00			1.00
Satd. Flow (prot)			1863			1863
Flt Permitted			1.00			1.00
Satd. Flow (perm)			1863			1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	523	0	0	451
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	523	0	0	451
Turn Type			NA			NA
Protected Phases			2 3			Free
Permitted Phases						
Actuated Green, G (s)			59.5			120.0
Effective Green, g (s)			59.5			120.0
Actuated g/C Ratio			0.50			1.00
Clearance Time (s)						
Lane Grp Cap (vph)			923			1863
v/s Ratio Prot			c0.28			0.24
v/s Ratio Perm						
v/c Ratio			0.57			0.24
Uniform Delay, d1			21.2			0.0
Progression Factor			0.07			1.00
Incremental Delay, d2			0.2			0.0
Delay (s)			1.7			0.0
Level of Service			A			A
Approach Delay (s)	0.0		1.7			0.0
Approach LOS	A		A			A

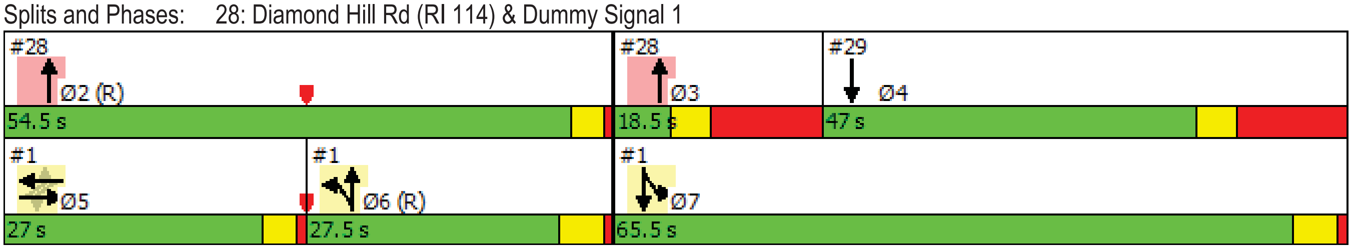
Intersection Summary			
HCM 2000 Control Delay	0.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	36.0
Intersection Capacity Utilization	33.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7
Lane Configurations												
Traffic Volume (vph)	0	0	481	0	0	415						
Future Volume (vph)	0	0	481	0	0	415						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900						
Lane Width (ft)	12	12	12	12	12	12						
Grade (%)	0%		0%			0%						
Storage Length (ft)	0	0		0	0							
Storage Lanes	0	0		0	0							
Taper Length (ft)	25				25							
Right Turn on Red		Yes		Yes								
Link Speed (mph)	30		20			20						
Link Distance (ft)	238		150			227						
Travel Time (s)	5.4		5.1			7.7						
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92						
Growth Factor	100%	100%	100%	100%	100%	100%						
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%						
Bus Blockages (#/hr)	0	0	0	0	0	0						
Parking (#/hr)												
Mid-Block Traffic (%)	0%		0%			0%						
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	523	0	0	451						
Turn Type			NA			NA						
Protected Phases			2 3			Free	2	3	4	5	6	7
Permitted Phases												
Detector Phase			2 3									
Switch Phase												
Minimum Initial (s)							10.0	5.0	5.0	10.0	10.0	10.0
Minimum Split (s)							23.0	18.5	18.5	14.0	15.0	15.0
Total Split (s)							54.5	18.5	47.0	27.0	27.5	65.5
Total Split (%)							45%	15%	39%	23%	23%	55%
Maximum Green (s)							50.5	5.0	33.5	23.0	22.5	60.5
Yellow Time (s)							3.0	3.5	3.5	3.0	4.0	4.0
All-Red Time (s)							1.0	10.0	10.0	1.0	1.0	1.0
Lost Time Adjust (s)												
Total Lost Time (s)												
Lead/Lag								Lead	Lag	Lead	Lag	
Lead-Lag Optimize?								Yes	Yes	Yes	Yes	
Vehicle Extension (s)							2.6	3.0	3.0	2.6	3.0	3.0
Minimum Gap (s)							3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)							0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)							0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode							None	Max	Max	None	Min	Min
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio			0.49			0.24						
Control Delay			1.2			0.7						

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7
Queue Delay			54.8			0.0						
Total Delay			56.0			0.8						
Queue Length 50th (ft)			5			0						
Queue Length 95th (ft)			m4			m0						
Internal Link Dist (ft)	158		70			147						
Turn Bay Length (ft)												
Base Capacity (vph)			1071			1863						
Starvation Cap Reductn			599			0						
Spillback Cap Reductn			0			283						
Storage Cap Reductn			0			0						
Reduced v/c Ratio			1.11			0.29						

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBT and 6:, Start of Green	
Natural Cycle: 150	
Control Type: Pretimed	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 28: Diamond Hill Rd (RI 114) & Dummy Signal 1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	124	32	18	125	107	49	313	20	104	253	58
Future Volume (vph)	61	124	32	18	125	107	49	313	20	104	253	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.98			0.94			0.99			0.98	
Flt Protected		0.99			1.00			0.99			0.99	
Satd. Flow (prot)		1789			1757			1803			1787	
Flt Permitted		0.48			0.95			0.99			0.99	
Satd. Flow (perm)		862			1668			1803			1787	
Peak-hour factor, PHF	0.80	0.84	0.80	0.90	0.82	0.84	0.82	0.82	0.83	0.81	0.82	0.81
Adj. Flow (vph)	76	148	40	20	152	127	60	382	24	128	309	72
RTOR Reduction (vph)	0	6	0	0	22	0	0	2	0	0	5	0
Lane Group Flow (vph)	0	258	0	0	277	0	0	464	0	0	504	0
Heavy Vehicles (%)	6%	6%	6%	5%	5%	5%	4%	4%	4%	3%	3%	3%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		5			5		6	6		7	7	
Permitted Phases	5			5								
Actuated Green, G (s)		23.0			23.0			22.5			60.5	
Effective Green, g (s)		23.0			23.0			22.5			60.5	
Actuated g/C Ratio		0.19			0.19			0.19			0.50	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Lane Grp Cap (vph)		165			319			338			900	
v/s Ratio Prot								c0.26			c0.28	
v/s Ratio Perm		c0.30			0.17							
v/c Ratio		1.57			0.87			1.37			0.56	
Uniform Delay, d1		48.5			47.0			48.8			20.6	
Progression Factor		1.00			1.00			1.00			0.45	
Incremental Delay, d2		281.8			26.0			186.0			2.5	
Delay (s)		330.3			73.0			234.7			11.7	
Level of Service		F			E			F			B	
Approach Delay (s)		330.3			73.0			234.7			11.7	
Approach LOS		F			E			F			B	

Intersection Summary			
HCM 2000 Control Delay	145.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	36.0
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	61	124	32	18	125	107	49	313	20	104	253	58
Future Volume (vph)	61	124	32	18	125	107	49	313	20	104	253	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		1854			4162			1592			150	
Travel Time (s)		31.6			70.9			36.2			3.4	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.80	0.84	0.80	0.90	0.82	0.84	0.82	0.82	0.83	0.81	0.82	0.81
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	6%	6%	6%	5%	5%	5%	4%	4%	4%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	264	0	0	299	0	0	466	0	0	509	0
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		5			5		6	6		7	7	
Permitted Phases	5			5								
Detector Phase	5	5		5	5		6	6		7	7	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	27.0	27.0		27.0	27.0		27.5	27.5		65.5	65.5	
Total Split (%)	22.5%	22.5%		22.5%	22.5%		22.9%	22.9%		54.6%	54.6%	
Maximum Green (s)	23.0	23.0		23.0	23.0		22.5	22.5		60.5	60.5	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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	
Total Lost Time (s)		4.0			4.0			5.0			5.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes				
Vehicle Extension (s)	2.6	2.6		2.6	2.6		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		1.55			0.88			1.37			0.56	
Control Delay		308.7			69.2			223.8			11.8	

Lane Group	Ø2	Ø3	Ø4
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Grade (%)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Right Turn on Red			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Confl. Bikes (#/hr)			
Peak Hour Factor			
Growth Factor			
Heavy Vehicles (%)			
Bus Blockages (#/hr)			
Parking (#/hr)			
Mid-Block Traffic (%)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	2	3	4
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	10.0	5.0	5.0
Minimum Split (s)	23.0	18.5	18.5
Total Split (s)	54.5	18.5	47.0
Total Split (%)	45%	15%	39%
Maximum Green (s)	50.5	5.0	33.5
Yellow Time (s)	3.0	3.5	3.5
All-Red Time (s)	1.0	10.0	10.0
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag		Lead	Lag
Lead-Lag Optimize?		Yes	Yes
Vehicle Extension (s)	2.6	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0
Recall Mode	None	Max	Max
Walk Time (s)			
Flash Dont Walk (s)			
Pedestrian Calls (#/hr)			
v/c Ratio			
Control Delay			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.3			17.5	
Total Delay		308.7			69.2			224.0			29.3	
Queue Length 50th (ft)		~286			208			~479			48	
Queue Length 95th (ft)		#417			#309			#602			112	
Internal Link Dist (ft)		1774			4082			1512			70	
Turn Bay Length (ft)												
Base Capacity (vph)		170			341			339			906	
Starvation Cap Reductn		0			0			0			389	
Spillback Cap Reductn		0			0			9			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.55			0.88			1.41			0.98	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBT and 6:, Start of Green

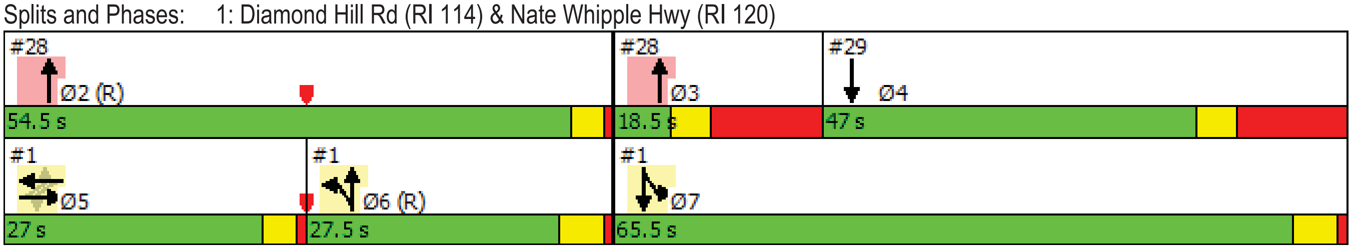
Natural Cycle: 150

Control Type: Pretimed

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)



Lane Group	Ø2	Ø3	Ø4
Queue Delay			
Total Delay			
Queue Length 50th (ft)			
Queue Length 95th (ft)			
Internal Link Dist (ft)			
Turn Bay Length (ft)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			

Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑			↑
Traffic Volume (vph)	0	0	403	0	0	325
Future Volume (vph)	0	0	403	0	0	325
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0			13.5
Lane Util. Factor			1.00			1.00
Frt			1.00			1.00
Flt Protected			1.00			1.00
Satd. Flow (prot)			1863			950
Flt Permitted			1.00			1.00
Satd. Flow (perm)			1863			950
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	438	0	0	353
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	438	0	0	353
Heavy Vehicles (%)	2%	2%	2%	2%	2%	100%
Turn Type			NA			NA
Protected Phases			Free			4
Permitted Phases						
Actuated Green, G (s)			120.0			27.5
Effective Green, g (s)			120.0			27.5
Actuated g/C Ratio			1.00			0.23
Clearance Time (s)						13.5
Lane Grp Cap (vph)			1863			217
v/s Ratio Prot			0.24			c0.37
v/s Ratio Perm						
v/c Ratio			0.24			1.63
Uniform Delay, d1			0.0			46.2
Progression Factor			1.00			1.00
Incremental Delay, d2			0.3			302.1
Delay (s)			0.3			348.4
Level of Service			A			F
Approach Delay (s)	0.0		0.3			348.4
Approach LOS	A		A			F

Intersection Summary			
HCM 2000 Control Delay	155.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	36.0
Intersection Capacity Utilization	28.4%	ICU Level of Service	A
Analysis Period (min)	15		

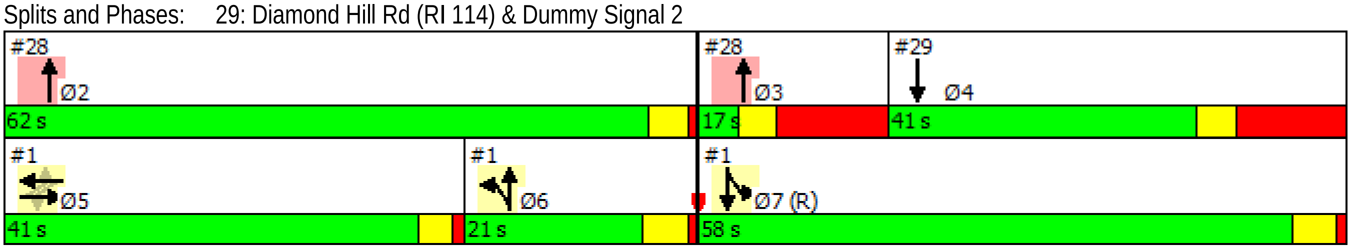
c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø2	Ø3	Ø5	Ø6	Ø7
Lane Configurations											
Traffic Volume (vph)	0	0	403	0	0	325					
Future Volume (vph)	0	0	403	0	0	325					
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900					
Lane Width (ft)	12	12	12	12	12	12					
Grade (%)	0%		0%			0%					
Storage Length (ft)	0	0		0	0						
Storage Lanes	0	0		0	0						
Taper Length (ft)	25				25						
Right Turn on Red		Yes		Yes							
Link Speed (mph)	20		20			20					
Link Distance (ft)	281		227			8671					
Travel Time (s)	9.6		7.7			295.6					
Confl. Peds. (#/hr)											
Confl. Bikes (#/hr)											
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92					
Growth Factor	100%	100%	100%	100%	100%	100%					
Heavy Vehicles (%)	2%	2%	2%	2%	2%	100%					
Bus Blockages (#/hr)	0	0	0	0	0	0					
Parking (#/hr)											
Mid-Block Traffic (%)	0%		0%			0%					
Shared Lane Traffic (%)											
Lane Group Flow (vph)	0	0	438	0	0	353					
Turn Type			NA			NA					
Protected Phases			Free			4	2	3	5	6	7
Permitted Phases											
Detector Phase						4					
Switch Phase											
Minimum Initial (s)						5.0	5.0	5.0	10.0	10.0	10.0
Minimum Split (s)						22.5	22.5	18.5	14.0	15.0	15.0
Total Split (s)						41.0	62.0	17.0	41.0	21.0	58.0
Total Split (%)						34.2%	52%	14%	34%	18%	48%
Maximum Green (s)						27.5	57.5	3.5	37.0	16.0	53.0
Yellow Time (s)						3.5	3.5	3.5	3.0	4.0	4.0
All-Red Time (s)						10.0	1.0	10.0	1.0	1.0	1.0
Lost Time Adjust (s)						0.0					
Total Lost Time (s)						13.5					
Lead/Lag						Lag		Lead	Lead	Lag	
Lead-Lag Optimize?						Yes		Yes	Yes	Yes	
Vehicle Extension (s)						3.0	3.0	3.0	2.6	3.0	3.0
Minimum Gap (s)						3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)						0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)						0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode						Max	Max	Max	Max	Max	Max
Walk Time (s)											
Flash Dont Walk (s)											
Pedestrian Calls (#/hr)											
v/c Ratio			0.24			1.63					
Control Delay			0.3			333.8					

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø2	Ø3	Ø5	Ø6	Ø7
Queue Delay			0.0			0.0					
Total Delay			0.3			333.8					
Queue Length 50th (ft)			0			~394					
Queue Length 95th (ft)			0			#582					
Internal Link Dist (ft)	201		147			8591					
Turn Bay Length (ft)											
Base Capacity (vph)			1863			217					
Starvation Cap Reductn			0			0					
Spillback Cap Reductn			0			0					
Storage Cap Reductn			0			0					
Reduced v/c Ratio			0.24			1.63					

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 23.5 (20%), Referenced to phase 7:SBTL, Start of Green	
Natural Cycle: 150	
Control Type: Pretimed	
~ Volume exceeds capacity, queue is theoretically infinite.	
Queue shown is maximum after two cycles.	
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 29: Diamond Hill Rd (RI 114) & Dummy Signal 2



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑			↑
Traffic Volume (vph)	0	0	403	0	0	325
Future Volume (vph)	0	0	403	0	0	325
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.5			4.0
Lane Util. Factor			1.00			1.00
Frt			1.00			1.00
Flt Protected			1.00			1.00
Satd. Flow (prot)			1863			1863
Flt Permitted			1.00			1.00
Satd. Flow (perm)			1863			1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	438	0	0	353
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	438	0	0	353
Turn Type			NA			NA
Protected Phases			2 3			Free
Permitted Phases						
Actuated Green, G (s)			65.5			120.0
Effective Green, g (s)			65.5			120.0
Actuated g/C Ratio			0.55			1.00
Clearance Time (s)						
Lane Grp Cap (vph)			1016			1863
v/s Ratio Prot			c0.24			0.19
v/s Ratio Perm						
v/c Ratio			0.43			0.19
Uniform Delay, d1			16.2			0.0
Progression Factor			0.08			1.00
Incremental Delay, d2			0.1			0.0
Delay (s)			1.4			0.0
Level of Service			A			A
Approach Delay (s)	0.0		1.4			0.0
Approach LOS	A		A			A

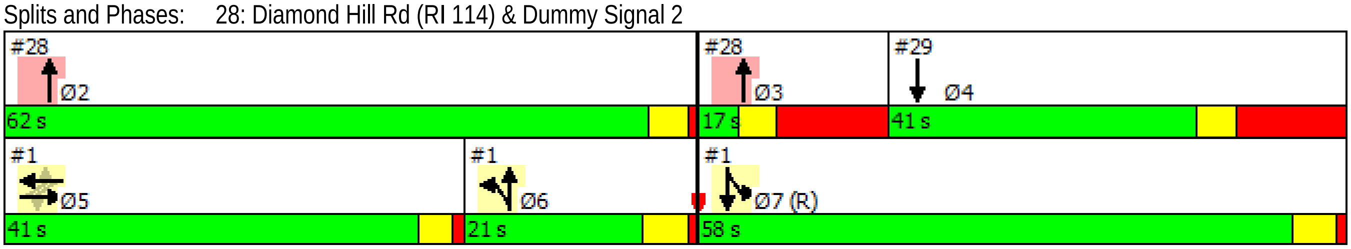
Intersection Summary			
HCM 2000 Control Delay	0.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	36.0
Intersection Capacity Utilization	28.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7
Lane Configurations												
Traffic Volume (vph)	0	0	403	0	0	325						
Future Volume (vph)	0	0	403	0	0	325						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900						
Lane Width (ft)	12	12	12	12	12	12						
Grade (%)	0%		0%			0%						
Storage Length (ft)	0	0		0	0							
Storage Lanes	0	0		0	0							
Taper Length (ft)	25				25							
Right Turn on Red		Yes		Yes								
Link Speed (mph)	20		20			20						
Link Distance (ft)	269		150			227						
Travel Time (s)	9.2		5.1			7.7						
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92						
Growth Factor	100%	100%	100%	100%	100%	100%						
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%						
Bus Blockages (#/hr)	0	0	0	0	0	0						
Parking (#/hr)												
Mid-Block Traffic (%)	0%		0%			0%						
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	438	0	0	353						
Turn Type			NA			NA						
Protected Phases			2 3			Free	2	3	4	5	6	7
Permitted Phases												
Detector Phase			2 3									
Switch Phase												
Minimum Initial (s)							5.0	5.0	5.0	10.0	10.0	10.0
Minimum Split (s)							22.5	18.5	22.5	14.0	15.0	15.0
Total Split (s)							62.0	17.0	41.0	41.0	21.0	58.0
Total Split (%)							52%	14%	34%	34%	18%	48%
Maximum Green (s)							57.5	3.5	27.5	37.0	16.0	53.0
Yellow Time (s)							3.5	3.5	3.5	3.0	4.0	4.0
All-Red Time (s)							1.0	10.0	10.0	1.0	1.0	1.0
Lost Time Adjust (s)												
Total Lost Time (s)												
Lead/Lag								Lead	Lag	Lead	Lag	
Lead-Lag Optimize?								Yes	Yes	Yes	Yes	
Vehicle Extension (s)							3.0	3.0	3.0	2.6	3.0	3.0
Minimum Gap (s)							3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)							0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)							0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode							Max	Max	Max	Max	Max	Max
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio			0.38			0.19						
Control Delay			1.0			0.5						

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7
Queue Delay			61.4			0.3						
Total Delay			62.5			0.9						
Queue Length 50th (ft)			5			0						
Queue Length 95th (ft)			m2			m0						
Internal Link Dist (ft)	189		70			147						
Turn Bay Length (ft)												
Base Capacity (vph)			1156			1863						
Starvation Cap Reductn			897			0						
Spillback Cap Reductn			0			975						
Storage Cap Reductn			0			0						
Reduced v/c Ratio			1.69			0.40						

Intersection Summary	
Area Type:	Other
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 23.5 (20%), Referenced to phase 7:SBTL, Start of Green	
Natural Cycle: 150	
Control Type: Pretimed	
m Volume for 95th percentile queue is metered by upstream signal.	

Splits and Phases: 28: Diamond Hill Rd (RI 114) & Dummy Signal 2



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	306	43	236	442	110	35	225	120	113	174	38
Future Volume (vph)	68	306	43	236	442	110	35	225	120	113	174	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.99			0.98			0.96			0.98	
Flt Protected		0.99			0.98			1.00			0.98	
Satd. Flow (prot)		1702			1791			1730			1730	
Flt Permitted		0.77			0.46			1.00			0.98	
Satd. Flow (perm)		1327			830			1730			1730	
Peak-hour factor, PHF	0.74	0.70	0.77	0.70	0.79	0.86	0.88	0.69	0.77	0.69	0.73	0.63
Adj. Flow (vph)	92	437	56	337	559	128	40	326	156	164	238	60
RTOR Reduction (vph)	0	3	0	0	4	0	0	13	0	0	4	0
Lane Group Flow (vph)	0	582	0	0	1020	0	0	509	0	0	458	0
Heavy Vehicles (%)	13%	13%	13%	6%	6%	6%	5%	5%	5%	6%	6%	6%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		5			5		6	6		7	7	
Permitted Phases	5			5								
Actuated Green, G (s)		37.0			37.0			16.0			53.0	
Effective Green, g (s)		37.0			37.0			16.0			53.0	
Actuated g/C Ratio		0.31			0.31			0.13			0.44	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Lane Grp Cap (vph)		409			255			230			764	
v/s Ratio Prot								c0.29			c0.26	
v/s Ratio Perm		0.44			c1.23							
v/c Ratio		1.42			4.00			2.21			0.60	
Uniform Delay, d1		41.5			41.5			52.0			25.4	
Progression Factor		1.00			1.00			1.00			0.67	
Incremental Delay, d2		203.7			1359.1			559.8			3.4	
Delay (s)		245.2			1400.6			611.8			20.5	
Level of Service		F			F			F			C	
Approach Delay (s)		245.2			1400.6			611.8			20.5	
Approach LOS		F			F			F			C	

Intersection Summary			
HCM 2000 Control Delay	735.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	2.55		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	36.0
Intersection Capacity Utilization	119.3%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	306	43	236	442	110	35	225	120	113	174	38
Future Volume (vph)	68	306	43	236	442	110	35	225	120	113	174	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			20	
Link Distance (ft)		1854			4162			1592			150	
Travel Time (s)		31.6			70.9			36.2			5.1	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.74	0.70	0.77	0.70	0.79	0.86	0.88	0.69	0.77	0.69	0.73	0.63
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	13%	13%	13%	6%	6%	6%	5%	5%	5%	6%	6%	6%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	585	0	0	1024	0	0	522	0	0	462	0
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		5			5		6	6		7	7	
Permitted Phases	5			5								
Detector Phase	5	5		5	5		6	6		7	7	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	41.0	41.0		41.0	41.0		21.0	21.0		58.0	58.0	
Total Split (%)	34.2%	34.2%		34.2%	34.2%		17.5%	17.5%		48.3%	48.3%	
Maximum Green (s)	37.0	37.0		37.0	37.0		16.0	16.0		53.0	53.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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	
Total Lost Time (s)		4.0			4.0			5.0			5.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes				
Vehicle Extension (s)	2.6	2.6		2.6	2.6		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Max	Max		Max	Max		Max	Max		Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		1.42			3.94			2.15			0.60	
Control Delay		235.5			1345.5			555.7			20.6	

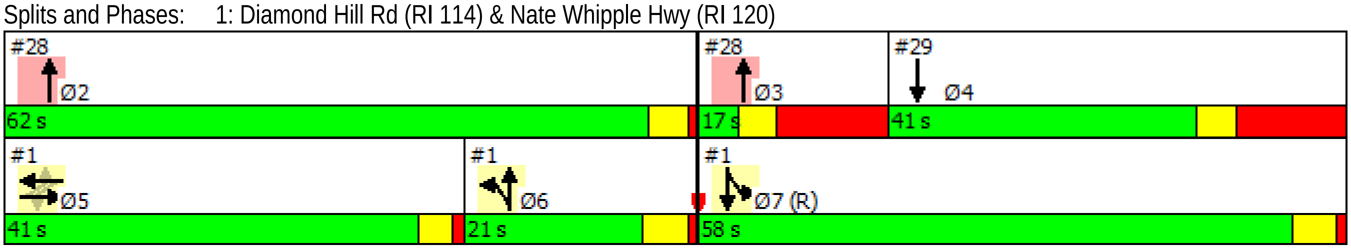
Lane Group	Ø2	Ø3	Ø4
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Grade (%)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Right Turn on Red			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Confl. Bikes (#/hr)			
Peak Hour Factor			
Growth Factor			
Heavy Vehicles (%)			
Bus Blockages (#/hr)			
Parking (#/hr)			
Mid-Block Traffic (%)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	2	3	4
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	5.0	5.0	5.0
Minimum Split (s)	22.5	18.5	22.5
Total Split (s)	62.0	17.0	41.0
Total Split (%)	52%	14%	34%
Maximum Green (s)	57.5	3.5	27.5
Yellow Time (s)	3.5	3.5	3.5
All-Red Time (s)	1.0	10.0	10.0
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag		Lead	Lag
Lead-Lag Optimize?		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0
Recall Mode	Max	Max	Max
Walk Time (s)			
Flash Dont Walk (s)			
Pedestrian Calls (#/hr)			
v/c Ratio			
Control Delay			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.3			55.8	
Total Delay		235.5			1345.5			556.0			76.4	
Queue Length 50th (ft)		~612			~1268			~642			94	
Queue Length 95th (ft)		#575			#1288			#609			132	
Internal Link Dist (ft)		1774			4082			1512			70	
Turn Bay Length (ft)												
Base Capacity (vph)		412			260			243			768	
Starvation Cap Reductn		0			0			0			371	
Spillback Cap Reductn		0			0			5			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.42			3.94			2.19			1.16	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 23.5 (20%), Referenced to phase 7:SBTL, Start of Green
Natural Cycle: 150
Control Type: Pretimed
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)



Lane Group	Ø2	Ø3	Ø4
Queue Delay			
Total Delay			
Queue Length 50th (ft)			
Queue Length 95th (ft)			
Internal Link Dist (ft)			
Turn Bay Length (ft)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			

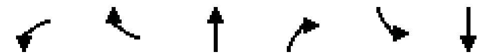
Intersection Summary

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑			↑
Traffic Volume (vph)	0	0	417	0	0	477
Future Volume (vph)	0	0	417	0	0	477
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0			13.5
Lane Util. Factor			1.00			1.00
Frt			1.00			1.00
Flt Protected			1.00			1.00
Satd. Flow (prot)			1863			950
Flt Permitted			1.00			1.00
Satd. Flow (perm)			1863			950
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	453	0	0	518
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	453	0	0	518
Heavy Vehicles (%)	2%	2%	2%	2%	2%	100%
Turn Type			NA			NA
Protected Phases			Free			4
Permitted Phases						
Actuated Green, G (s)			120.0			41.0
Effective Green, g (s)			120.0			41.0
Actuated g/C Ratio			1.00			0.34
Clearance Time (s)						13.5
Lane Grp Cap (vph)			1863			324
v/s Ratio Prot			0.24			c0.55
v/s Ratio Perm						
v/c Ratio			0.24			1.60
Uniform Delay, d1			0.0			39.5
Progression Factor			1.00			1.00
Incremental Delay, d2			0.3			283.5
Delay (s)			0.3			323.0
Level of Service			A			F
Approach Delay (s)	0.0		0.3			323.0
Approach LOS	A		A			F

Intersection Summary			
HCM 2000 Control Delay	172.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	36.0
Intersection Capacity Utilization	36.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø2	Ø3	Ø5	Ø6	Ø7
Lane Configurations			↑			↑					
Traffic Volume (vph)	0	0	417	0	0	477					
Future Volume (vph)	0	0	417	0	0	477					
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900					
Lane Width (ft)	12	12	12	12	12	12					
Grade (%)	0%		0%			0%					
Storage Length (ft)	0	0		0	0						
Storage Lanes	0	0		0	0						
Taper Length (ft)	25				25						
Right Turn on Red		Yes		Yes							
Link Speed (mph)	30		30			30					
Link Distance (ft)	281		228			8666					
Travel Time (s)	6.4		5.2			197.0					
Confl. Peds. (#/hr)											
Confl. Bikes (#/hr)											
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92					
Growth Factor	100%	100%	100%	100%	100%	100%					
Heavy Vehicles (%)	2%	2%	2%	2%	2%	100%					
Bus Blockages (#/hr)	0	0	0	0	0	0					
Parking (#/hr)											
Mid-Block Traffic (%)	0%		0%			0%					
Shared Lane Traffic (%)											
Lane Group Flow (vph)	0	0	453	0	0	518					
Turn Type			NA			NA					
Protected Phases			Free			4	2	3	5	6	7
Permitted Phases											
Detector Phase						4					
Switch Phase											
Minimum Initial (s)						5.0	5.0	5.0	10.0	10.0	10.0
Minimum Split (s)						31.5	22.5	18.5	14.0	15.0	15.0
Total Split (s)						54.5	47.0	18.5	28.0	19.0	73.0
Total Split (%)						45.4%	39%	15%	23%	16%	61%
Maximum Green (s)						41.0	42.5	5.0	24.0	14.0	68.0
Yellow Time (s)						3.5	3.5	3.5	3.0	4.0	4.0
All-Red Time (s)						10.0	1.0	10.0	1.0	1.0	1.0
Lost Time Adjust (s)						0.0					
Total Lost Time (s)						13.5					
Lead/Lag						Lag		Lead	Lead	Lag	
Lead-Lag Optimize?						Yes		Yes	Yes	Yes	
Vehicle Extension (s)						3.0	3.0	3.0	2.6	3.0	3.0
Minimum Gap (s)						3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)						0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)						0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode						Max	Max	Max	Max	Max	Max
Walk Time (s)						7.0	7.0				
Flash Dont Walk (s)						11.0	11.0				
Pedestrian Calls (#/hr)						0	0				
v/c Ratio			0.24			1.60					
Control Delay			0.3			313.0					



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø2	Ø3	Ø5	Ø6	Ø7
Queue Delay			0.0			0.0					
Total Delay			0.3			313.0					
Queue Length 50th (ft)			0			~573					
Queue Length 95th (ft)			0			#788					
Internal Link Dist (ft)	201		148			8586					
Turn Bay Length (ft)											
Base Capacity (vph)			1863			324					
Starvation Cap Reductn			0			0					
Spillback Cap Reductn			0			0					
Storage Cap Reductn			0			0					
Reduced v/c Ratio			0.24			1.60					

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 7:SBTL, Start of Green

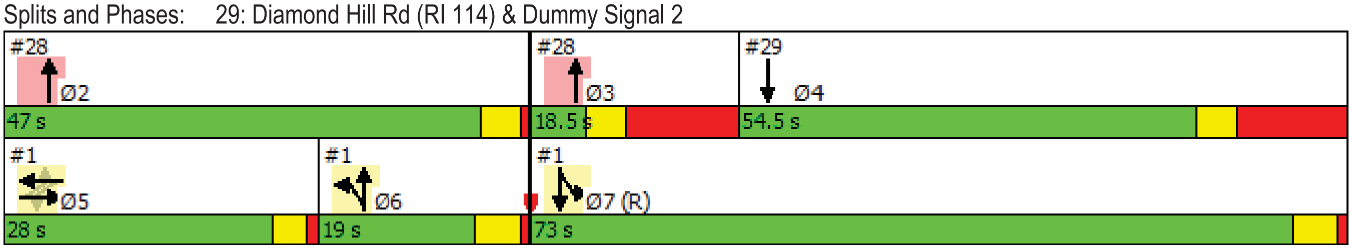
Natural Cycle: 150

Control Type: Pretimed

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 29: Diamond Hill Rd (RI 114) & Dummy Signal 2



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	0	417	0	0	477
Future Volume (vph)	0	0	417	0	0	477
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.5			4.0
Lane Util. Factor			1.00			1.00
Frt			1.00			1.00
Flt Protected			1.00			1.00
Satd. Flow (prot)			1863			1863
Flt Permitted			1.00			1.00
Satd. Flow (perm)			1863			1863
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	0	453	0	0	518
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	453	0	0	518
Turn Type			NA			NA
Protected Phases			2 3			Free
Permitted Phases						
Actuated Green, G (s)			52.0			120.0
Effective Green, g (s)			52.0			120.0
Actuated g/C Ratio			0.43			1.00
Clearance Time (s)						
Lane Grp Cap (vph)			807			1863
v/s Ratio Prot			c0.24			0.28
v/s Ratio Perm						
v/c Ratio			0.56			0.28
Uniform Delay, d1			25.5			0.0
Progression Factor			0.06			1.00
Incremental Delay, d2			0.3			0.0
Delay (s)			1.7			0.0
Level of Service			A			A
Approach Delay (s)	0.0		1.7			0.0
Approach LOS	A		A			A

Intersection Summary			
HCM 2000 Control Delay	0.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	36.0
Intersection Capacity Utilization	36.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

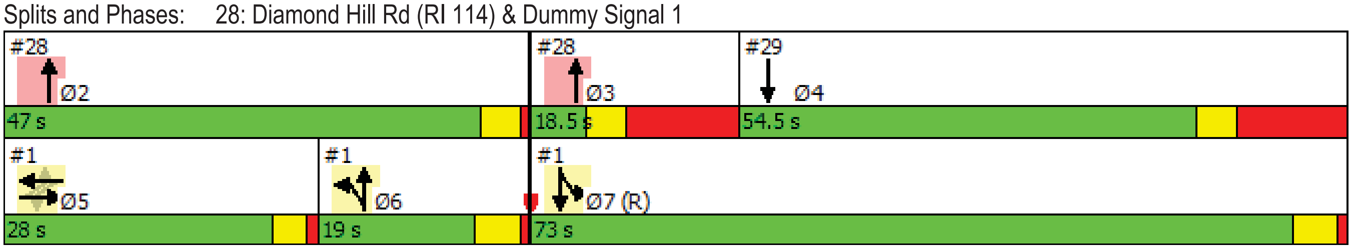
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7
Lane Configurations												
Traffic Volume (vph)	0	0	417	0	0	477						
Future Volume (vph)	0	0	417	0	0	477						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900						
Lane Width (ft)	12	12	12	12	12	12						
Grade (%)	0%		0%			0%						
Storage Length (ft)	0	0		0	0							
Storage Lanes	0	0		0	0							
Taper Length (ft)	25				25							
Right Turn on Red		Yes		Yes								
Link Speed (mph)	30		30			30						
Link Distance (ft)	268		154			228						
Travel Time (s)	6.1		3.5			5.2						
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92						
Growth Factor	100%	100%	100%	100%	100%	100%						
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%						
Bus Blockages (#/hr)	0	0	0	0	0	0						
Parking (#/hr)												
Mid-Block Traffic (%)	0%		0%			0%						
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	453	0	0	518						
Turn Type			NA			NA						
Protected Phases			2 3			Free	2	3	4	5	6	7
Permitted Phases												
Detector Phase			2 3									
Switch Phase												
Minimum Initial (s)							5.0	5.0	5.0	10.0	10.0	10.0
Minimum Split (s)							22.5	18.5	31.5	14.0	15.0	15.0
Total Split (s)							47.0	18.5	54.5	28.0	19.0	73.0
Total Split (%)							39%	15%	45%	23%	16%	61%
Maximum Green (s)							42.5	5.0	41.0	24.0	14.0	68.0
Yellow Time (s)							3.5	3.5	3.5	3.0	4.0	4.0
All-Red Time (s)							1.0	10.0	10.0	1.0	1.0	1.0
Lost Time Adjust (s)												
Total Lost Time (s)												
Lead/Lag								Lead	Lag	Lead	Lag	
Lead-Lag Optimize?								Yes	Yes	Yes	Yes	
Vehicle Extension (s)							3.0	3.0	3.0	2.6	3.0	3.0
Minimum Gap (s)							3.0	3.0	3.0	3.0	3.0	3.0
Time Before Reduce (s)							0.0	0.0	0.0	0.0	0.0	0.0
Time To Reduce (s)							0.0	0.0	0.0	0.0	0.0	0.0
Recall Mode							Max	Max	Max	Max	Max	Max
Walk Time (s)							7.0		7.0			
Flash Dont Walk (s)							11.0		11.0			
Pedestrian Calls (#/hr)							0		0			
v/c Ratio			0.48			0.28						
Control Delay			1.3			0.4						

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT	Ø2	Ø3	Ø4	Ø5	Ø6	Ø7
Queue Delay			56.7			0.0						
Total Delay			58.0			0.4						
Queue Length 50th (ft)			9			0						
Queue Length 95th (ft)			m6			m0						
Internal Link Dist (ft)	188		74			148						
Turn Bay Length (ft)												
Base Capacity (vph)			947			1863						
Starvation Cap Reductn			565			0						
Spillback Cap Reductn			0			222						
Storage Cap Reductn			0			0						
Reduced v/c Ratio			1.19			0.32						

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 7:SBTL, Start of Green
Natural Cycle: 150
Control Type: Pretimed
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 28: Diamond Hill Rd (RI 114) & Dummy Signal 1



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	83	119	42	17	117	129	49	205	30	176	225	76
Future Volume (vph)	83	119	42	17	117	129	49	205	30	176	225	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	13	13	13	13	13	12	12	12	12	12	12
Total Lost time (s)		4.0			4.0			5.0			5.0	
Lane Util. Factor		1.00			1.00			1.00			1.00	
Frt		0.97			0.94			0.98			0.98	
Flt Protected		0.98			1.00			0.99			0.98	
Satd. Flow (prot)		1792			1800			1813			1783	
Flt Permitted		0.40			0.91			0.99			0.98	
Satd. Flow (perm)		723			1643			1813			1783	
Peak-hour factor, PHF	0.86	0.85	0.75	0.53	0.75	0.85	0.68	0.93	0.75	0.75	0.97	0.79
Adj. Flow (vph)	97	140	56	32	156	152	72	220	40	235	232	96
RTOR Reduction (vph)	0	7	0	0	24	0	0	4	0	0	6	0
Lane Group Flow (vph)	0	286	0	0	316	0	0	328	0	0	557	0
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		5			5		6	6		7	7	
Permitted Phases	5			5								
Actuated Green, G (s)		24.0			24.0			14.0			68.0	
Effective Green, g (s)		24.0			24.0			14.0			68.0	
Actuated g/C Ratio		0.20			0.20			0.12			0.57	
Clearance Time (s)		4.0			4.0			5.0			5.0	
Lane Grp Cap (vph)		144			328			211			1010	
v/s Ratio Prot								c0.18			c0.31	
v/s Ratio Perm		c0.40			0.19							
v/c Ratio		1.98			0.96			1.55			0.55	
Uniform Delay, d1		48.0			47.6			53.0			16.4	
Progression Factor		1.00			1.00			1.00			0.17	
Incremental Delay, d2		467.0			41.2			270.7			2.1	
Delay (s)		515.0			88.8			323.7			4.9	
Level of Service		F			F			F			A	
Approach Delay (s)		515.0			88.8			323.7			4.9	
Approach LOS		F			F			F			A	

Intersection Summary			
HCM 2000 Control Delay	190.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	36.0
Intersection Capacity Utilization	84.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	83	119	42	17	117	129	49	205	30	176	225	76
Future Volume (vph)	83	119	42	17	117	129	49	205	30	176	225	76
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	13	13	13	13	13	12	12	12	12	12	12
Grade (%)		0%			0%			0%			0%	
Storage Length (ft)	0		0	0		0	0		0	0		0
Storage Lanes	0		0	0		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		40			40			30			30	
Link Distance (ft)		1854			4162			1592			154	
Travel Time (s)		31.6			70.9			36.2			3.5	
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.86	0.85	0.75	0.53	0.75	0.85	0.68	0.93	0.75	0.75	0.97	0.79
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	293	0	0	340	0	0	332	0	0	563	0
Turn Type	Perm	NA		Perm	NA		Split	NA		Split	NA	
Protected Phases		5			5		6	6		7	7	
Permitted Phases	5			5								
Detector Phase	5	5		5	5		6	6		7	7	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	14.0	14.0		14.0	14.0		15.0	15.0		15.0	15.0	
Total Split (s)	28.0	28.0		28.0	28.0		19.0	19.0		73.0	73.0	
Total Split (%)	23.3%	23.3%		23.3%	23.3%		15.8%	15.8%		60.8%	60.8%	
Maximum Green (s)	24.0	24.0		24.0	24.0		14.0	14.0		68.0	68.0	
Yellow Time (s)	3.0	3.0		3.0	3.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	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	
Total Lost Time (s)		4.0			4.0			5.0			5.0	
Lead/Lag	Lead	Lead		Lead	Lead		Lag	Lag				
Lead-Lag Optimize?	Yes	Yes		Yes	Yes		Yes	Yes				
Vehicle Extension (s)	2.6	2.6		2.6	2.6		3.0	3.0		3.0	3.0	
Minimum Gap (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Time Before Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Time To Reduce (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Recall Mode	Max	Max		Max	Max		Max	Max		Max	Max	
Walk Time (s)												
Flash Dont Walk (s)												
Pedestrian Calls (#/hr)												
v/c Ratio		1.94			0.97			1.54			0.55	
Control Delay		473.4			84.0			302.1			4.9	

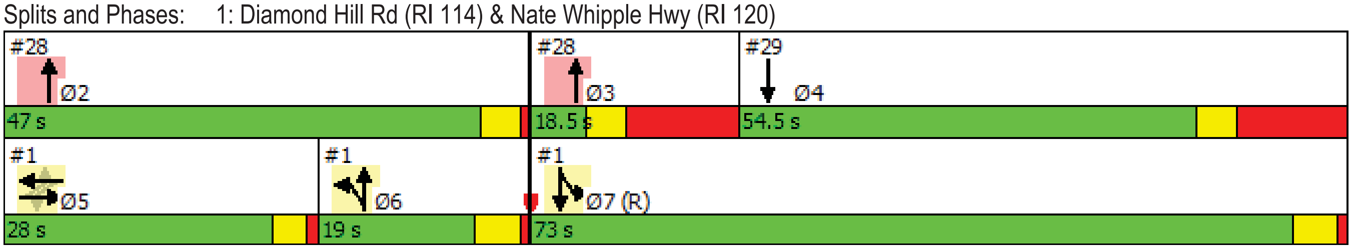
Lane Group	Ø2	Ø3	Ø4
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Lane Width (ft)			
Grade (%)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Right Turn on Red			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Confl. Bikes (#/hr)			
Peak Hour Factor			
Growth Factor			
Heavy Vehicles (%)			
Bus Blockages (#/hr)			
Parking (#/hr)			
Mid-Block Traffic (%)			
Shared Lane Traffic (%)			
Lane Group Flow (vph)			
Turn Type			
Protected Phases	2	3	4
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	5.0	5.0	5.0
Minimum Split (s)	22.5	18.5	31.5
Total Split (s)	47.0	18.5	54.5
Total Split (%)	39%	15%	45%
Maximum Green (s)	42.5	5.0	41.0
Yellow Time (s)	3.5	3.5	3.5
All-Red Time (s)	1.0	10.0	10.0
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag		Lead	Lag
Lead-Lag Optimize?		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0
Minimum Gap (s)	3.0	3.0	3.0
Time Before Reduce (s)	0.0	0.0	0.0
Time To Reduce (s)	0.0	0.0	0.0
Recall Mode	Max	Max	Max
Walk Time (s)	7.0		7.0
Flash Dont Walk (s)	11.0		11.0
Pedestrian Calls (#/hr)	0		0
v/c Ratio			
Control Delay			

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		0.0			0.0			0.0			4.7	
Total Delay		473.4			84.0			302.1			9.6	
Queue Length 50th (ft)		~348			243			~361			12	
Queue Length 95th (ft)		#490			#309			#547			62	
Internal Link Dist (ft)		1774			4082			1512			74	
Turn Bay Length (ft)												
Base Capacity (vph)		151			352			215			1017	
Starvation Cap Reductn		0			0			0			374	
Spillback Cap Reductn		0			0			0			0	
Storage Cap Reductn		0			0			0			0	
Reduced v/c Ratio		1.94			0.97			1.54			0.88	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 7:SBTL, Start of Green
Natural Cycle: 150
Control Type: Pretimed
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 1: Diamond Hill Rd (RI 114) & Nate Whipple Hwy (RI 120)



Lane Group	Ø2	Ø3	Ø4
Queue Delay			
Total Delay			
Queue Length 50th (ft)			
Queue Length 95th (ft)			
Internal Link Dist (ft)			
Turn Bay Length (ft)			
Base Capacity (vph)			
Starvation Cap Reductn			
Spillback Cap Reductn			
Storage Cap Reductn			
Reduced v/c Ratio			

Intersection Summary

Appendix D

Small-Site Stormwater Pollution Prevention Plan

Bridge Group 17C – Newell and Sneech

Town of Cumberland, RI
PTSID No. 2602D

RIDOT Bridge No. 020401 over East Branch Sneech Brook and RIDOT Bridge No. 124501 over Long Brook

PREPARED FOR

Rhode Island Department of Transportation
Two Capitol Hill
Providence, RI 02903

PREPARED BY

1 Cedar Street, Suite 400
Providence, RI 02903

May 2024

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SMALL-SITE
Stormwater Pollution Prevention Plan

For:

Bridge Group 17C – Newell and Sneech

Town of Cumberland

Rhode Island

Owner:	**RI DEPARTMENT OF TRANSPORTATION** Alisa Diaz Richardson 2 Capitol Hill Providence, RI 02903 401-222-2468
Operator:	Company Name Name Address City, State, Zip Code Telephone Number
Estimated Project Dates:	Start Date: 8/5/2024
	Completion Date: 5/26/2026
SWPPP Prepared By:	VHB, Inc. Shawn Giatas, P.E. 1 Cedar Street, Suite 400 Providence, RI, 02903 401-272-8100
SWPPP Preparation Date:	4/11/2024

OWNER CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under the direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

5/24/24

Owner Signature: Date

Owner Name: Alisa Diaz Richardson, PE

Owner Title: Administrator, Environmental Division

Company Name: Rhode Island Department of Transportation

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INTRODUCTION

This Small-Site Storm Water Pollution Prevention Plan (SWPPP) has been prepared for the State of Rhode Island Department of Transportation (RIDOT) for a construction project that has less than one (1) acre of soil disturbance. This document provides general guidance for the installation and maintenance of erosion and sediment controls on small projects.

The purpose of erosion and sedimentation best management practices (BMPs) is to prevent pollutants from leaving the construction site and entering waterways or environmentally sensitive areas during and after construction. This SWPPP has been prepared prior to the initiation of construction activities to address anticipated worksite conditions. The best management practices (BMPs) depicted on the site plan and described in this narrative should be considered the minimum measures required to control erosion, sedimentation, and stormwater runoff at the site. Since construction is a dynamic process with changing site conditions, it is the operator's responsibility to manage the site during the construction phases to prevent pollutants from leaving the site. This may require the operator to revise and amend the SWPPP during construction to address varying site and/or weather conditions, such as by adding or realigning erosion or sediment controls.

It is the responsibility of the RIDOT Construction Manager to maintain the SWPPP, including all attachments, amendments, and inspection records, at the project field office and to make all records available for inspection by RIDEM during construction.

The RIDOT Construction Manager and designated Certified SWPPP Inspector are required to review the SWPPP and sign the Party Certification pages (Section 8). The prime contractor and all subcontractors involved in earthwork or exterior construction activities are also required to review the SWPPP and sign the certification pages before construction begins.

Any questions regarding the SWPPP, BMPs, inspection requirements, or any other facet of this document may be addressed to the RIDOT Environmental Division at 401-734-4892.

Please note: Even if practices are correctly installed on a site according to the approved plan, the site is only in compliance when erosion and sedimentation are effectively controlled throughout the entire site.

SECTION 1: SITE DESCRIPTION

1.1 Project/Site Information

- Replacement of Newell Bridge No. 204 including temporary and permanent relocation of utilities, replacement of drainage structures, guardrail installation, sidewalk and curb replacement and pavement markings.
- New pavement connection and milling and overlaying of Sneech Pond Road
- Rehabilitation of Sneech Pond Road Culvert No. 124501 including guardrail installation

1.2 Nature and Sequence of Construction Activity

Estimated Project Start Date:	8/5/2024
Estimated Project Completion Date:	5/26/2026
Estimated Number of Months:	22

1.3 Construction Site Estimates

The following are estimates of the construction site:

Total Project Area	3.03 acres
Construction Site Area to be disturbed	0.14 acres
Percentage impervious area before construction	55 %
Percentage impervious area after construction	50 %

1.4 Potential Discharges

Environmentally Sensitive Areas	Construction Site Discharges to: (Yes / No)	List discharge points & indicate how determination was made
Waters of the State	Yes	East Sneech Brook, determined from the RIDEM Environmental Resource Map
Wetlands (Coastal or Upland)	Yes	East Sneech Brook, determined from the RIDEM Environmental Resource Map
Separate Storm Sewer System	No	
303(d) Impaired Waters	Yes	East Sneech Brook, determined from the RIDEM Environmental Resource Map
TMDL Waters	Yes	Enterococcus impairments within the East Sneech Brook waterbody; WBID RI0001006R-03, determined from the RIDEM Environmental Resource Map and the mywaterway.epa.gov waterbody report for East Sneech Brook.
Special Resource Protection Waters (SRPWs)	Yes	East Sneech Brook, determined from the RIDEM Environmental Resource Map
Cold Water Fisheries	No	
Natural Heritage Areas	No	
Historic/Cultural Areas	Yes	East Sneech Brook, determined from the RIDEM Environmental Resource Map
Permanent Stormwater Structures (swales, outfalls, treatment units, etc.)	No	

1.5 Allowable Non-Storm Water Discharges

RIPDES Construction General Permit – IV.E.1.g

Are there allowable non-stormwater discharges on or near the project area?

☐ Yes ☒ No

List of allowable non-stormwater discharges:

- Not applicable.

Are there any known or contaminated discharges, including dewatering operations, on or near the project area?

☐ Yes ☒ No

If yes, list the discharges and the RIPDES individual permit number(s) or RIPDES Remediation General Permit Authorization number(s) associated with these discharges.

- RIPDES individual permit number: Not applicable.
- RIPDES Remediation General Permit Authorization number: Not applicable.

1.6 Potential Sources of Pollution

Anticipated on this Project (Y/N)	Operation/ Location	Stormwater Pollutants
Y	Clearing, grading, excavating, and unstabilized areas	Sediment; Trash/Debris
Y	Construction Entrance	Sediment
N	Soil Stockpiles	Sediment
Y	Paving operations	Sediment; Trash/Debris
Y	Concrete washout and waste	Heavy metals; pH; Trash/Debris
Y	Structure construction/ painting/ cleaning	Nutrients; pH; Trash/Debris; Toxic chemicals
Y	Demolition and debris disposal	Sediment; Trash/Debris
N	Dewatering operations	Sediment; Nutrients
N	Drilling and blasting operations	Sediment; pH; Trash/Debris
Y	Material delivery and storage	Sediment; Nutrients; Heavy metals; pH; Pesticides/Herbicides; Oil/Grease; Trash/Debris; Toxic chemicals
Y	Material use during building process	Nutrients; heavy metals; pH; pesticides/herbicides; oil/grease; trash/debris; toxic chemicals
Y	Solid waste/ trash/ debris	trash/debris; toxic chemicals
N	Hazardous waste	heavy metals; pH; pesticides/herbicides; oil/grease; toxic chemicals
N	Contaminated spills	Nutrients; heavy metals; pH; pesticides/herbicides; oil/grease; toxic chemicals
Y	Sanitary/septic waste (porta potty?)	Nutrients; pH; Bacteria/Viruses; toxic chemicals
N	Vehicle/equipment fueling and maintenance	Oil/Grease; Toxic chemicals; fuel
Y	Vehicle/equipment use and storage	Oil/Grease; Toxic chemicals
N	Landscaping operations	Sediment; Nutrients; Trash/Debris
N	Off-site LUHPPL run-on	Industrial toxins; oil/grease; heavy metals; fuel; salt; hazardous materials
N	Other:	

1.7 Site Plans

TITLE & DATE OF PLAN SET(S): Bridge Group 17C – Newell and Sneech

- ☒ Total area of development
- ☒ Total area of soil disturbance
- ☒ Areas that will not be disturbed
- ☒ The location of all erosion and sediment controls
- ☒ Locations of storm drain inlets and outfalls
- ☐The location and name of the receiving waters or separate storm sewer system and the ultimate receiving waters
- ☐Location and name of all waters of the State, including wetlands
- ☒Location of environmentally sensitive features/areas to be protected (Section 1.4)
- ☐ Constraint locations of material storage areas, equipment storage areas, concrete washouts, dumpsters, stockpiles, fueling locations etc.
  (i.e. locations where these activities will not occur)

SECTION 2: EROSION AND SEDIMENTATION CONTROLS

What is a BMP?

Erosion and Sedimentation controls are Best Management Practice (BMP) devices, practices, or methods for preventing storm water pollutants from leaving the construction site and reaching environmentally sensitive areas. The most common BMPs are compost filter socks, straw bales, and silt fence, but a BMP can also be a policy or procedure like construction sequencing and street sweeping. The objectives of erosion and sediment controls are to minimize the potential for erosion and sedimentation during construction activities.

If BMPs are not depicted on the approved plan set, but erosion or sedimentation is occurring, appropriate BMPs must be installed as directed by the RIDOT Construction Manager.

☒ 2.1 *Minimize Disturbed Area and Protect Natural Features*

As far as is practicable, existing vegetation will be protected and left in place, in accordance with the clearing limits shown on the approved Plans. Prior to any land disturbance activities commencing on the site, the Contractor will physically mark limits of disturbance (LOD) on the site and any areas to be protected within the site, so that workers can see the areas to be protected. Topsoil will be preserved where possible, in accordance with stock pile management specifications

☒ 2.2 Phase Construction Activity

At a minimum, construction sequencing and timing of construction activities will include:

1. Before any earthwork begins, erosion and sediment controls will be installed as depicted on the Approved Plans, and in accordance with all applicable sections of the RIDOT Standard Specifications. Upon acceptable completion of site preparation and installation of erosion and sediment controls, site construction activities may commence.

2. While earthwork is being done, routine inspection and maintenance and/or modification of erosion and sediment controls will be performed.

3. Final stabilization of any disturbed areas after earthwork has been completed.

☒ 2.3 Control Stormwater Flowing Onto & Through Project

Structural BMPs will be used to divert flows from exposed soils, retain or detain flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site.

BMPs will be installed as depicted on the approved plan set and in accordance with applicable RIDOT Standard Specifications.

Control measures that may be used, upon approval, include straw bales/silt fencing, compost filter socks, fiber rolls, gravel bag berms, slope drains, check dams, and riprap.

☒ 2.4 Stabilizing Soils

Phased Clearing & Grubbing:

Only areas that can be reasonably expected to have active construction work being performed within 21-days of disturbance will be cleared/grubbed at any one time. It is NOT acceptable to clear and grub the entire construction site if disturbed portions will not be active within the 21-day time-frame.

Clearing/Grubbing will not take place during a rain event if erosion is likely to occur; nor will it occur if a rain event is forecasted and appropriate erosion controls cannot be installed prior to the storm and in accordance with section 201, 206 through 211 of the RIDOT standard specifications.

No undisturbed areas will be cleared of existing vegetation after October 15th of any calendar year or during any period of full or limited winter shutdown. All disturbed soils exposed prior to October 15 of any calendar year will be seeded or protected by that date. Any such areas that do not have adequate vegetative stabilization, as determined by the Construction Manager or environmental inspector, by November 15 of any calendar year, must be stabilized by erosion control matting or mulch, in accordance with specifications contained within the RI Soil Erosion and Sediment Control Handbook (as amended). If work continues within any of these areas during the period from October 15 through April 15, care must be taken to ensure that only the area required for that Day's work is exposed, and all erodible soil must be restabilized within 5 working days.

As per RIDOT Standard Specification 201.03.1 – Clearing and Grubbing:
After clearing, and by the end of each day's grubbing operation, the Contractor will install erosion control measures that are indicated on the Plans or as directed by the Construction Manager. Such erosion control measures will be installed in strict accordance with the requirements of **SECTIONS 206, 207,** and **208** of these Specifications, **PERIMETER EROSION CONTROLS, CHECK DAMS**, and **TEMPORARY DEWATERING BASINS**, respectively.

Initiating Stabilization Practices

Upon completion and acceptance of site preparation and initial installation of erosion and sediment controls the operator will initiate appropriate stabilization practices during all phases of construction on all disturbed areas as soon as possible but not more than fourteen (14) days after the construction activity in that area has temporarily or permanently ceased, unless the activity is to resume within twenty-one (21) days.

Any disturbed areas that will not have active construction activity occurring within twenty-one (21) days must be stabilized using the BMPs depicted on the approved plan set and in accordance with RIDOT Standard Specifications Section L.02 – Seeding, Section L.05 - Seed Stabilizers and Section M.18 – Landscape Materials (M.18.08 – Mulch and M.18.09 – Seed Stabilizer Materials).

Maintaining Stabilization

Controls and methods that may be used to maintain soil stabilization include the placement of geotextiles, erosion control blankets/mats, and temporary seeding. If the stabilization BMPs fail and erosion occurs, then alternative control measures &/or methods may need to be substituted.

☒ 2.5 Protect Slopes

Structural BMPs will be used to temporarily conduct concentrated stormwater runoff safely down the face of a cut or fill slope without causing erosion on or below the slope.

BMPs will be installed as depicted on the approved plan set and in accordance with applicable RIDOT Standard Specifications.

Control measures that may be used, upon approval, include temporary slope drains, compost filter socks, fiber rolls, gravel bag berms, erosion control mats/blankets, and temporary vegetative cover.

☒ 2.6 Protect Storm Drain Inlets

Structural BMPs will be used to protect ALL stormwater inlets &/or catch basins that may receive sediment-laden stormwater flow.

BMPs will be installed as depicted on the approved plan set and in accordance with applicable RIDOT Standard Specifications.

Control measures that may be used, upon approval, include catch basin inserts, compost filter socks, fiber rolls, and gravel bag berms.

☐ 2.7 Protect Storm Drain Outfalls.

Structural BMPs will be used to protect ALL stormwater outfalls that may discharge sediment-laden stormwater flow.

BMPs will be installed as depicted on the approved plan set and in accordance with applicable RIDOT Standard Specifications.

Control measures that may be used, upon approval, include compost filter socks, fiber rolls, gravel bag berms, and rip-rap.

Storm drain inlets will be protected to catch sediment-laden stormwater flow. The stormwater outfalls are outside of the project limits and outside of the existing ROW.

☒ 2.8 Establish Perimeter Controls and Sediment Barriers.

Structural BMPs will be used to establish perimeter barriers that will stop sediment-laden stormwater flow from leaving the construction site.

BMPs will be installed as depicted on the approved plan set and in accordance with applicable RIDOT Standard Specifications.

Control measures that may be used, upon approval, include baled straw &/or silt fence, compost filter socks, fiber rolls, and gravel bag berms.

☒ *2.9 Retain Sediment On-Site and Control Dewatering Practices*

Sediment traps, basins, and barriers are used to retain sediment on the site to protect streams, lakes, drainage systems, and adjacent property. These devices are used at the outlets of channels, diversions, and other runoff conveyance measures to allow sediment-filled water to pool and sediment to settle. These measures are often used as the last line of defense to stop sediment from leaving the site.

The dewatering of non-contaminated non-stormwater (i.e. groundwater) or accumulated precipitation discharge of sediment-laden water into storm drains, streams, lakes or wetlands prior to sediment removal is prohibited.

The dewatering of contaminated non-stormwater cannot be discharged without prior notice and approval from either the Rhode Island Department of Environmental Management (RIDEM) or the Coastal

Resources Management Council (CRMC). Should dewatering of contaminated water be occurring on this construction project, appropriate permits will have been obtained, and will be included as part of the Contract Documents.

- Compost filter socks and sedimentation inlet protections will be used project wide. If necessary, standard dewatering practices as specified in the RIDOT Blue Book will be performed.

☒ *2.10 Monitoring Weather Conditions*

Care will be taken to avoid having unstabilized areas exposed during precipitation events. Weather forecasts will be routinely checked, and in the case of an expected precipitation event of over 0.25-inches over a 24-hour period, all BMPs will be inspected, and maintained as necessary, prior to the weather event.

In the case of an extreme weather forecast (greater than one-inch of rain over a 24-hour period), additional erosion/sediment controls will be installed where appropriate.

- CUMBERLAND, RI US; GHCND:US1RIPR0021

SECTION 3: GOOD HOUSEKEEPING BMPS

The purpose of good housekeeping is to prevent daily construction operations and activities from causing pollution.

☒ 3.1 *Off-site Tracking of Sediments*

Any construction site access point must employ the BMPs depicted on the approved plan set and in accordance with RIDOT Standard Specifications Section 211 – Construction Accesses, or any method approved of by the RIDOT Construction Manager and the RIDOT Environmental Division. Construction accesses will be used in conjunction with the stabilization of construction roads to reduce the amount of mud picked up by construction vehicles. All RI STD 9.9.0 Construction Access roads will be constructed prior to any roadway accepting construction traffic

If a Construction Access BMP is not designated on the plans, it is still the responsibility of the Operator to ensure that no sediment is tracked off the construction site by any vehicles leaving the site. Additional control measures that may be used, upon approval, include a vehicle washing station and/or daily street sweeping.

The Operator will remain responsible for the clean-up of any mud or dirt that is tracked onto streets or paved areas, even with the installation of gravel construction entrances. Inspect access for excessive sediment build up. Remove sediment and rebuild the exit as necessary to retain effectiveness and prevent off-site tracking. Additional street cleaning may be required if unable to retain sediment on site.

☒ 3.2 *Waste Disposal*

Building materials and other construction site wastes will be properly managed and disposed of to prevent the discharge of solid materials from wind and precipitation. All types of waste generated at the site will be disposed of in a manner consistent with State Law and/or regulations.

- The waste collection area will not be within any of the constraint areas located on the “Constraint Map” (Section 1.7) and will be approved by the RIDOT Construction Manager.
- All waste containers will be covered to avoid contact with wind and precipitation.
- Waste collection will be scheduled frequently enough to prevent containers from overfilling.
- All construction site wastes will be collected, removed, and disposed of in accordance with applicable regulatory requirements and only at authorized disposal sites.
- Equipment and containers will be checked for leaks, corrosion, support or foundation failure, or other signs of deterioration. Those that are found to be defective will be immediately repaired or replaced.

☒ 3.3 *Spill Prevention and Control Plan*

Spills and leaks will be avoided through frequent inspection of equipment and material storage areas. Heavy equipment and other vehicles will be routinely inspected for leaks and repaired as necessary. Material storage areas will be routinely inspected for leaky containers, open containers, or improper storage techniques that may lead to spills or leaks. Appropriate cleanup procedures and supplies will be available on-site.

Spills will be cleaned up immediately and following proper response procedures and in accordance with any applicable regulatory requirements. At no time will spills be cleaned and flushed down storm drains or in to any environmentally sensitive area (i.e. stream, pond, wetland).

Equipment/vehicle fueling and repair/maintenance operations or hazardous material storage will not take place within any of the constraint areas located on the "Constraint Map" (Section 1.7) and will be approved by the RIDOT Construction Manager.

☐ 3.4 Control of Allowable Non-Storm Water Discharges

Non-storm water discharges will be controlled to reduce the likelihood of contamination. Allowable discharges will be kept separate from stormwater flow with BMPs.

For contaminated non-stormwater discharge(s), the requirements and regulations of the associated RIPDES individual permit or RIPDES Remediation General Permit will be adhered to at all times.

Not part of this project.

☐ 3.5 Establish Proper Building Material Staging Areas

Stock piles will not be located within any of the constraint areas located on the "Constraint Map" (Section 1.7) and will be approved by the RIDOT Construction Manager. They will have side slopes no greater than 30% and stockpiles of erodible material will be seeded and ringed with RI STD 9.1.0 to stabilize (or RIDOT approved equivalent: berms, dikes, fiber rolls, compost socks, sandbag, gravel bags).

If soil stockpiles are not stabilized with vegetation, then they will be securely covered at the end of each workday.

All chemicals and/or hazardous waste material must be stored properly and legally in covered areas, with containment systems constructed in or around the storage areas. Areas must be designated for materials delivery and storage. Designated areas will not be located within any of the constraint areas located on the "Constraint Map" (Section 1.12) and will be approved by the RIDOT Construction Manager.

Not part of this project.

☐ 3.6 Designate Washout Areas

Concrete mixer trucks and chutes will be washed in a designated area or concrete wastes will be properly disposed of off-site. Washout areas for concrete, paint or any other material will not be within any of the constraint areas located on the "Constraint Map" (Section 1.12) and will be approved by the RIDOT Construction Manager.

Temporary concrete washout areas must be constructed and maintained to contain all water and concrete waste generated by washout operations. A sign should be placed at the washout site to inform concrete equipment operators of the facility location. Facilities must be cleaned or replaced when they reach 75% capacity.

At no time will any material (concrete, paint, chemicals) be washed into storm drains, open ditches, streets, streams, wetlands, or any environmentally sensitive area. The site operator must ensure that construction waste is properly and legally disposed of, to avoid exposure to precipitation, at the end of each working day. Designated areas will not be located within any of the constraint areas located on the "Constraint Map" (Section 1.12) and will be approved by the RIDOT Construction Manager.

Not part of this project.

☐ *3.7 Establish proper equipment/vehicle fueling & maintenance practices*

Vehicle fueling, maintenance and/or washing will occur off-site, or in designated areas. Designated areas will not be located within any of the constraint areas located on the "Constraint Map" (Section 1.7) and will be approved by the RIDOT Construction Manager.

Areas will be clearly designated, and berms, sandbags, or other barriers will be used around the perimeter of the maintenance area to prevent storm water contamination.

Construction vehicles will be inspected frequently for leaks. Repairs will take place immediately. Disposal of all used oil, antifreeze, solvents and other automotive-related chemicals will be according to applicable regulations; at no time will any material be washed down the storm drain or in to any environmentally sensitive area.

Not part of this project.

☒ *3.8 Dust Control*

Dust control procedures and practices will be used to suppress dust on a construction site during the construction process, as applicable. Precipitation, temperature, humidity, wind velocity and direction will determine amount and frequency of applications. However, the best method of controlling dust is to prevent dust production. This can best be accomplished by limiting the amount of bare soil exposed at one time. RIDOT Standard Specifications Section 907 – Dust Control – will be followed.

Dust Control methods may include watering, surface roughening, wind barriers, walls, and covers.

☒ *3.9 Sweeping*

Sweeping of streets, roads, highways, and parking lots that have accumulated significant amounts of pollutants (construction site sediment, trash, debris) will be done as necessary, or as directed by the RIDOT Construction Manager. When construction exits are not keeping construction site sediment from the roadway, sweeping will be done daily. Disposal of collected sweeping material will follow RIDOT Standard Specifications Section 931 – Cleaning and Sweeping Pavement.

SECTION 4: POST-CONSTRUCTION BMPs

Post-Construction Best Management Practices are BMPs that are installed during the Construction Phase of a project to manage storm water flow after the construction is completed.

Measures must be used during the construction project to protect permanent or long term BMPs as they are installed so that they will function properly when they are brought online at the end of the construction phase.

Such long-term BMPs may include: infiltration basins, open vegetated swales and natural depressions, vegetated buffer strips, and detention/ retention structures. Controls may also be needed to prevent or minimize erosion at outfall locations or along the length of vegetated channels to reduce velocity flow from the structure to the receiving waters.

Control measures that may need to be implemented during the construction phase typically include measures to ensure proper installation and/or long term functioning of the long-term BMPs. Examples include: ensuring proper material staging areas and equipment routing to avoid compaction of soil in areas meant for permanent BMPs, and final cleaning of structural BMPs before construction finalization.

4.1 Post-Construction BMPs

Location	Post-Construction BMP	Protective Measures
Not applicable.		

SECTION 5: MAINTENANCE and INSPECTIONS

RIPDES Construction General Permit – Section IV.E.2.d

5.1 Maintenance

Maintenance procedures for erosion and sedimentation controls and stormwater management structures/facilities are described on the approved plan set and in Section 212 of the RHODE ISLAND DEPARTMENT OF TRANSPORTATION Standard Specifications for Road and Bridge Construction August 2023 EDITION (and Amendments).

The Contractor will maintain erosion and pollution controls to the satisfaction of the Construction Manager. Erosion and pollution controls must be able to prevent, under normal weather conditions, both the movement of soil materials and the intrusion of sediment-laden discharges into environmentally sensitive areas.

Construction will not commence or continue until all specified erosion and pollution controls are in place, properly installed and accepted by the Construction Manager.

Erosion and pollution controls will be cleaned when sediment deposits reach the heights indicated in the table provided in Section 212.03.1 of the RIDOT Standard Specifications, after a rainstorm as necessary; and/or when directed by the RIDOT Construction Manager.

Erosion control structures will remain in place until all disturbed earth has been securely stabilized and accepted by RIDOT. Before final removal, all accumulated sediment on the upstream side will be removed and legally disposed of. After removal of structures, disturbed areas will be regraded and stabilized as necessary.

BMPs will be maintained in effective operating condition by appropriate means. Upon identification of BMPs that are not operating effectively, maintenance and/or appropriate means will be performed as soon as practicable.

Timely maintenance of the control measures identified in this SWPPP will be ensured by weekly and post-storm event site inspections. These site inspections are a condition and requirement of the RIDOT Stormwater Management Program Plan.

Please Note: The contractor is required to have a full-time, on-site designated contact person responsible for working with the RIDOT Construction Manager and the SWPPP Inspector to resolve SWPPP-related issues.

5.2 Inspections

Minimum Monitoring and Reporting Requirements

The construction site must be inspected at least once every seven (7) calendar days and within twenty-four (24) hours after any storm event which generates at least 0.25-inches of precipitation per twenty-four (24) hour period and/or after a significant amount of runoff or snowmelt. An appropriate rain gauge (as may be found on www.wunderground.com or www.nws.noaa.gov (or similar sites)) must be identified and utilized for the determination of the storm events.

General Notes

- The Certified SWPPP Inspector (Inspector) will prepare a separate inspection report for each inspection.
- The Inspection Reference Number will be a combination of the
  Construction Contract Number - consecutively numbered inspections.
  ex. Inspection reference number for the **4**th inspection of a project would be:
  2011-AA-BBB-**4**
- Each report will be signed and dated by the SWPPP Inspector and forwarded to the Construction Manager within 24 hours of the inspection.
- Each report will be signed and dated by the Construction Manager and forwarded to the Contractor's designated representative.
- Each report will be signed and dated by the Contractor upon receipt.
- If Corrective Actions are required, the Contractor will initiate appropriate measures within 24 hours of receiving of the inspection report.
- It is the responsibility of the RIDOT Construction Manager to maintain a copy of the SWPPP, copies of all completed inspection reports, and amendments as part of the SWPPP documentation at the project field office during construction.

ATTACHMENT A: Inspection Report Instructions and Template

5.3 Corrective Actions

If, in the opinion of the Inspector or Construction Manager, corrective action is required, the Inspector or Construction Manager will note it on the inspection report and will notify and direct the Contractor to take corrective action and make all necessary repairs whenever maintenance of the erosion and pollution controls is required.

In accordance with Section 212 of the RIDOT Standard Specifications, the Contractor will commence with the requisite cleaning and maintenance measures no later than the next consecutive calendar day after receiving such a directive from the Construction Manager, and will aggressively and expeditiously perform such cleaning and maintenance work until the original problem is remedied to the complete satisfaction of the Construction Manager.

If the Construction Manager decides on any given day that those erosion and pollution controls specified in the Contract are not in place or have not been adequately maintained as specified in this Section, the daily charge set forth in Special Provision Code 212.1000 will be deducted from monies due the Contractor as a charge for failure to comply with this Specification. Moreover, the stated daily charge will continue each consecutive calendar day thereafter until the deficiencies noted have been corrected to the complete satisfaction of the Construction Manager.

ATTACHMENT A: Inspection Report Instructions and Template including Corrective Action Log

SECTION 6: Amendments

This SWPPP is intended to be a working document.

It is expected that amendments will be required throughout the construction of the project.

Even if practices are installed on a site per the approved plan, the site is only in compliance when erosion and sedimentation are effectively controlled throughout the entire site.

The SWPPP will be amended whenever there is a change in design, construction, operation, maintenance, or other procedure which has a significant effect on the potential for the discharge of pollutants, or if the SWPPP proves to be ineffective in achieving its objectives (i.e. the selected BMPs are not effective in controlling erosion or sedimentation).

All revisions must be recorded in the Record of Amendments Log Sheet within the SWPPP, and dated red-line drawings and/or a detailed written description must be appended to the SWPPP. Inspection Forms must be revised to reflect all amendments. Update the Revision Date and the Version # in the footer of the Report to reflect amendments made.

All SWPPP Amendments, except minor non-technical revisions, must be approved by the Construction Manager.

SECTION 7: Recordkeeping

7.1 Requirements

It is the RIDOT Construction Manager's responsibility to have the following documents at the Field Office and immediately available for review upon request:

- A copy of the fully signed and dated SWPPP
- Copies of all signed and dated Inspection Reports
- Corrective Action Log
- Amendment Log
- Any Regulatory permits obtained as part of the Project

SECTION 8: Party Certifications

All parties working for the Rhode Island Department of Transportation are required to comply with the Stormwater Pollution Prevention Plan (SWPPP) for any work that is performed on-site. Any person or group who violates any condition of the SWPPP may be subject to substantial penalties or loss of contract. Contractors and Sub-Contractors are encouraged to advise all employees working on this project of the requirements of the SWPPP. A copy of the SWPPP is available for your review at the RIDOT Field Office, or may be obtained from the RIDOT Environmental Division by calling (401) 734-4892.

The prime contractor and each subcontractor engaged in activities at the construction site that could impact stormwater must be identified and sign the following certification statement.

I acknowledge that I have read and understand the terms and conditions of the SWPPP for the above designated project and agree to follow the BMPs and practices described in the SWPPP.

RIDOT Construction Manager:
Insert Company or Organization Name
Insert Name & Title ______________________________
Insert Address signature/date
Insert City, State, Zip Code
Insert Telephone Number, Insert Fax/Email

Contractor's Certified SWPPP Inspector:
Insert Company or Organization Name
Insert Name & Title ______________________________
Insert Address signature/date & certification w/#
Insert City, State, Zip Code
Insert Telephone Number, Insert Fax/Email

Contractor SWPPP Contact:
Insert Company or Organization Name
Insert Name & Title ______________________________
Insert Address signature/date
Insert City, State, Zip Code
Insert Telephone Number, Insert Fax/Email

Subcontractor SWPPP Contact:
Insert Company or Organization Name
Insert Name & Title ______________________________
Insert Address signature/date
Insert City, State, Zip Code
Insert Telephone Number, Insert Fax/Email

Amendment Log

ALL AMENDMENTS MUST BE APPROVED BY RIDOT CONSTRUCTION MANAGER

Describe amendment to be made to SWPPP, the date, and the person/title making the amendment. The RIDOT Construction Manager must approve ALL amendments.

	Date	Description of Amendment	R.E. initials
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

SWPPP APPENDICES

Attachment A

Small-Site SWPPP Inspection Report with Instructions

Small-Site SWPPP Corrective Action Log

Department of Transportation
Two Capitol Hill
Providence, RI 02903

Office 401-222-2450
Fax 401-222-3905

Small-Site SWPPP Inspection Report with Instructions

For all projects with **less than one (1) acre of soil disturbance**, RIDOT is required to develop and enforce a site-specific **Storm Water Pollution Prevention Plan** (**SWPPP**) to remain in compliance with RIDOT's Stormwater Management Program Plan (SWMPP). As part of the SWPPP, a site-specific inspection report must be created and utilized.

Preparing the Inspection Report

This inspection report template has been provided by RIDOT for the development of the site-specific SWPPP Inspection Report. It must be customized for each individual Project to meet the requirements of the RIPDES Construction General Permit and our SWMPP.

It is expected that this Inspection Report will be prepared as part of the preparation of the site-specific SWPPP. This inspection report template is designed to be customized according to the SWPPP document (initially) and then customized based on conditions at the site.

Review the site-specific SWPPP and the Plans to develop the inspection report. ***On a copy of the site plan, number all stormwater BMPs and areas of the site that will be inspected.*** Include both structural (basins, outlet protection, swales, etc) and non-structural (construction entrances, perimeter barriers, trash areas, etc) BMPs and areas that will be inspected. Also, identify all point source outfalls, areas of highly erodible soils, and the priority natural resource areas (i.e. streams, wetlands, mature trees, etc). **List each BMP or area to be inspected separately in the site-specific BMP section of the inspection report**.

An appropriate rain gauge must be identified and utilized for the determination of the storm events. Rain gauges may be found on www.wunderground.com, www.nws.noaa.gov (or similar sites).

Small-Site SWPPP Inspection Report Instructions for:

RIDOT ENVIRONMENTAL DIVISION

- The RIDOT Administrator of the Environmental Division must review the SWPPP and sign the Certification Statement as the site OWNER on p. iii of the SWPPP.

RIDOT CONSTRUCTION MANAGER

- The RIDOT Construction Manager (CM) must review the SWPPP and sign the Certification Statement for RIDOT Construction Manager in Section 8. If the CM has any questions, contact the RIDOT Environmental Division (ED) at 401-734-4892.
- After an inspection has been performed, the CM must sign the 'acknowledgement' certification on Page 1 of the Inspection Report **at time of receipt from the Inspector.**
- The CM must review the Inspection Report within 24-hours of receipt.
  - If the CM agrees with the Inspection report, the CM must:
    - Fill out the "NOTICE TO CONTRACTOR" box on the last page of the Report
    - Have the Contractor sign the 'acknowledgement' certification on Page 1
    - Make a copy of the Inspection Report with all 3 signatures for the Contractor's use
  - If the CM disagrees with a corrective action item, the CM must:
    - Document objection with each item and provide justifiable reason in the inspection report. The contractor will not responsible for initiating corrective actions for such items. RIDOT's ED will review such items if warranted.
    - Fill out the "NOTICE TO CONTRACTOR" box on the last page of the Report
    - Have the Contractor sign the 'acknowledgement' certification on Page 1
    - Make a copy of the Inspection Report with all 3 signatures for the Contractor's use
- It is the responsibility of the RIDOT Construction Manager to maintain a copy of the SWPPP, copies of all completed inspection reports, and amendments as part of the SWPPP documentation at the project field office during construction.
- **The Inspection Report serves as the RIDOT directive to the Contractor to proceed with corrective actions.**
- **The CM is responsible for verifying Corrective Actions performed by the Contractor (sign/date on Corrective Action Log).**

- On a monthly basis, the Construction Manager must electronically submit a PDF of the Inspection Reports to the Project Manager (PM) and the Environmental Division (ED). Please submit ED reports to: dot.swppp@dot.ri.gov .

Monthly submission:

- must include each completed, dated, and signed inspection report, including any associated photos.
- must be submitted no later than the 10th of the month following the end of the reporting period.
- must include a copy of the daily rainfall summary data for the month as reported by the selected rain gauge (ex/ the monthly calendar from www.wunderground.com).
- may have the report content, frequency, &/or submission format changed with approval from the ED.

CONTRACTOR'S CERTIFIED SWPPP INSPECTOR

- The Contractor may be the Inspector if they are qualified, or the Contractor may designate another qualified person as the Inspector (see current Section 212 of RIDOT Specifications). The designated inspector must review the SWPP Plan and sign the Certification Statement for SWPPP Inspector in Section 8 of the SWPPP.
- **It is the responsibility of the Contractor's Inspector to start the SWPPP Inspections BEFORE EARTHWORK BEGINS.** Earthwork is NOT allowed to proceed until a SWPPP Inspection of the site has been completed.
- A separate inspection report will be prepared for each inspection.
- Complete any items that will remain constant, such as the project information and BMP locations and descriptions. Then print out multiple copies (double-sided!) of this customized inspection report to use during the inspections *or save the file for future use on a computer*. **The Inspector must also include their Certification/Qualification number on each inspection report.**
- The Inspection Reference Number shall be a combination of the Construction Contract Number - consecutively numbered inspections.
  ex. Inspection reference number for the **4th** inspection of a project would be:
  2006-AA-BBB-**4**
- Check the rain gauge for past & future weather data prior to inspection.
- Minimum Monitoring and Reporting Requirements

  "…the site must be inspected at least once every seven (7) calendar days and within twenty-four (24) hours after any storm event which generates at least 0.25-inches of precipitation per twenty-four (24) hour period and/or after a significant amount of runoff or snowmelt." (per RIPDES CGP)

- When conducting the inspection, walk the site by following the site map and numbered BMPs locations for inspection. Also, note whether the overall site issues have been addressed.
- Take photos to document issues, completed required maintenance/corrective actions – each photo should be dated and have a unique identification # and written description indicating where it is located within the project area. If a close-up photo is required, it should be preceded with a photo including both the detail area and some type of visible fixed reference point. Photos should be annotated with Station numbers and other identifying information where needed.
- For each inspection, the Inspector must determine if the Construction site is in compliance with the SWPPP, or not. The Inspector must check the appropriate check-box on Page 1 of the inspection report.
- Each report must be signed and dated by the Inspector and forwarded to the RIDOT Construction Manager within 24-hours of the inspection.

CONTRACTOR

- The Contractor must review the SWPPP and sign the Certification Statement for Contractor in Section 8 of the SWPPP.
- After an Inspection has been performed, the Contractor must sign the 'acknowledgement' certification on Page 1 of the inspection form at time of receipt from the Construction Manager.
- The CM will provide a copy of the signed Inspection Report to the Contractor.
- **The Inspection Report serves as your RIDOT directive to proceed with corrective actions.**
- In accordance with the SWPPP and Section 212 of the RIDOT Standard Specifications, the **Contractor will commence with the requisite cleaning and maintenance measures no later than the next consecutive calendar day after receiving such a directive from the Construction Manager, and will aggressively and expeditiously perform such cleaning and maintenance work until the original problem is remedied to the complete satisfaction of the Construction Manager**.
- The **CONTRACTOR** is responsible for maintaining the CORRECTIVE ACTION LOG for each inspection report. The log is a running total. Do not create a new one for each inspection.

Small-Site SWPPP Inspection Report Instructions for:

<u>INSPECTOR, CONSTRUCTION MANAGER, & CONTRACTOR</u>

Amendments

The SWPPP shall be amended whenever there is a change in design, construction, operation, maintenance, or other procedure which has a significant effect on the potential for the discharge of pollutants, or if the SWPPP proves to be ineffective in achieving its objectives.

SWPPP Amendments may be recommended by any party, but <u>all amendments must be approved by the Construction Manager</u>. The revision must be recorded in the Record of Amendments Log Sheet within the SWPPP and dated red-line drawings and/or a detailed written description must be appended to the SWPPP. Inspection Forms must be revised to reflect all amendments by the Inspector.

<u>Questions</u>

RIDOT Environmental Division
360 Lincoln Ave
Warwick, RI 02888
401-734-4892
dot.swppp@dot.ri.gov

RIC # INSPECTION #

RIDOT Small-Site SWPPP Inspection Report

Project Information			
Name/RIC/PTSID			
RIDOT Project Mgr		**RIDOT Construction Mgr**	
Contractor		**Contractor's Project Superintendent**	
E&S Sub-Contractor Contact		**Certified SWPPP Inspector's Cert. & Cert. #**	

Inspection Information			
Contractor's SWPPP Inspector Info	**Name**	**Phone**	**Email**
Inspection Date	Click or tap to enter a date.	**Start/End Time**	

Inspection Type
☐ **Weekly** ☐ **Pre-storm event** ☐ **During storm event** ☐ **Post-storm event** ☐ **Violation**

Weather Information

Rain Gauge:

Last Rain Event
Date Click or tap to enter a date.: Duration (hrs): Approximate Rainfall (in):

Current Weather at time of this inspection:

Weather Forecast at time of this inspection: (And: When is next precipitation or wind event anticipated?)

Certification Statements

Inspector: (check one)
☐ I, as the designated Inspector, certify that this site has been inspected and <u>is in compliance</u> with the site-specific SWPPP.

☐ I, as the designated Inspector, certify that this site has been inspected and I have made the determination that the <u>site requires corrective actions</u> before it will be compliant with the site-specific SWPPP. The required corrective actions are noted within this inspection report.

Print Name:	Signature:	Date: Click or tap to enter a date.

Construction Manager:
I, the RIDOT Construction Manager, acknowledge the receipt of this SWPPP inspection report, and understand the requirements set forth in the RIDOT Standard Specifications and the Contract Documents regarding the implementation and maintenance of erosion and sedimentation controls.

Print Name:	Signature:	Date: Click or tap to enter a date.

Contractor:
I, the designated Contractor representative, acknowledge the receipt of this SWPPP inspection report, and understand the requirements set forth in the RIDOT Standard Specifications and the Contract Documents regarding the implementation and maintenance of erosion and sedimentation controls.

Print Name:	Signature:	Date: Click or tap to enter a date.

RIC # INSPECTION #

EROSION AND SEDIMENTATION BMP INSPECTION		"No" means needs attention	Assoc. Photo #	If "No", what is the CORRECTIVE ACTION to bring into compliance?
2.1	Are **Limits of Disturbance** clearly marked at the site?	☐Yes ☐No		
2.1	Are **natural resource areas** (e.g., streams, wetlands, trees, etc.) protected with sediment barriers or similar BMPs?	☐Yes ☐No ☐None on/adjacent to site		
2.2	Is **construction sequencing** being followed?	☐Yes ☐No ☐N/A		
2.3	Are **structural BMPs** properly installed to divert stormwater flow from entering the construction site?	☐Yes ☐No ☐None needed		
2.4	Is **clearing/grubbing** only occurring in areas that will have active work within 21-days?	☐Yes ☐No		
2.4	Is **clearing/grubbing** taking place inside the Apr 15 - Oct 15 window?	☐Yes ☐No		
2.4	Do **disturbed/unstabilized areas** have appropriate erosion/ sedimentation controls in place?	☐Yes ☐No ☐All areas stabilized		
2.5	Are all **slopes** protected from concentrated stormwater flow?	☐Yes ☐No ☐No slopes		
2.6	Are **ALL** storm drain **inlets &/or catch basins** properly protected with silt sacks or other appropriate BMPs?	☐Yes ☐No		
2.7	Are **ALL** storm drain **outfalls** properly protected from scour/erosion?	☐Yes ☐No ☐No outfalls		
2.8	Are **perimeter and sediment controls** adequately installed & maintained to prevent sediment from leaving the site (including entering drainage system)?	☐Yes ☐No		
2.9	If dewatering, are discharge points protected & **receiving waters** free of sediment deposits?	☐Yes ☐No ☐No dewatering		
2.10	Is **weather** forecast being checked regularly?	☐Yes ☐No		

Notes on Erosion and Sediment Controls:

RIC # INSPECTION #

GOOD HOUSEKEEPING BMP INSPECTION		"No" means needs attention	Assoc. Photo #	If "No", what is CORRECTIVE ACTION to bring into compliance?
3.1	Are BMPs effectively limiting **sediment** from being tracked into the street?	☐Yes ☐No		
3.2	Is **trash/litter** from work areas collected & placed in covered containers regularly?	☐Yes ☐No		
3.3	Are **equipment**, vehicles, containers, & storage areas free from leaks?	☐Yes ☐No		
3.3	Are **materials** that are potential stormwater contaminants covered or stored inside?	☐Yes ☐No		
3.4	Are **non-storm water discharges** (i.e. dust control H_2O) free from contamination?	☐Yes ☐No		
3.5	Are **stockpiles** covered (either with temporary vegetation or tarps), ringed with barrier BMPs, & located at least 50 feet away from natural resources & storm drains?	☐Yes ☐No ☐No stockpiles		
3.6	Are **washout facilities** (e.g. paint, grout, concrete) available, clearly marked, and **maintained** & located at least 50-feet away from natural resources and storm drains?	☐Yes ☐No ☐No concrete use at this time		
3.7	Are **vehicle** & **equipment** fueling, cleaning, & maintenance areas free from leaks & located at least 50-feet away from natural resources & storm drains?	☐Yes ☐No ☐No fueling areas		
3.8	Is **dust** being controlled on-site?	☐Yes ☐No		
3.9	Is **sweeping** being used to keep sediment off roads & parking lots?	☐Yes ☐No		

PROCEDURAL BMP INSPECTION		"No" means needs attention	Assoc. Photo #	If "No", what is CORRECTIVE ACTION to bring into compliance?
4.1	Are **permanent stormwater STUs** (i.e. infiltration basins, swales, permeable pavement areas) being protected from compaction? (*No stockpiling or vehicles in these areas*!)	☐Yes ☐No ☐No permanent STUs		
5.1	Are all **erosion & pollution controls** being maintained in accordance with RIDOT Standard Spec Section 212?	☐Yes ☐No		
5.2	Are **inspections** taking place at least every 7 days & after storm events?	☐Yes ☐No		
5.3	Has the Contractor initiated & completed previous **Corrective Actions** (CA)?	☐Yes ☐No ☐No previous CA		
6.0	Are SWPPP **Amendments** being logged?	☐Yes ☐No ☐None		
7.0	Are SWPPP & ALL **inspection reports** being kept at RIDOT Field Office?	☐Yes ☐No		

RIC #　　　　　　　　　　　　　　　　　　　　　　　　　INSPECTION #

TO BE FILLED OUT BY RIDOT CONSTRUCTION MANAGER

OUTSTANDING CORRECTIVE ACTIONS

Were **CORRECTIVE ACTIONS** reported in the previous inspection report?

☐ **NO**	No Corrective Actions were issued in previous inspection report.	
☐ **YES** and…	☐ All Corrective Actions have been addressed	
	Date work began: Click or tap to enter a date.	Date work completed: Click or tap to enter a date.
	☐ Corrective Actions remain and are noted in this inspection report. **WHY did they not get addressed w/in 7-days?**	

NOTICE TO CONTRACTOR

This SWPPP Inspection Report, completed by a qualified inspector, indicates that this construction site is:

☐ **COMPLIANT**	☐ No immediate actions are required. Keep up the good work! ☐ **Work is required to maintain site compliance. Contractor to complete the noted corrective actions within 24 hours to stay in compliance. Site moves into non-compliant category after 24 hours if not completed. Charges may be assessed.**
☐ **NON-COMPLIANT**	**This document serves as your RIDOT directive to proceed with the CORRECTIVE ACTIONS that have been outlined above.** The SWPPP, Construction Contract documents, and Section 212 of the RIDOT Standard Specifications state that the **Contractor** will commence with the requisite cleaning and maintenance measures **no later than the next consecutive calendar day** after receiving such a directive from the Construction Manager **and will aggressively and expeditiously perform such cleaning and maintenance work until the original problem is remedied to the complete satisfaction of the Construction Manager**.
	Date work to begin: Click or tap to enter a date.
	Date work to be completed: Click or tap to enter a date.

R.E. initials: ____________　　　R.E. Comments:

Date: Click or tap to enter a date.

RIC #　　　　　　　　　　　　　　　　　　　　INSPECTION #

Corrective Action Log

THIS FORM TO BE FILLED OUT BY SITE CONTRACTOR FOR EVERY INSPECTION

Location/ Station	Corrective Action	Date Notified	Date Completed	RIDOT Initial
		Click or tap to	Click or tap to enter a	
		Click or tap to	Click or tap to enter a	
		Click or tap to	Click or tap to enter a	
		Click or tap to	Click or tap to enter a	
		Click or tap to	Click or tap to enter a	
		Click or tap to	Click or tap to enter a	
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		Click or tap to	Click or tap to enter a	
		Click or tap to	Click or tap to enter a	
		Click or tap to	Click or tap to enter a	
Operator Signature:		**Date:**	Click or tap to enter a date.	

Appendix E

Freshwater Wetland Permit

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF WATER RESOURCES
235 Promenade Street
Providence, Rhode Island 02908

July 18, 2024

RI Department of Transportation
Alisa Richardson, MS, PE, PMP, Administrator, Environmental Division
360 Lincoln Avenue
Warwick, RI, 02888

Freshwater Wetlands Permit

Re: Application No. 24-0152 for the property and project located:

At the Newell Bridge and within the state highway right-of-way on Diamond Hill Road, approximately 270-feet north of Nate Whipple Highway and approximately 400-feet northeast of Nate Whipple Highway and its intersection with Sneech Pond Road, near Utility Pole Nos. 302 to 304, RI State Highway Plat 121, Cumberland, RI.

Dear Ms. Richardson:

Kindly be advised that the Department of Environmental Management's ("DEM") Freshwater Wetlands Program ("Program") has completed its review of your **Application for a Freshwater Wetlands Permit** as described in Rule 3.11 of the Rules and Regulations Governing the Administration and Enforcement of the Fresh Water Wetlands Act, 250-RICR-150-15-3 ("Rules"). This review included a site inspection of the above referenced property ("subject property") and an evaluation of the proposed replacement of the Newell Bridge superstructure within the existing bridge footprint, including the installation of new micropile-supported abutments installed behind the existing stone abutments to remain, utility pole relocation, drainage improvements and associated site alterations as illustrated and detailed on site plans submitted with your application. These site plans were received by the DEM on June 20, 2024.

Our observations of the subject property, review of the site plans and evaluation of the proposed project reveals that alterations of jurisdictional areas are proposed. However, pursuant to Rule 3.7.3A of the Rules, this project meets the General Variance Criteria and a **Freshwater Wetlands Permit** may be issued under the following terms and conditions:

Terms and Conditions for Wetlands Application No. 24-0152:

1. This letter is the DEM's permit for this project under the R.I. Fresh Water Wetlands Act, R.I. Gen. Laws § 2-1-18 et seq.

2. This permit is specifically limited to the project, site alterations and limits of disturbance as detailed on the site plans submitted with your application and received by the DEM on June 20, 2024.
A copy of the site plans stamped approved by the DEM is enclosed. Changes or revisions to the project that would alter jurisdictional areas are not authorized without a permit from the DEM.

3. Where the terms and conditions of the permit conflict with the approved site plans, these terms and conditions shall be deemed to supersede the site plans.

4. You must notify this Program in writing of the anticipated start date, and of your contractor's contact information, by submitting the Notice of Start of Construction Form prior to commencement of any permitted site alterations or construction activity. You must also notify this Program in writing upon completion of the project. The Start of Construction Form can be found on the webpage: dem.ri.gov/stormwaterconstruction.

5. A copy of the stamped approved site plans and a copy of this permit must be kept at the site at all times during site preparation, construction, and final stabilization. Copies of this permit and the stamped approved plans must be made available for review by any DEM or town representative upon request.

6. The effective date of this permit is the date this letter was issued. This permit expires five (5) years from the date of this letter unless renewed pursuant to the Rules.

7. Any material utilized in this project must be clean and free of matter that could pollute any jurisdictional area. Debris captured by temporary floats and tarps must be removed daily or as needed to prevent dust and debris from entering the river. Debris collected must be disposed of in accordance with all local, state and federal laws.

8. Prior to commencement of site alterations, you shall erect or post a sign resistant to the weather and at least twelve (12) inches wide and eighteen (18) inches long, which boldly identifies the initials "DEM" and the application number of this permit. This sign must be maintained at the site in a conspicuous location until such time that the project is complete.

9. Temporary erosion and sediment controls detailed or described on the approved site plans shall be properly installed at the site prior to or commensurate with site alterations. Such controls shall be properly maintained, replaced, supplemented, or modified as necessary throughout the life of this project to minimize soil erosion and to prevent sediment from being deposited in any freshwater wetland, buffer, floodplain, area subject to storm flowage, or area subject to flooding or other jurisdictional areas not subject to disturbance under this permit.

10. Upon permanent stabilization of all disturbed soils, temporary erosion and/or sediment controls must be removed.

11. You are responsible for the proper installation, operation, maintenance and stability of any mitigative features, stormwater treatment facilities, and systems of treatment and control that are installed or used in compliance with this permit to prevent harm to adjacent freshwater wetland, buffer, floodplain or other jurisdictional areas until documentation is provided that this responsibility has been assigned to another entity. Operation and maintenance shall be as described in the plan entitled, "RIDOT Small-Site Stormwater Pollution Prevention Plan Bridge Group 17C Newell and Sneech, Town of Cumberland, RI PTSID No. 2602D", dated May 2024, as prepared by VHB, 1 Cedar Street, Suite 400, Providence, RI 02903.

12. You are obligated to install, utilize, follow, and maintain all best management practices detailed or described on the approved site plans in the construction of the project to minimize or prevent adverse impacts to any adjacent freshwater wetland, buffer or floodplain, or other jurisdictional areas and the functions and values provided by such freshwater wetlands and buffers or floodplain.

13. No clearing of vegetated buffer, unless otherwise exempt per Section 3.6 of the Rules is authorized under this permit for the relocation of utility poles or other construction activities.

14. You must provide written certification from a registered land surveyor or registered professional engineer that the stormwater drainage system including any and all basins, piping systems, catch basins, culverts, swales and any other stormwater management control features have been constructed/installed in accordance with the site plans approved by this permit. This written certification must be submitted to this Program within twenty (20) days of its request or upon completion of the project.

You are required to comply with the terms and conditions of this permit and to carry out this project in compliance with the Rules at all times. Failure to do so may result in an enforcement action by this Department.

In permitting the proposed alterations, the DEM assumes no responsibility for damages resulting from faulty design or construction.

Kindly be advised that this permit is not equivalent to a verification of the type or extent of freshwater wetlands or jurisdictional areas on site. Should you wish to have the types and extent of freshwater wetlands verified, you may submit the appropriate application in accordance with 250-RICR-150-15-3.9.3.

This permit does not remove your obligation to obtain any local, state, or federal approvals or permits required by ordinance or law, and does not relieve you from any duties owed to adjacent landowners with specific reference to any changes in drainage. If you have not already done so, or in order to check on the status of their review, please contact the U.S. Army Corps of Engineers to determine federal permit requirements on your project.

Please contact Sam Dufresne of this office (telephone: 401-537-4220) should you have any questions regarding this letter.

Sincerely,

Nancy L. Freeman

Nancy L. Freeman, Environmental Scientist III
Office of Water Resources
Freshwater Wetlands Program

NLF/SGD/sgd

Enclosure: Approved site plans

ec: Andrew F. Prezioso, PE, VHB
Scott S. Hobson, PWS, Senior Ecologist, VHB
Heather Hamilton, RIDOT
Joseph Duarte, Director of Public Works, Cumberland, RI

Appendix F

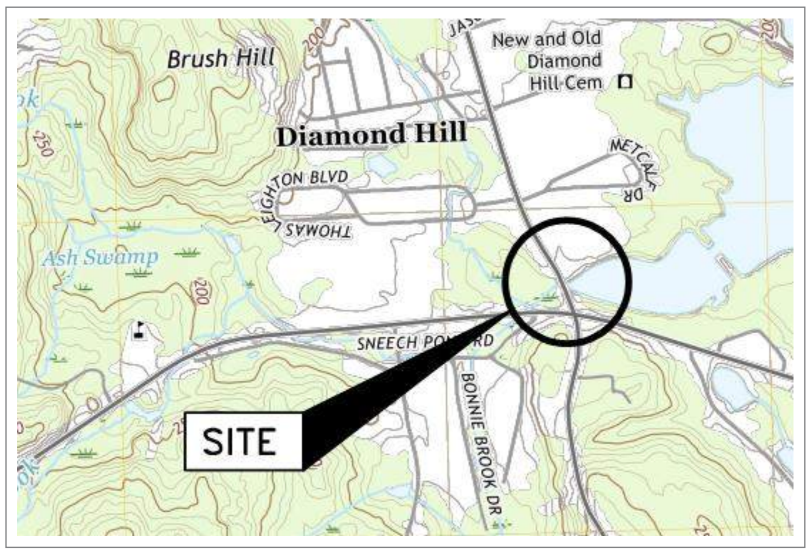
Geotechnical Data Report & Boring Logs

Known for excellence. Built on trust.

GEOTECHNICAL DATA REPORT

RIDOT Bridge Group 17C
Major Bridge Rehabilitation
Newell Bridge (No. 020451)
Cumberland, Rhode Island

April 14, 2020
03.0034674.00



PREPARED FOR:
Steere Engineering, Inc.
Warwick, Rhode Island

GZA GeoEnvironmental, Inc.
188 Valley Street, Suite 300 | Providence, RI 02909
401-421-4140

31 Offices Nationwide
www.gza.com

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Construction Management

188 Valley Street
Suite 300
Providence, RI 02909
T: 401.421.4140
F: 401.751.8613
www.gza.com

April 14, 2020
File No. 03.0034674.00

Ms. Alison Steere, P.E.
Steere Engineering, Inc.
2350 Post Road, Suite 100
Warwick, Rhode Island 02886

Re: Geotechnical Data Report (GDR)
RIDOT Bridge Group 17C - Major Bridge Rehabilitation
Newell Bridge (No. 020451)
Cumberland, Rhode Island

Dear Ms. Steere:

We are pleased to provide Steere Engineering, Inc. with this "Geotechnical Data Report" (GDR) for the Newell Bridge (No. 020451) Project in Cumberland, Rhode Island. This report presents a compilation of existing boring data and the findings of a recent subsurface exploration and laboratory testing program performed as part of this study. This report is intended to be used by Steere Engineering, Inc. for project scoping and development of preliminary design documents for the major rehabilitation or the replacement of the bridge structure or superstructure.

The preparation of this report was undertaken by GZA GeoEnvironmental, Inc. (GZA) in accordance with our proposal dated December 5, 2019, revised on January 7, 2020, and is subject to the Limitations in **Appendix A**.

We appreciate the opportunity to have provided these services to Steere Engineering, Inc. If you have any questions or need additional information, please do not hesitate to contact the undersigned at your convenience.

Sincerely,
GZA GEOENVIRONMENTAL, INC.

Alexander Haag
Alexander Haag, Dipl. Ing.
Project Manager

Diane Baxter
Diane Y. Baxter, Ph.D., P.E., LEED AP
Associate Principal

J:\Geo\34674.ah\TASK 1 - NEWELL BRIDGE, CUMBERLAND\Report\GDR\20200414_GDR_Newell Bridge.docx

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1.3 EXISTING CONDITIONS 1

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APPENDIX B EXISTING BORING INFORMATION

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APPENDIX E LABORATORY TEST RESULTS

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1.0 INTRODUCTION

1.1 GENERAL

This report presents a compilation of existing and current boring data and laboratory testing results performed to evaluate the subsurface conditions for the design of the rehabilitation or replacement of Newell Bridge (No. 020451) in Cumberland, Rhode Island. This Geotechnical Data Report (GDR) was prepared by GZA GeoEnvironmental, Inc. (GZA) in accordance with our proposal dated December 5, 2019 and revised on January 7, 2020. This report is subject to the **Limitations** that are attached in **Appendix A.**

1.2 PURPOSE AND SCOPE

GZA's services consisted of completing a limited test boring and laboratory testing program to supplement existing subsurface information to be used for preliminary design for the subject bridge.

The location of the subject bridge is shown on **Figure 1, Locus Plan** and **Figure 2, Exploration Location Plan**. The substructures that are to be evaluated as part of this project include:

- Newell Bridge (No. 020451) South Abutment
- Newell Bridge (No. 020451) North Abutment

1.3 EXISTING CONDITIONS

Based on review of information provided to us for the preparation of this work, we understand that the Newell Bridge No. 20401 was originally constructed around 1886 on stone masonry abutments. The existing bridge is approximately 26 feet long and approximately 42 feet wide. It is unknown if the bridge is founded on shallow foundations or on deep foundations such as timber piles. Plans and physical evidence suggest that around 1926, the bridge's beam seats were modified, and the bridge's superstructure was replaced with a reinforced concrete slab spanning the distance between the north and south abutments. Recent bridge inspections have revealed damage to the masonry abutments, concrete beam seats, and concrete superstructure.

The bridge spans north to south over East Sneech Brook and is bounded to the north and to the south by Diamond Hill Road (Route 114), to the east by Arnold Mills Reservoir and to the west by East Sneech Brook. The roadway cross section contains two traffic lanes and two sidewalks.

The existing approaches for the Newell Bridge are comprised of granular fill within masonry coping walls. The existing road grade has been estimated at approximate elevation 177.5 to 178 feet in reference to the North American Vertical Datum of 1988 (NAVD88). Roadway grade elevation estimations are based on recent survey of four storm drainage manhole rim elevations in the vicinity of the Newell Bridge and survey of the roadway elevation at the recent boring location shown in **Figure 2, Exploration Location Plan**. Please note that elevations on the previous exploration location plan and boring logs that are included in **Appendix B,** are referenced to the National Geodetic Vertical Datum of 1929 (NGVD29) which is equivalent to the USC&GS Mean Seal Level Datum of 1929 (MSL). Elevation estimates should be considered approximate. Ground surface elevations are generally level across the bridge span but decrease gradually from north to south along Diamond Hill Road.

1.4 REPORT LIMITATIONS

This report has been prepared for specific application to the Newell Bridge (No. 020451) rehabilitation project. This report was prepared in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made. Refer to the **Limitations** in **Appendix A**.

The data submitted in this report are based upon information from moderately spaced subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it will be necessary to reevaluate the information presented in this report.

Water level readings were made in the drill holes and measured from surface water bodies where stated on the boring logs. It must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors occurring since the time measurements were made.

Existing data included in this report from previous investigations by others was provided to GZA by Rhode Island Department of Transportation (RIDOT). No responsibility is assumed for the completeness or accuracy of subsurface information for explorations not completed or observed by GZA.

The geotechnical scope of this study did not include an assessment of environmental conditions or the presence of hazardous materials.

2.0 BACKGROUND INFORMATION

2.1 GENERAL

GZA compiled and reviewed available information from previous subsurface investigations and drawings for the subject bridge. These include:

- 1926 structural plans associated with the re-construction of the existing Newell Bridge superstructure;
- 2003 subsurface test boring and probe logs drilled at the existing Newell Bridge.

2.2 PREVIOUS INVESTIGATIONS AND EXISTING DATA

The above referenced documents were provided to GZA in PDF format. The 2003 exploration location plan shows the location of three test borings and eight probes that were completed as part of a previous evaluation effort for Newell Bridge in May to June of 2003.

The test borings, BB1(OW), BB2, and BB4 were advanced to depths between 36 and 43 feet below the existing ground surface. Test probes were conducted to investigate the shape and depth of the back of the abutments. Test probes P1A, P1B, P1C, P1D, P1E, and P1F were completed on the southern side of the bridge and were advanced to depths ranging from 2.5 to 30 feet below the existing ground surface. The probes except P1B and P1F were advanced to refusal. Test probes P2A, P2B, P2C, and P2D were completed on the northern side of the bridge and were advanced to refusal, to depths ranging from 3.5 to 19.3 feet below the existing ground surface.

The subsurface profile established from the previous boring logs consists of approximately 16 feet of fill, underlain by approximately 7 feet of glacial outwash, underlain by 6 to 10 feet of glacial till/weathered rock underlain by bedrock to the bottom of explorations. Test boring logs, probe logs and the associated exploration location plan are attached in **Appendix B**.

2.3 REGIONAL GEOLOGIC SETTING

Available United States Geological Survey (USGS) publications were reviewed in order to obtain an understanding of the area geology. According to the 1949 Bedrock Geology Map of the Pawtucket Quadrangle, Rhode Island-Massachusetts, the bedrock underlying the site at the Newell Bridge is undifferentiated sedimentary rocks that are underlain by Pennsylvanian strata. Pennsylvanian strata in this area include the Wamsutta formation, which is further described as red conglomerate, sandstone, and shale.

The 1949 Surficial Geology Map of the Pawtucket Quadrangle, Rhode Island-Massachusetts, indicates that the surficial soils in the vicinity of Newell Bridge are comprised of outwash plains to the north, and Kame Terraces and Ground Moraine to the south. Outwash plains in this case are further described as sand and gravel plains deposited by flowing glacial meltwater along valley floors. Kame terraces are further described as deposits of glacial sand and gravel against one or both walls of the valley and Ground Moraine is described as till deposited by the ice as an uneven layer over much of the quadrangle, and is composed of loose, sandy, and generally light gray till or compact, slightly indurated, and brownish till. Ground Moraine includes areas of unusually abundant glacial boulders. Copies of the referenced publications are contained in **Appendix D**.

SUBSURFACE INVESTIGATIONS

2.4 GENERAL

The following sections describe the test boring that was drilled as part of this study. The boring location is shown on the attached **Figure 2, Exploration Location Plan** and the boring log of the test boring is included in **Appendix C**.

2.5 TEST BORING

One test boring, designated SB-101 was drilled at Newell Bridge by New England Boring Contractors (NEBC) between March 2 and 3, 2020. The test boring was advanced to a depth of 49 feet below existing grade using 5-inch (PW) and 4-inch (HW) casing. Casing was advanced using standard drive-and-wash techniques with rotary equipment.

Split spoon soil samples were generally obtained continuously from 0 to 28 feet and in conformance with ASTM D-1586, the Standard Penetration Test (SPT). The Standard Penetration Test consists of driving a 1-3/8 inch inside diameter standard split spoon sampler at least 18 inches with a 140-pound hammer dropping from a height of 30 inches. The standard penetration value is the number of blows required to drive the sampler from 6 to 18 inches of penetration and is a commonly used indicator of soil density and consistency.

Four continuous rock cores (C-1 through C-4) were obtained from 30 to 49 feet below the existing ground surface. The rock cores were collected with a standard double tube core barrel with an inner and outer diameter of 2 and 2.5 inches respectively. The collected cores were 2 inches in diameter. Coring rates were recorded in minutes per foot. Rock cores were processed for recovery, rock quality designation (RQD), and classification immediately upon retrieval from the inner core barrel. The RQD values for cores C-1 through C-4 were approximately 17%, 93%, 52%, and 96% respectively. Photographs of the rock cores included in **Appendix F**.

The subsurface profile encountered within the exploration can be generalized as approximately 0.6-feet of surficial asphalt, underlain by granular fill to approximately 12-feet below ground surface, underlain by glacial outwash to approximately 20 feet below ground surface, underlain by glacial till to approximately 28 feet below ground surface, underlain by weathered rock to 34 feet below ground surface, underlain by bedrock to the end of exploration depth of 49 feet below ground surface. The fill primarily consisted of fine to coarse sand and gravel with little silt. The glacial outwash primarily consisted of fine to coarse sand, some fine to coarse gravel and little to trace silt. The glacial till primarily consisted of fine to coarse sand, some fine gravel and little silt. The weathered rock appeared to be of the same nature of the underlying bedrock which can generally be classified as meta-conglomerate.

GZA personnel observed and logged the test borings. The exploration locations were determined using "line-of-sight" and tape measurements from existing site features and should be considered accurate only to the degree implied by the methods used. The ground surface elevation at the exploration location was surveyed by others following completing of the boring. The grade surface elevation (referenced to the NAVD88 datum) provided to GZA agrees with estimates of ground surface elevations based on the previous exploration location plan and boring logs that are included in **Appendix B**, that are referenced to the NGVD1929 datum. Generally, the ground surface elevations of the exploration should be considered approximate.

3.0 LABORATORY TESTING PROGRAM

3.1 SOIL TESTING

Five soil samples collected from split spoons were submitted for laboratory analyses. Three samples were submitted for mechanical grain size analyses (ASTM D6913). Two soil samples were submitted for corrosivity testing. The results of these tests are included in **Appendix E** and are summarized below.

Boring	Sample (Strata)	Depth (ft)	Modified Burmister Classification	Percent Fines (%)	Resistivity (Mohms-cm)	Sulfate (mg/kg)	Chloride (mg/kg)	pH
SB-101	SS-3 (Fill)	6-8	Reddish brown, fine to coarse SAND, some fine to coarse Gravel, little Silt	16.7	--	--	--	--
SB-101	SS-8 (Outwash)	16-18	Brown, fine to coarse SAND and fine to coarse GRAVEL, trace Silt	7.2	--	--	--	--
SB-101	SS-11 (Till)	22-24	Reddish brown, fine to coarse SAND, some fine Gravel, little Silt	17.7	--	--	--	--
SB-101	SS-4 (Fill)	8-10	--	--	0.013	205	155	8.69
SB-101	SS-12 (Till)	24-26	--	--	0.002	68	ND	7.89

ND = Not Detectable

3.2 ROCK TESTING

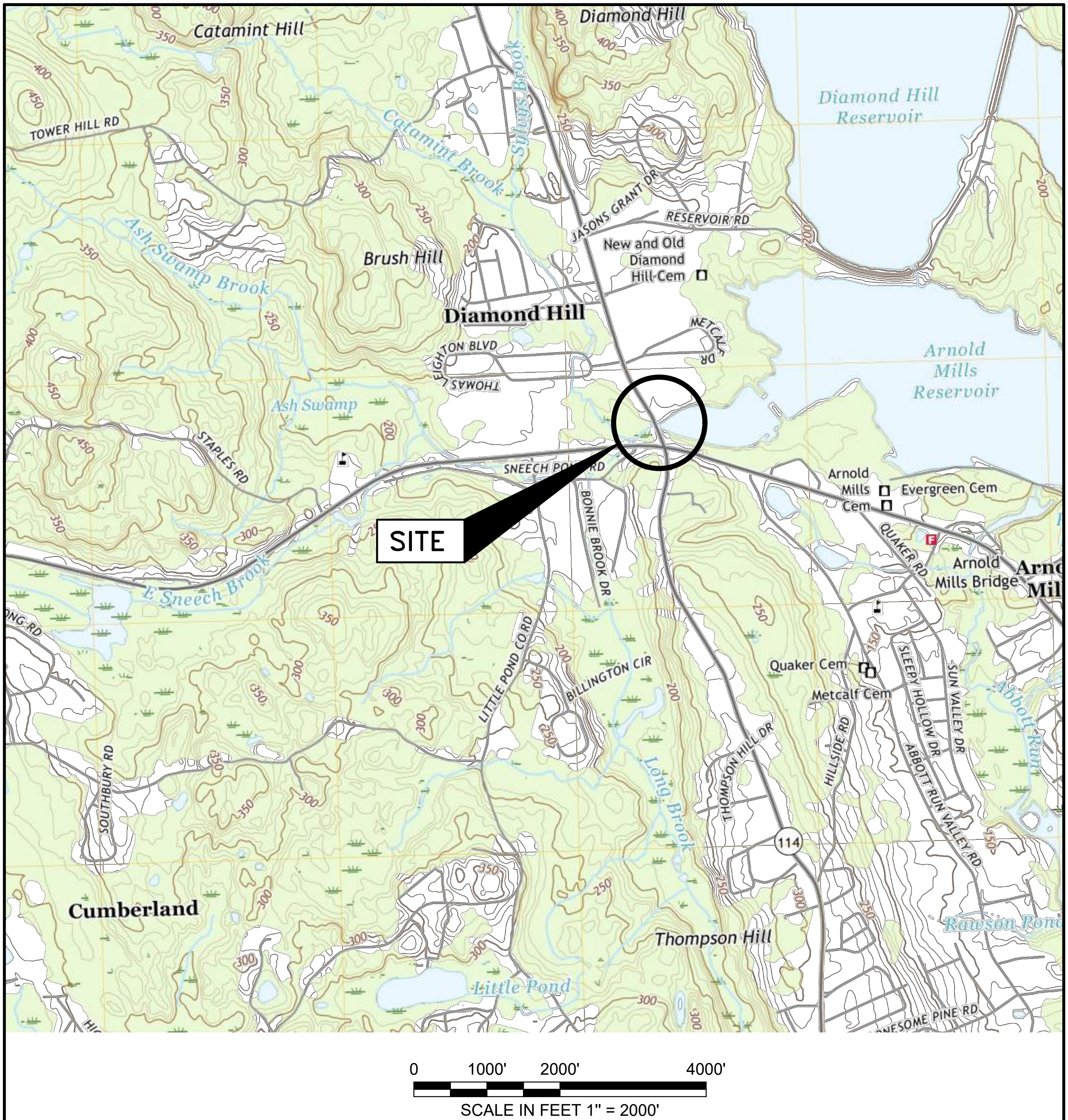
Two representative sections of rock core were submitted for unit weight analysis and unconfined compression testing. The results of these tests are included in **Appendix E** and are summarized below.

Boring	Core Run	Core Depth (ft)	Rock Formation Description	Unit Weight (PCF)	Strength (PSI)	Break Description
SB-101	C-2	37.3-38	Arkosic Conglomerate	16.7	4708	Break was fresh that went around some lithics
SB-101	C-4	47-47.9	Arkosic Conglomerate	7.2	6200	Break was fresh

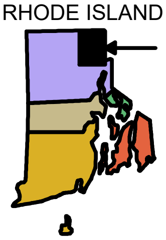
4.0 REFERENCES

1. “Geologic Map of the Pawtucket Quadrangle, Rhode Island-Massachusetts, Surficial Geology,” Department of the Interior, dated 1949.
2. “Geologic Map of the Pawtucket Quadrangle, Rhode Island-Massachusetts, Bedrock Geology,” Department of the Interior, dated 1949.
3. “Newell Bridge, Cumberland, Rhode Island, Additional Coping Walls,” State Board of Public Roads, Bridge Department, dated 1926.
4. “Final Structural Evaluation Report, Newell Bridge No. 204, Diamond Hill Road over East Branch Sneech Brook, Cumberland, Rhode Island”, Green international Affiliates, dated October 2003.

FIGURES



RHODE ISLAND



QUADRANGLE LOCATION

SOURCE:

BASE MAP FROM THE FOLLOWING USGS QUADRANGLE MAP:
PAWTUCKET, RHODE ISLANE (2018)

DIGITAL TOPOGRAPHIC MAPS PROVIDED BY USGSSTORE.GOV.

CONTOUR ELEVATIONS REFERENCE NAVD 88,
CONTOURS ARE SHOWN IN FEET AT 10' INTERVALS

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NEWELL BRIDGE
DIAMOND HILL ROAD
CUMBERLAND, RHODE ISLAND

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
STEERE ENGINEERING
2350 POST ROAD, SUITE 100
WARWICK, RI 02886

LOCUS

PROJ MGR: AH	REVIEWED BY: AH	CHECKED BY: DYB	FIGURE
DESIGNED BY: NEH	DRAWN BY: MEA	SCALE: SCALE	1
DATE: MARCH 2020	PROJECT NO. 34674.00	REVISION NO. 0	SHEET NO. 1 OF 2

© 2016 – GZA GeoEnvironmental, Inc. GZA–J:\GEO\34674.AH\TASK 1 – NEWELL BRIDGE, CUMBERLAND\FIGURES\CAD\DWGS\34674.00_LOCUS.DWG 1 – LOCUS JUNE 12, 2014 MICHAEL AUBIN

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GENERAL NOTES

1. AERIAL BASE MAP DEVELOPED FROM THE RHODE ISLAND GEOGRAPHIC INFORMATION SYSTEM (RIGIS). AERIAL IMAGERY TAKEN AND PUBLISHED IN APRIL 2019.
2. THE LOCATION OF THE EXPLORATION WAS MEASURED IN FIELD USING TAPE MEASUREMENTS FROM EXISTING FEATURES. THE EXPLORATION LOCATION SHOULD BE CONSIDERED ACCURATE TO THE DEGREE IMPLIED BY THE METHOD USED.

LEGEND

SB-101 INDICATES BORING DRILLED BY NEW ENGLAND BORING CONTRACTORS FROM MARCH 2, 2020 TO MARCH 3, 2020 AND OBSERVED AND LOGGED BY GZA.

N
W E
S

0 20' 40' 80'

SCALE IN FEET 1" = 20'

NO.	ISSUE/DESCRIPTION	BY	DATE

UNLESS SPECIFICALLY STATED BY WRITTEN AGREEMENT, THIS DRAWING IS THE SOLE PROPERTY OF GZA GEOENVIRONMENTAL, INC. (GZA). THE INFORMATION SHOWN ON THE DRAWING IS SOLELY FOR USE BY GZA'S CLIENT OR THE CLIENT'S DESIGNATED REPRESENTATIVE FOR THE SPECIFIC PROJECT AND LOCATION IDENTIFIED ON THE DRAWING. THE DRAWING SHALL NOT BE TRANSFERRED, REUSED, COPIED, OR ALTERED IN ANY MANNER FOR USE AT ANY OTHER LOCATION OR FOR ANY OTHER PURPOSE WITHOUT THE PRIOR WRITTEN CONSENT OF GZA. ANY TRANSFER, REUSE, OR MODIFICATION TO THE DRAWING BY THE CLIENT OR OTHERS, WITHOUT THE PRIOR WRITTEN EXPRESS CONSENT OF GZA, WILL BE AT THE USER'S SOLE RISK AND WITHOUT ANY RISK OR LIABILITY TO GZA.

NEWELL BRIDGE
DIAMOND HILL ROAD
CUMBERLAND, RHODE ISLAND

EXPLORATION LOCATION PLAN

PREPARED BY:
GZA GeoEnvironmental, Inc.
Engineers and Scientists
www.gza.com

PREPARED FOR:
STEERE ENGINEERING
2350 POST ROAD, SUITE 100
WARWICK, RHODE ISLAND 02886

PROJ MGR: AH	REVIEWED BY: AH	CHECKED BY: DYB	FIGURE
DESIGNED BY: NEH	DRAWN BY: NEH	SCALE: AS NOTED	1
DATE: MARCH, 2020	PROJECT NO. 34674.00	REVISION NO. 0	SHEET NO. 2 OF2

APPENDIX A

LIMITATIONS

GEOTECHNICAL LIMITATIONS

Use of Report

1. GZA GeoEnvironmental, Inc. (GZA) prepared this report on behalf of, and for the exclusive use of our Client for the stated purpose(s) and location(s) identified in the Proposal for Services and/or Report. Use of this report, in whole or in part, at other locations, or for other purposes, may lead to inappropriate conclusions; and we do not accept any responsibility for the consequences of such use(s). Further, reliance by any party not expressly identified in the agreement, for any use, without our prior written permission, shall be at that party's sole risk, and without any liability to GZA.

Standard of Care

2. GZA's findings and conclusions are based on the work conducted as part of the Scope of Services set forth in Proposal for Services and/or Report, and reflect our professional judgment. These findings and conclusions must be considered not as scientific or engineering certainties, but rather as our professional opinions concerning the limited data gathered during the course of our work. If conditions other than those described in this report are found at the subject location(s), or the design has been altered in any way, GZA shall be so notified and afforded the opportunity to revise the report, as appropriate, to reflect the unanticipated changed conditions.

3. GZA's services were performed using the degree of skill and care ordinarily exercised by qualified professionals performing the same type of services, at the same time, under similar conditions, at the same or a similar property. No warranty, expressed or implied, is made.

Subsurface Conditions

4. The generalized soil profile(s) provided in our Report are based on widely-spaced subsurface explorations and are intended only to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized, and were based on our assessment of subsurface conditions. The composition of strata, and the transitions between strata, may be more variable and more complex than indicated. For more specific information on soil conditions at a specific location refer to the exploration logs.

5. In preparing this report, GZA relied on certain information provided by the Client, state and local officials, and other parties referenced therein which were made available to GZA at the time of our evaluation. GZA did not attempt to independently verify the accuracy or completeness of all information reviewed or received during the course of this evaluation.

6. Water level readings have been made in test holes (as described in the Report) and monitoring wells at the specified times and under the stated conditions. These data have been reviewed and interpretations have been made in this Report. Fluctuations in the level of the groundwater however occur due to temporal or spatial variations in areal recharge rates, soil heterogeneities, the presence of subsurface utilities, and/or natural or artificially induced perturbations. The water table encountered in the course of the work may differ from that indicated in the Report.

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7. GZA's services did not include an assessment of the presence of oil or hazardous materials at the property. Consequently, we did not consider the potential impacts (if any) that contaminants in soil or groundwater may have on construction activities, or the use of structures on the property.

8. Recommendations for foundation drainage, waterproofing, and moisture control address the conventional geotechnical engineering aspects of seepage control. These recommendations may not preclude an environment that allows the infestation of mold or other biological pollutants.

Compliance with Codes and Regulations

9. We used reasonable care in identifying and interpreting applicable codes and regulations. These codes and regulations are subject to various, and possibly contradictory, interpretations. Compliance with codes and regulations by other parties is beyond our control.

Cost Estimates

10. Unless otherwise stated, our cost estimates are only for comparative and general planning purposes. These estimates may involve approximate quantity evaluations. Note that these quantity estimates are not intended to be sufficiently accurate to develop construction bids, or to predict the actual cost of work addressed in this Report. Further, since we have no control over either when the work will take place, or the labor and material costs required to plan and execute the anticipated work, our cost estimates were made by relying on our experience, the experience of others, and other sources of readily available information. Actual costs may vary over time and could be significantly more, or less, than stated in the Report.

Additional Services

11. GZA recommends that we be retained to provide services during any future: site observations, design, implementation activities, construction and/or property development/redevelopment. This will allow us the opportunity to: i) observe conditions and compliance with our design concepts and opinions; ii) allow for changes in the event that conditions are other than anticipated; iii) provide modifications to our design; and iv) assess the consequences of changes in technologies and/or regulations.

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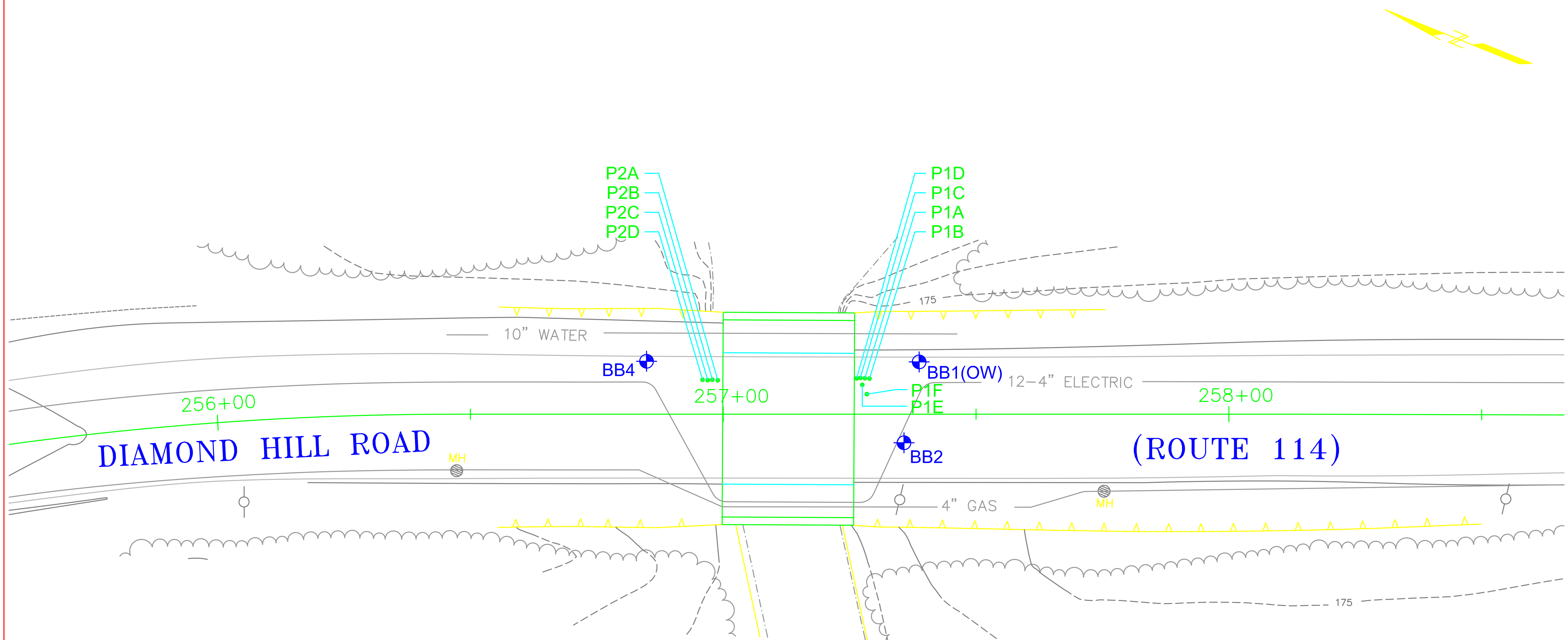
APPENDIX B

EXISTING BORING INFORMATION



LEGEND:

BB2	BORING PERFORMED IN MAY 2003
BB1(OW)	OBSERVATION WELL INSTALLED IN BORING, MAY 2003
P1A	GEOTECHNICAL PROBE PERFORMED IN MAY 2003
A A	LOCATION OF SUBSURFACE PROFILE (*SEE FIGURE 3*)

NOTES:

1. PLAN BASED ON DRAWING PREPARED BY GREEN INTERNATIONAL AFFILIATES, INC. TITLED "SUBSURFACE EXPLORATION PLAN, NEWELL BRIDGE, NO. 204, DIAMOND HILL ROAD," FEBRUARY 20, 2003.
2. APPROXIMATE BORING LOCATIONS SHOWN. BORINGS WERE LOCATED IN THE FIELD BY MEASURING DISTANCES FROM EXISTING FEATURES.
3. REFER TO FIGURE 3 FOR SUBSURFACE PROFILE.

DRAFT

0 20 40
SCALE, FEET

Green International Affiliates, Inc. Medford, Massachusetts	Newell Bridge, No. 204 Diamond Hill Road Cumberland, Rhode Island	BORING LOCATION PLAN
GEI Consultants, Inc.	Project 02361	June 2003 Fig. 2

02361-NEWELL-03 ptc 5/29/03

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 2

TO Green International Affiliates, Inc. | ADDRESS Medford, MA | HOLE NO. BB1(OW)
PROJECT NAME Newman Ave. & Newell Bridges | LOCATION East Providence/Cumberland, R.I. | PROJ. NO. 02361-0
REPORT SENT TO above | OUR JOB NO. 03-233 | SURF. ELEV. 178.7 +/-

GROUND WATER OBSERVATIONS

At 15.8 after ____ Hours
At ____ after ____ Hours

	CASING	SAMPLER	CORE BAR.
Type	HW	S/S	NV-II
Size I.D.	4"	1-3/8"	
Hammer Wt.	300#	140#	BIT
Hammer Fall	24"	30"	Dia.

	DATE
Start	5/8/03
Complete	5/9/03
Boring Foreman	P. Brescia
Inspector/Engr.	J. Mazzarino

LOCATION OF BORING Newell Bridge No. 204 - Cumberland, R.I.

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev./Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen"	Rec."
									Asphalt			
		1.0-3.0	D	13	15	10		0.6	Dark Brown medium to fine SAND and fine to medium Gravel	1	24	4
						7			Fill			
5		4.0-6.0	D	13	9	11			Brown fine to coarse SAND, some fine gravel	2	24	5
						10			Fill			
10		9.0-11.0	D	26	17	13			Brown fine to medium SAND, some coarse sand & fine to medium gravel, trace silt, cobbles	3	24	8
						25			(Fill)			
15		14.0-16.0	D	16	12	9			" (Possible Fill)	4	24	8
						15						
								16.5				
20		19.0-21.0	D	62	27	13			Brown medium to coarse GRAVEL and Sand,	5	24	9
						18			Cobbles & Boulders (Possible Glacial Outwash)			
								23.0				
25		24.0-26.0	D	32	24	29			Red compact silty fine to medium SAND and fine to medium Gravel, Cobbles - Completely weathered Red CONGLOMERATE and coarse Sandstone	6	24	8
						69						
30		29.0-31.0	D	32	60	60			Red completely weathered CONGLOMERATE and coarse Sandstone	7	24	11
						33						
							Min/Ft					
		33.0-38.0	C	(RQD=0%)			6	33.0		C1	60	24
35							5		Red CONGLOMERATE and coarse Sandstone, soft			
							5		to very soft, moderately to severely weathered, very			
							5.5		close to close joint spacing.			
							7		(WAMSUTTA FORMATION)			
		38.0-43.0	C	(RQD=9%)			7			C2	60	42
							6.45					

GROUND SURFACE TO 33' USED HW CASING: THEN Cored to 43'

Sample Type
D=Drive C=Cored W=Washed
UP=Fixed Piston UT=Shelby Tube
TP=Test Pit A=Auger
OE = Open End Rod
* 300# hammer

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb. Wt x 30" fall on 2" O.D. Sampler

Cohesionless	Density	Cohesive	Consistency	
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M./Stiff	
30-50	Dense	8-15	Stiff	
50+	Very Dense	15-30	V-Stiff	

SUMMARY:
Earth Boring 33'
Rock Coring 10'
Samples 7

HOLE NO. BB1(OW)

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

TO Green International Affiliates, Inc. ADDRESS Medford, MA HOLE NO. BB1(OW)
PROJECT NAME Newman Ave. & Newell Bridges LOCATION East Providence/Cumberland, R.I. PROJ. NO. 02361-0
REPORT SENT TO above OUR JOB NO. 03-233 SURF. ELEV. 178.7 +/-

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev./Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No	Pen"	Rec."
							8					
							7					
							4					
								43.0	Bottom of Boring 43'			
									Installed 2" PVC Well at 25' 10' Slotted - 15' Solid 4 Bags of Sand 10 lbs. of Hole Plug One 6" Gate Box			

GROUND SURFACE TO 33' USED HW CASING: THEN Cored to 43'

Sample Type
D=Drive C=Cored W=Washed
UP=Fixed Piston UT=Shelby Tube
TP=Test Pit A=Auger
OE = Open End Rod
* 300# hammer

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb. Wt x 30" fall on 2" O.D. Sampler

Cohesionless	Density	Cohesive	Consistency	
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M./Stiff	
30-50	Dense	8-15	Stiff	
50+	Very Dense	15-30	V-Stiff	

SUMMARY:
Earth Boring 33'
Rock Coring 10'
Samples 7

HOLE NO. BB1(OW)

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

TO	Green International Affiliates, Inc.	ADDRESS	Medford, MA	HOLE NO.	BB2
PROJECT NAME	Newman Ave. & Newell Bridges	LOCATION	East Providence/Cumberland, R.I.	PROJ. NO.	02361-0
REPORT SENT TO	above	OUR JOB NO.	03-233	SURF. ELEV.	178.7 +/-

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.		DATE
At ____ after ____ Hours	Type	HW	S/S	NV-II	Start	5/7/03
	Size I.D.	4"	1-3/8"		Complete	5/9/03
At ____ after ____ Hours	Hammer Wt.	300#	140#	BIT	Boring Foreman	P. Brescia
	Hammer Fall	24"	30"	Dia.	Inspector/Engr.	J. Mazzarino

LOCATION OF BORING **Newell Bridge No. 204 - Cumberland, R.I.**

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev./Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen"	Rec."
									Asphalt			
		1.0-3.0	D	39	45	27		0.7	Brown fine to medium SAND, little silt & fine to	1	24	15
						17			medium gravel			
									FILL			
		4.0-6.0	D	16	9	6			Brown fine to coarse SAND and Gravel, trace silt	2	24	6
5						4						
									FILL			
		9.0-11.0	D	15	8	5			Piece of coarse GRAVEL (Possible Fill)	3	24	0
10						6		10.0				
		11.0-13.0	D	16	16	17			Brown medium to coarse SAND, trace fine gravel	4	24	10
						12						
		14.0-16.0	D	15	12	39			Brown medium to coarse SAND and medium Gravel,	5	24	7
15						18			Cobbles			
									(Possible Fill)			
		19.0-21.0	D	12	9	17			Brown medium to fine SAND and fine to coarse	6	24	7
20						31			Gravel, Cobbles, little silt			
								22.0	BOULDER			
									(Change in color on Roller Bit - Red)			
		24.0-24.3	D	100/3"				23.0		7	3	0
25									Red compact silty fine to medium SAND and fine to			
									medium Gravel - Completely weathered Red			
									CONGLOMERATE and coarse Sandstone			
		29.0-29.6	D	54	65/1"					8	7	6
30							Min/Ft	29.6	Red CONCLOMERATE and coarse Sandstone,			
		31.0-36.0	C	(RQD=28%)			6		medium hard (0-18"), soft to very soft (18"-47"),	C1	60	47
							6		moderately to severely weathered, very close to close			
							6.30		joint spacing, clay visible at joints (18"-47").			
							5		(WAMSUTTA FORMATION)			
35							6.45					
								36.0	Bottom of Boring 36'			

GROUND SURFACE TO **31'** USED **HW** CASING: THEN **Cored to 36'**

Sample Type	Proportions Used		140 lb. Wt x 30" fall on 2" O.D. Sampler					SUMMARY:
D=Drive C=Cored W=Washed	trace	0 to 10%	Cohesionless	Density	Cohesive	Consistency		Earth Boring 31'
UP=Fixed Piston UT=Shelby Tube	little	10 to 20%	0-10	Loose	0-4	Soft	30 + Hard	Rock Coring 5'
TP=Test Pit A=Auger	some	20 to 35%	10-30	Med. Dense	4-8	M./Stiff		Samples 8
OE = Open End Rod	and	35 to 50%	30-50	Dense	8-15	Stiff		
* 300# hammer			50+	Very Dense	15-30	V-Stiff		HOLE NO. BB2

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

TO Green International Affiliates, Inc. | ADDRESS Medford, MA | HOLE NO. BB4
PROJECT NAME Newman Ave. & Newell Bridges | LOCATION East Providence/Cumberland, R.I. | PROJ. NO. 02361-0
REPORT SENT TO above | OUR JOB NO. 03-233 | SURF. ELEV. 179.1 +/-

GROUND WATER OBSERVATIONS

At 15.8 after ___ Hours

At ___ after ___ Hours

	CASING	SAMPLER	CORE BAR.		DATE
Type	HW	S/S	NV-II	Start	5/5/03
Size I.D.	4"	1-3/8"		Complete	5/6/03
Hammer Wt.	300#	140#	BIT	Boring Foreman	P. Brescia
Hammer Fall	24"	30"	Dia.	Inspector/Engr.	J. Mazzarino

LOCATION OF BORING Newell Bridge No. 204 - Cumberland, R.I.

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Elev./Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen"	Rec."
									Asphalt			
		1.0-3.0	D	27	22	25		0.7	Dark Brown fine to medium SAND and fine to coarse	1	24	14
						37			Gravel, trace silt			
									FILL			
5		4.0-6.0	D	5	3	3			Brown fine to medium SAND, some fine gravel, trace	2	24	3
						3			silt			
									(Possible Fill)			
10		9.0-11.0	D	15	16	10			Brown fine to medium SAND, some fine to medium	3	24	9
						15			gravel, trace silt (Possible Fill)			
15		14.0-16.0	D	9	5	3		14.0	Fine to coarse GRAVEL, some coarse sand	4	24	1
						1	▽		(Possible Glacial Outwash)			
20		19.0-21.0	D	16	16	22		19.5	Red compact fine to medium SAND, some fine gravel	5	24	13
						20			& silt - Completely weathered Red			
									CONGLOMERATE and coarse Sandstone			
25		24.0-25.3	D	22	16	100/3"				6	15	15
								27.0	(Roller Bit 2' into Possible Rock to 29')			
		29.0-29.0	D	100/0"			Min/Ft					
30		29.0-34.0	C	(RQD=36%)			5			C1	60	59
							6.5		Red CONGLOMERATE and coarse Sandstone, hard,			
							7		slightly to moderately weathered, very close to close			
							6.5		joint spacing.			
							8.5		(WAMSUTTA FORMATION)			
35		34.0-39.0	C	(RQD=29%)			8			C2	60	58
							7.5					
							8					
							11					
							8					
								39.0	Bottom of Boring 39'			

GROUND SURFACE TO 27' USED HW CASING: THEN R.B. to 29' then Cored

Sample Type	Proportions Used		140 lb. Wt x 30" fall on 2" O.D. Sampler					SUMMARY:
D=Drive C=Cored W=Washed	trace	0 to 10%	Cohesionless	Density	Cohesive	Consistency		Earth Boring 29'
UP=Fixed Piston UT=Shelby Tube	little	10 to 20%	0-10	Loose	0-4	Soft	30 + Hard	Rock Coring 10'
TP=Test Pit A=Auger	some	20 to 35%	10-30	Med. Dense	4-8	M./Stiff		Samples 7
OE = Open End Rod	and	35 to 50%	30-50	Dense	8-15	Stiff		
* 300# hammer			50+	Verv Dense	15-30	V-Stiff		HOLE NO. BB4

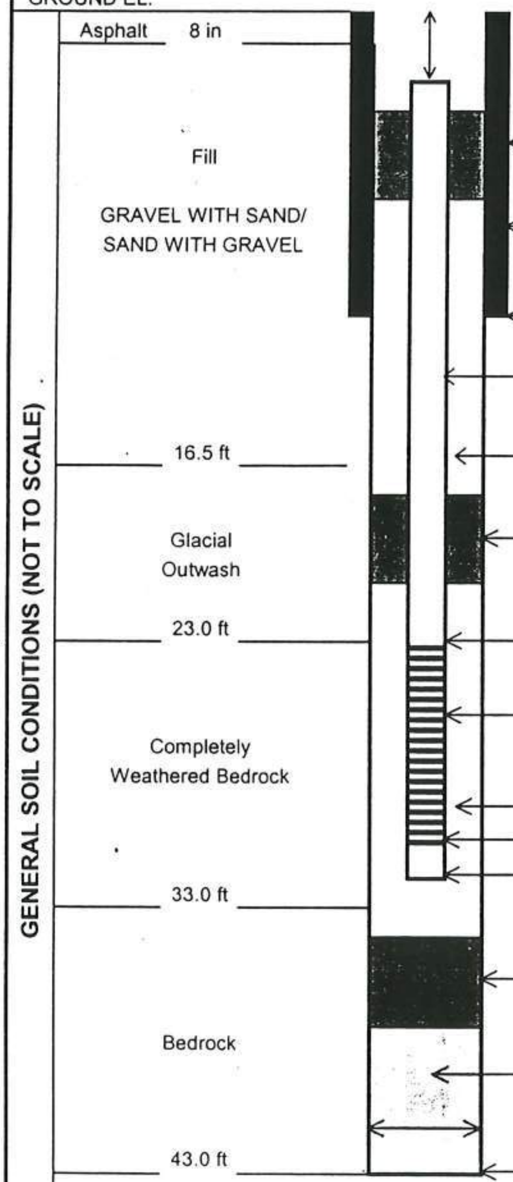
GROUNDWATER MONITORING WELL REPORT

WELL ID # BB1(OW)

PROJECT	RIDOT Project Group 5 Bridges		
LOCATION	Cumberland, Rhode Island	PROJECT NO.	02361-0
CLIENT	Green International Affiliates, INC.	BORING NO.	BB1
CONTRACTOR	Guild Drilling Co. DRILLER P. Brescia	LOCATION	Newell Bridge
GEI REP.	J. Mazzarino		See Plan
CHECKED BY	K. DiRocco DATE 6/27/2003	INSTALL. DATE	4/22/2003

SURVEY DATUM

GROUND EL.



CASING LENGTH ABOVE GROUND SURFACE	-
DEPTH TO TOP OF RISER PIPE	1"
THICKNESS OF SURFACE SEAL	~1 ft
TYPE OF SURFACE SEAL	Cement
ID OF SURFACE CASING	3 7/8"
TYPE OF SURFACE CASING	Road Box
DEPTH BOTTOM OF CASING	9 1/4"
ID and OD OF RISER PIPE	2" ID / 2 3/8" OD
TYPE OF RISER PIPE	Sch. 40 PVC
TYPE OF BACKFILL AROUND RISER PIPE	3/8" peastone/cuttings
DEPTH TOP OF SEAL	11.0'
TYPE OF SEAL	Bentonite Chips
DEPTH BOTTOM OF SEAL	12.0'
DEPTH TOP OF PERVIOUS SECTION	15.0'
TYPE OF PERVIOUS SECTION	Sch. 40 PVC
DESCRIBE OPENINGS	0.010" slotted
ID and OD OF PERVIOUS SECTION	2" ID / 2 3/8" OD
TYPE OF BACKFILL AROUND PERVIOUS SECTION	Silica Sand
DEPTH BOTTOM OF PERVIOUS SECTION	24'-9"
DEPTH BOTTOM OF SILT TRAP	25.0'
DEPTH BOTTOM OF SAND/TOP OF SEAL	NA
TYPE OF SEAL	NA
DEPTH BOTTOM OF SEAL	NA
TYPE OF BACKFILL BELOW PERVIOUS SECTION	Peastone/silica sand
DIAMETER OF BOREHOLE	4.5"
DEPTH BOTTOM OF BOREHOLE	43.0'

NOTES:

Silica Sand- Superior quartz filtration media (00N)

Φ GEI Consultants, Inc.

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

TO Green International Affiliates, Inc. | ADDRESS Medford, MA | HOLE NO. P1A

PROJECT NAME Newman Ave. & Newell Bridges | LOCATION East Providence/Cumberland, R.I. | PROJ. NO. 02361-0

REPORT SENT TO above | OUR JOB NO. 03-233 | SURF. ELEV. 178.7 +/-

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.		DATE
At ____ after ____ Hours	Type	4" Solid	Probe		Start	5/2/03
	Size I.D.	Auger			Complete	5/2/03
At ____ after ____ Hours	Hammer Wt.			BIT	Boring Foreman	P. Brescia
	Hammer Fall				Inspector/Engr.	J. Mazzarino

LOCATION OF BORING Newell Bridge No. 204 - Cumberland, R.I.

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Elev./Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen"	Rec."
									8" Asphalt			
5												
10												
15												
20												
								22.0	Refusal - Bottom of Probe 22'			

GROUND SURFACE TO ____ USED ____ CASING: THEN ____

Sample Type
D=Drive C=Cored W=Washed
UP=Fixed Piston UT=Shelby Tube
TP=Test Pit A=Auger
OE = Open End Rod
* 300# hammer

Proportions Used

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb. Wt x 30" fall on 2" O.D. Sampler

Cohesionless	Density	Cohesive	Consistency	
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M./Stiff	
30-50	Dense	8-15	Stiff	
50+	Very Dense	15-30	V-Stiff	

SUMMARY:
Earth Boring 22'
Rock Coring ____
Samples 0

HOLE NO. P1A

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

TO Green International Affiliates, Inc.	ADDRESS Medford, MA	HOLE NO. P1B
PROJECT NAME Newman Ave. & Newell Bridges	LOCATION East Providence/Cumberland, R.I.	PROJ. NO. 02361-0
REPORT SENT TO above	OUR JOB NO. 03-233	SURF. ELEV. 178.7 +/-

GROUND WATER OBSERVATIONS

At ______ after ______ Hours

At ______ after ______ Hours

	CASING	SAMPLER	CORE BAR.
Type	4" Solid	Probe	
Size I.D.	Auger		
Hammer Wt.			BIT
Hammer Fall			

	DATE
Start	5/2/03
Complete	5/2/03
Boring Foreman	P. Brescia
Inspector/Engr.	J. Mazzarino

LOCATION OF BORING Newell Bridge No. 204 - Cumberland, R.I.

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen"	Rec."
									8" Asphalt			
5												
10												
15												
20												
25												
30								30.0	No Refusal - Bottom of Probe 30'			

GROUND SURFACE TO ______ USED ______ CASING: THEN ______

Sample Type
D=Drive C=Cored W=Washed
UP=Fixed Piston UT=Shelby Tube
TP=Test Pit A=Auger
OE = Open End Rod
* 300# hammer

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb. Wt x 30" fall on 2" O.D. Sampler

Cohesionless	Density	Cohesive	Consistency	
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M./Stiff	
30-50	Dense	8-15	Stiff	
50+	Very Dense	15-30	V-Stiff	

SUMMARY:
Earth Boring 30'
Rock Coring ______
Samples 0

HOLE NO. P1B

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

TO Green International Affiliates, Inc. ADDRESS Medford, MA HOLE NO. P1C
PROJECT NAME Newman Ave. & Newell Bridges LOCATION East Providence/Cumberland, R.I. PROJ. NO. 02361-0
REPORT SENT TO above OUR JOB NO. 03-233 SURF. ELEV. 178.7 +/-

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.		DATE
At ____ after ____ Hours	Type	4" Solid	Probe		Start	5/2/03
	Size I.D.	Auger			Complete	5/2/03
At ____ after ____ Hours	Hammer Wt.			BIT	Boring Foreman	P. Brescia
	Hammer Fall				Inspector/Engr.	J. Mazzarino

LOCATION OF BORING Newell Bridge No. 204 - Cumberland, R.I.

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Elev./Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen"	Rec."
								4.0	Refusal - Bottom of Probe 4'			

GROUND SURFACE TO ________ USED ________ CASING: THEN ________

Sample Type	Proportions Used		140 lb. Wt x 30" fall on 2" O.D. Sampler					SUMMARY:
D=Drive C=Cored W=Washed	trace	0 to 10%	Cohesionless	Density	Cohesive	Consistency		Earth Boring 4'
UP=Fixed Piston UT=Shelby Tube	little	10 to 20%	0-10	Loose	0-4	Soft	30 + Hard	Rock Coring ____
TP=Test Pit A=Auger	some	20 to 35%	10-30	Med. Dense	4-8	M./Stiff		Samples 0
OE = Open End Rod	and	35 to 50%	30-50	Dense	8-15	Stiff		
* 300# hammer			50+	Very Dense	15-30	V-Stiff		HOLE NO. P1C

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

TO Green International Affiliates, Inc.	ADDRESS Medford, MA	HOLE NO. P1D
PROJECT NAME Newman Ave. & Newell Bridges	LOCATION East Providence/Cumberland, R.I.	PROJ. NO. 02361-0
REPORT SENT TO above	OUR JOB NO. 03-233	SURF. ELEV. 178.7 +/-

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.		DATE
At ___ after ___ Hours	Type	4" Solid	Probe		Start	5/2/03
	Size I.D.	Auger			Complete	5/2/03
At ___ after ___ Hours	Hammer Wt.			BIT	Boring Foreman	P. Brescia
	Hammer Fall				Inspector/Engr.	J. Mazzarino

LOCATION OF BORING Newell Bridge No. 204 - Cumberland, R.I.

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen"	Rec."
									8" Asphalt			
								2.5	Refusal - Bottom of Probe 2.5'			

GROUND SURFACE TO ______ USED ______ CASING: THEN ______

Sample Type	Proportions Used		140 lb. Wt x 30" fall on 2" O.D. Sampler					SUMMARY:
D=Drive C=Cored W=Washed	trace	0 to 10%	Cohesionless	Density	Cohesive	Consistency		Earth Boring 2.5'
UP=Fixed Piston UT=Shelby Tube	little	10 to 20%	0-10	Loose	0-4	Soft	30 + Hard	Rock Coring
TP=Test Pit A=Auger	some	20 to 35%	10-30	Med. Dense	4-8	M./Stiff		Samples 0
OE = Open End Rod	and	35 to 50%	30-50	Dense	8-15	Stiff		
* 300# hammer			50+	Very Dense	15-30	V-Stiff		HOLE NO. P1D

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

TO	Green International Affiliates, Inc.	ADDRESS	Medford, MA	HOLE NO.	P1E
PROJECT NAME	Newman Ave. & Newell Bridges	LOCATION	East Providence/Cumberland, R.I.	PROJ. NO.	02361-0
REPORT SENT TO	above	OUR JOB NO.	03-233	SURF. ELEV.	178.7 +/-

GROUND WATER OBSERVATIONS

At ______ after ____ Hours

At ______ after ____ Hours

	CASING	SAMPLER	CORE BAR.
Type	4" Solid	Probe	
Size I.D.	Auger		
Hammer Wt.			BIT
Hammer Fall			

	DATE
Start	5/2/03
Complete	5/2/03
Boring Foreman	P. Brescia
Inspector/Engr.	J. Mazzarino

LOCATION OF BORING Newell Bridge No. 204 - Cumberland, R.I.

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen"	Rec."
									8" Asphalt			
5												
10												
15												
								19.0	Refusal - Bottom of Probe 19'			
									* Augers were not plumb at completion of probe. Auger tip wandered toward South during drilling.			

GROUND SURFACE TO ______ USED ______ CASING: THEN ______

Sample Type
D=Drive C=Cored W=Washed
UP=Fixed Piston UT=Shelby Tube
TP=Test Pit A=Auger
OE = Open End Rod
* 300# hammer

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb. Wt x 30" fall on 2" O.D. Sampler

Cohesionless	Density	Cohesive	Consistency	
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M./Stiff	
30-50	Dense	8-15	Stiff	
50+	Very Dense	15-30	V-Stiff	

SUMMARY:
Earth Boring 19'
Rock Coring ______
Samples 0

HOLE NO. P1E

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

TO Green International Affiliates, Inc.	ADDRESS Medford, MA	HOLE NO. P1F	
PROJECT NAME Newman Ave. & Newell Bridges	LOCATION East Providence/Cumberland, R.I.	PROJ. NO. 02361-0	
REPORT SENT TO above	OUR JOB NO. 03-233	SURF. ELEV. 178.7 +/-	

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.		DATE
At ______ after ____ Hours	Type	4" Solid	Probe		Start	5/2/03
	Size I.D.	Auger			Complete	5/2/03
At ______ after ____ Hours	Hammer Wt.			BIT	Boring Foreman	P. Brescia
	Hammer Fall				Inspector/Engr.	J. Mazzarino

LOCATION OF BORING Newell Bridge No. 204 - Cumberland, R.I.

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen"	Rec."
									8" Asphalt			
5												
10												
15												
20												
25												
								29.5	No Refusal - Bottom of Probe 29.5'			

GROUND SURFACE TO ______ USED ______ CASING: THEN ______

Sample Type	Proportions Used		140 lb. Wt x 30" fall on 2" O.D. Sampler					SUMMARY:
D=Drive C=Cored W=Washed			Cohesionless	Density	Cohesive	Consistency		Earth Boring 29.5'
UP=Fixed Piston UT=Shelby Tube	trace	0 to 10%	0-10	Loose	0-4	Soft	30 + Hard	Rock Coring ____
TP=Test Pit A=Auger	little	10 to 20%	10-30	Med. Dense	4-8	M./Stiff		Samples 0
OE = Open End Rod	some	20 to 35%	30-50	Dense	8-15	Stiff		
• 300# hammer	and	35 to 50%	50+	Very Dense	15-30	V-Stiff		HOLE NO. P1F

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

TO Green International Affiliates, Inc.	ADDRESS Medford, MA	HOLE NO. P2A
PROJECT NAME Newman Ave. & Newell Bridges	LOCATION East Providence/Cumberland, R.I.	PROJ. NO. 02361-0
REPORT SENT TO above	OUR JOB NO. 03-233	SURF. ELEV. 179.1 +/-

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.		DATE
At ___ after ___ Hours	Type	4" Solid	Probe		Start	5/5/03
	Size I.D.	Auger			Complete	5/5/03
At ___ after ___ Hours	Hammer Wt.			BIT	Boring Foreman	P. Brescia
	Hammer Fall				Inspector/Engr.	J. Mazzarino

LOCATION OF BORING Newell Bridge No. 204 - Cumberland, R.I.

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen"	Rec."
									8" Asphalt			
								3.5	Refusal - Bottom of Probe 3.5'			

GROUND SURFACE TO ______ USED ______ CASING: THEN ______

Sample Type	Proportions Used		140 lb. Wt x 30" fall on 2" O.D. Sampler					SUMMARY:
D=Drive C=Cored W=Washed	trace	0 to 10%	Cohesionless	Density	Cohesive	Consistency		Earth Boring 3.5'
UP=Fixed Piston UT=Shelby Tube	little	10 to 20%	0-10	Loose	0-4	Soft	30 + Hard	Rock Coring ___
TP=Test Pit A=Auger	some	20 to 35%	10-30	Med. Dense	4-8	M./Stiff		Samples 0
OE = Open End Rod	and	35 to 50%	30-50	Dense	8-15	Stiff		
* 300# hammer			50+	Very Dense	15-30	V-Stiff		HOLE NO. P2A

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

TO Green International Affiliates, Inc.	ADDRESS Medford, MA		HOLE NO. P2B
PROJECT NAME Newman Ave. & Newell Bridges	LOCATION East Providence/Cumberland, R.I.		PROJ. NO. 02361-0
REPORT SENT TO above	OUR JOB NO. 03-233		SURF. ELEV. 179.1 +/-

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.		DATE
At ___ after ___ Hours	Type	4" Solid	Probe		Start	5/5/03
	Size I.D.	Auger			Complete	5/5/03
At ___ after ___ Hours	Hammer Wt.			BIT	Boring Foreman	P. Brescia
	Hammer Fall				Inspector/Engr.	J. Mazzarino

LOCATION OF BORING Newell Bridge No. 204 - Cumberland, R.I.

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen"	Rec."
									8" Asphalt			
5												
								6.1	Refusal - Bottom of Probe 6.1'			

GROUND SURFACE TO ___ USED ___ CASING: THEN ___

Sample Type
D=Drive C=Cored W=Washed
UP=Fixed Piston UT=Shelby Tube
TP=Test Pit A=Auger
OE = Open End Rod
* 300# hammer

Proportions Used	
trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb. Wt x 30" fall on 2" O.D. Sampler

Cohesionless	Density	Cohesive	Consistency	
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M./Stiff	
30-50	Dense	8-15	Stiff	
50+	Very Dense	15-30	V-Stiff	

SUMMARY:
Earth Boring 6.1'
Rock Coring ___
Samples 0

HOLE NO. P2B

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

TO Green International Affiliates, Inc. | ADDRESS Medford, MA | HOLE NO. P2C
PROJECT NAME Newman Ave. & Newell Bridges | LOCATION East Providence/Cumberland, R.I. | PROJ. NO. 02361-0
REPORT SENT TO above | OUR JOB NO. 03-233 | SURF. ELEV. 179.1 +/-

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.		DATE
At ___ after ___ Hours	Type	4" Solid	Probe		Start	5/5/03
	Size I.D.	Auger			Complete	5/5/03
At ___ after ___ Hours	Hammer Wt.			BIT	Boring Foreman	P. Brescia
	Hammer Fall				Inspector/Engr.	J. Mazzarino

LOCATION OF BORING Newell Bridge No. 204 - Cumberland, R.I.

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From To 0-6	6-12	12-18	Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen"	Rec."
									8" Asphalt			
5												
10												
15												
								19.3	Refusal - Bottom of Probe 19.3'			

GROUND SURFACE TO ______ USED ______ CASING: THEN ______

Sample Type	Proportions Used		140 lb. Wt x 30" fall on 2" O.D. Sampler					SUMMARY:
D=Drive C=Cored W=Washed	trace	0 to 10%	Cohesionless	Density	Cohesive	Consistency		Earth Boring 19.3'
UP=Fixed Piston UT=Shelby Tube	little	10 to 20%	0-10	Loose	0-4	Soft	30 + Hard	Rock Coring ___
TP=Test Pit A=Auger	some	20 to 35%	10-30	Med. Dense	4-8	M./Stiff		Samples 0
OE = Open End Rod	and	35 to 50%	30-50	Dense	8-15	Stiff		
* 300# hammer			50+	Very Dense	15-30	V-Stiff		HOLE NO. P2C

GUILD DRILLING CO., INC.
100 WATER STREET • EAST PROVIDENCE, R.I.

SHEET 1 OF 1

TO Green International Affiliates, Inc. ADDRESS Medford, MA HOLE NO. P2D
PROJECT NAME Newman Ave. & Newell Bridges LOCATION East Providence/Cumberland, R.I. PROJ. NO. 02361-0
REPORT SENT TO above OUR JOB NO. 03-233 SURF. ELEV. 179.1 +/-

GROUND WATER OBSERVATIONS		CASING	SAMPLER	CORE BAR.		DATE
At ____ after ____ Hours	Type	4" Solid	Probe		Start	5/5/03
	Size I.D.	Auger			Complete	5/5/03
At ____ after ____ Hours	Hammer Wt.			BIT	Boring Foreman	P. Brescia
	Hammer Fall				Inspector/Engr.	J. Mazzarino

LOCATION OF BORING Newell Bridge No. 204 - Cumberland, R.I.

Depth	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev./ Depth	SOIL OR ROCK IDENTIFICATION Remarks include color, gradation, type of soil etc. Rock-color, type, condition, hardness, drilling time, seams, etc.	SAMPLE No.	Pen"	Rec."
									8" Asphalt			
5												
								9.6	Refusal - Bottom of Probe 9.6'			

GROUND SURFACE TO ______ USED ______ CASING: THEN ______

Sample Type	Proportions Used		140 lb. Wt x 30" fall on 2" O.D. Sampler					SUMMARY:
D=Drive C=Cored W=Washed	trace	0 to 10%	Cohesionless	Density	Cohesive	Consistency		Earth Boring 9.6'
UP=Fixed Piston UT=Shelby Tube	little	10 to 20%	0-10	Loose	0-4	Soft	30 + Hard	Rock Coring
TP=Test Pit A=Auger	some	20 to 35%	10-30	Med. Dense	4-8	M./Stiff		Samples 0
OE = Open End Rod	and	35 to 50%	30-50	Dense	8-15	Stiff		
* 300# hammer			50+	Very Dense	15-30	V-Stiff		HOLE NO. P2D

APPENDIX C

CURRENT BORING LOGS

RIDOT Project	Newell Bridge	**BORING # :**	SB-101
Sheet	1 **of** 4		
Location (C/T) :	Providence / CUMBERLAND	**RIDOT Database ID # :**	
RIC # :	2019-EH-024 WO#2	**FAP # :**	
Date Start :	3/2/20	**Date End :**	3/3/20
Bridge/Road # :	020401	**N Coord. :**	328,076 **Ft.**
Design Consult Co. :	Steere Engineering, Inc.	**E Coord. :**	352,600 **Ft.**
Geotech Consult Co. :	GZA GeoEnvironmental, Inc.	**Ground Surface Elev., Ft. :**	177.8
Inspector Name/Co. :	Nicholas Hetland	**Elevation Datum**	NAVD88

Methods Used to Determine Borehole Coordinates and Elevation :

Digitized

Drilling Firm : New England Boring Contractors

Project No. :

Drilling Foreman : Norman Studdard

Drilling Rig Make & Model : Truck Diedrich-D120

Drilling Methods and Tools

Casing Size : 5, 4 in **Hollow Stem Auger** ☐ **Flight OD :** 0 (in)

Methods Used to Advance Casing :

Driven (300 lbs) ☒ **Push** ☐ **Roller Bit** ☐ **Spin** ☐ **Open Hole** ☒

Drill Rod Size : NWJ **Wt./Ft.** 5.5 (lbs)

Soils/Rock Sampling :

SPT Hammer Type **Donut** ☐ **Safety** ☐ **Automatic Trip** ☒ **Other** ______

Hammer Wt : 140 (lbs) **Hammer Fall :** 30 (in)

Split Spoon Sampler : **Barrel Length :** 24 **Barrel ID:** 1.5 (in) **Barrel OD :** 2 (in)

Shoe ID: 1.375 (in) **Shoe OD :** 2 (in)

Liner Type : **Brass** ☐ **Stainless Steel** ☒ **Plastic** ☐ **Spring Core Catcher** ☒

Undisturbed Samplers :

Shelby Tube :	**Length :** ______ (in)	**ID/OD :** ______ (in)
Fixed Piston Sampler Type	**Length :** ______ (in)	**ID/OD :** ______ (in)
Other: ______	**Length :** ______ (in)	**ID/OD :** ______ (in)

Bedrock Core Barrel Type : Standard double tube **ID/OD :** 2/2.5 (in) **Core Diameter :** 2 (in)

Groundwater Monitoring : **Well Screen Depth from :** ______ **(ft) to** ______ **(ft)**

Soil/Rock Samples Delivered to :

Name : Thielsch Engineering **Date :** 3/5/20

Address : 195 Frances Ave, Cranston, Ri 02910

Rhode Island Department of Transportation

Two Capitol Hill
Providence, RI 02903

RIC # : 2019-EH-024 WO#2
Boring No. : SB-101
Database ID No. :

RIDOT Project Newell Bridge		**BORING # :** SB-101	**Sheet** 2 **of** 4
Location (C/T) : Providence / CUMBERLAND		**RIDOT Database ID # :**	
RIC # : 2019-EH-024 WO#2	**FAP # :**	**Date Start :** 3/2/20	**Date End :** 3/3/20
Bridge/Road # : 020401		**N Coord. :** 328,076 **Ft.**	
Design Consult Co. : Steere Engineering, Inc.		**E Coord. :** 352,600 **Ft.**	
Geotech Consult Co. : GZA GeoEnvironmental, Inc.		**Ground Surface Elev., Ft. :** 177.8	
Inspector Name/Co. : Nicholas Hetland		**Elevation Datum** NAVD88	

Borehole Location Description: See Plan

Sampler: Unless otherwise noted, soil sampler consists of a 2 in. split spoon driven using a 140 lb hammer, 30" fall.
Casing: Unless otherwise noted, casing is driven using 300 lb hammer, falling 24 in.

Casing Size: 5, 4 in **HS Auger** X

Groundwater Observations

Date	Time	Depth	Casing at	Stab. Time
03/03/20	00:00	NA	28	NA

DEPTH Ft.	CASING BLOWS /Ft.	Type & Number	SAMPLER Pen/ Rcy. Core Rcy. & RQD	Depth	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAMPLE DESCRIPTION Burmister Soil Classification System	Depth of Stratum Change	STRATUM DESCRIPTION	REMARKS
							0.6	ASPHALT	1
								FILL	
		SS-1	24/17	1.0	34-36-27	Very dense, brown/gray, fine to coarse SAND and fine Gravel, trace Silt, moist			
				3.0					
		SS-2	24/5	4.0	8-6-3	Medium dense, brown, fine to medium SAND and fine to coarse GRAVEL, little Silt, moist			
5									
		SS-3	24/11	6.0	18-18-20	Dense, light reddish brown, fine to coarse SAND, some fine to coarse Gravel, little Silt, moist			
		SS-4	24/6	8.0	10-6-7	Medium dense, reddish brown, fine to medium SAND, some fine Gravel, little Silt, moist			
10		SS-5	24/3	10.0	10-9-8	Medium dense, brown, fine to medium SAND, some fine Gravel, little Silt, moist (additional attempt w/ 3-inch Sampler SS-5A: Brown, fine to coarse SAND, some fine to coarse Gravel, little Silt, moist, 3-inch recovery)			2
		SS-6	24/0	12.0	7-13-9	NO RECOVERY (additional attempt w/ 3-inch Sampler SS-6A: NO RECOVERY)	12.0	GLACIAL OUTWASH	
		SS-7	24/7	14.0	7-5-4	Medium dense, brown, fine GRAVEL and fine to coarse SAND, trace Silt, moist			
15									

REMARKS: 1. Boring advanced from 0'-1' below ground surface (bgs) with roller bit. A 7" thick layer of asphalt was measured at the ground surface. 2. Depth intervals 10'-12', 12'-14 and 20'-22' bgs resampled with a 3" split spoon as samples SS-5A, SS-6A and SS-10A respecitvely. 3" split spoons were driven through disturbed substrate; blow counts are not representative and therefore were not recorded.

140# Wt x 30" fall on 2" OD SS Sampler

Proportions Used		Sampler Type	Cohesionless	Density	Cohesive	Consistency
trace	0 to 10%	SS - Split Spoon	0 - 10	Loose	0 - 4	Soft
little	10 to 20%	UT - Shelby Tube	10 - 30	Medium Dense	4 - 8	Firm
some	20 to 35%	UP - Fixed Position	30 - 50	Dense	8 - 15	Stiff
and	35 to 50%	C - Rock Core	50 +	Very Dense	15 - 30	Very Stiff
					30 +	Hard

RIC # : 2019-EH-024 WO#2
Boring No. : SB-101
Date Completed : 3/3/20
Database ID No. :

RIDOT Project	Newell Bridge	BORING # :	SB-101	Sheet 3 of 4
Location (C/T) :	Providence / CUMBERLAND	RIDOT Database ID # :		

DEPTH Ft.	CASINGS BL/Ft.	Type & Number	SAMPLER Pen/ Rcy. Core Rcy. & RQD	Depth	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAMPLE DESCRIPTION Burmister Soil Classification System	Depth of Stratum Change	STRATUM DESCRIPTION	REMARKS
								GLACIAL OUTWASH	
		SS-8	24/6	16.0	3-2-1	Loose, brown, fine to coarse SAND, and fine to coarse Gravel, trace Silt, wet			
		SS-9	24/6	18.0	6-3-4	Loose, brown, fine to coarse GRAVEL, some fine to coarse Sand, trace Silt, wet			
20		SS-10	24/0	20.0	2-11-23	NO RECOVERY (additional attempt w/ 3-inch Sampler SS-10A: Reddish brown, fine to coarse SAND, little fine to coarse Gravel, little Silt, wet, 5-inch recovery)	20.0	GLACIAL TILL	
		SS-11	24/12	22.0	18-19-22	Dense, reddish brown, fine to coarse SAND, some fine Gravel, little Silt, wet			3
		SS-12	24/18	24.0	19-27-20	Dense, reddish brown, fine to coarse SAND, some fine Gravel, little Silt, wet			
25									
		SS-13	20/11	26.0	8-9-65/2"	Medium dense, reddish brown, fine to medium SAND, little Silt, little fine Gravel, wet			
				27.7					
					(3)		28.0	WEATHERED ROCK	4
					(3)				5
30		C-1	48/47 16.7%	30.0	(3)	Very soft, severely weathered, reddish brown, moderately fractured meta-conglomerate (RUN=48", REC=47", REC%=98%, RQD=16.7%)			6
					(3)				
					(4)				
					(5)				
		C-2	60/60 93.3%	34.0	(4)	Soft, moderately weathered, reddish brown with green and gray clasts, slightly fractured, meta-conglomerate (RUN=60", REC=60", REC%=100%, RQD=93.3%)	34.0	BEDROCK	7
35					(4)				

REMARKS: 3. 5" (PW) casing driven to 20' bgs. 4" (HW) casing telescoped through 5" (PW) casing after driving sample S-10A. 4. Split spon refusal on sample S-13 at ±27.8' bgs. Weathered bedrock inferred at this depth. 5. At end of day on 3/2/20 the drill rods were removed, casing was driven flush with the ground surface and plugged; then the boring was covered with temporary asphalt cold patch. On 3/3/20 the asphalt patch and plug were removed and boring progression resumed. 6. 4" casing driven to ±28' bgs. Boring advanced from 27.8'-30' bgs with roller bit. 7. Rock core barrel jammed at 34' bgs. Run was stopped and the core was removed.

140# Wt x 30" fall on 2" OD SS Sampler

Proportions Used		Sampler Type	Cohesionless	Density	Cohesive	Consistency
trace	0 to 10%	SS - Split Spoon	0 - 10	Loose	0 - 4	Soft
little	10 to 20%	UT - Shelby Tube	10 - 30	Medium Dense	4 - 8	Firm
some	20 to 35%	UP - Fixed Position	30 - 50	Dense	8 - 15	Stiff
and	35 to 50%	C - Rock Core	50 +	Very Dense	15 - 30	Very Stiff
					30 +	Hard

RIC # : 2019-EH-024 WO#2
Boring No. : SB-101
Date Completed : 3/3/20
Database ID No. :

RIDOT Project	Newell Bridge	BORING # :	SB-101	Sheet 4 of 4
Location (C/T) :	Providence / CUMBERLAND	RIDOT Database ID # :		

DEPTH Ft.	CASING BLOWS /Ft.	Type & Number	SAMPLER Pen/Rcy. Core Rcy. & RQD	SAMPLER Depth	Blows per 6 in. (Coring min/ft) [Downpress psi]	SOIL AND ROCK SAMPLE DESCRIPTION Burmister Soil Classification System	Depth of Stratum Change	STRATUM DESCRIPTION	REMARKS
					(5)			BEDROCK	
					(3)				
					(4)				
		C-3	60/60 51.7%	39.0	(3)	Soft, moderately weathered, reddish brown, with green and gray clasts, moderately fractured meta-conglomerate (RUN=60", REC=60", REC%=100%, RQD=51.7%)			
40					(5)				
					(6)				
					(3)				
					(3)				
		C-4	60/60 95.8%	44.0	(4)	Soft, slightly weathered, reddish brown with gray clasts, slightly fractured meta-conglomerate (RUN=60", REC=60", REC%=100%, RQD=95.8%)			
45					(4)				
					(3)				
					(4)				
				49.0	(4)		49.0		8
50									9
55									

REMARKS: 8. End of exploration at 49' bgs. Boring backfilled with clean gravel and sand. Concrete was added when backfilling the top 5' of the boring. Borehole fixed with cold mix asphalt patch at the surface. Boring as-drilled location measured with tape from existing site features. 9. Groundwater not measured within the boring due to the introduction of drilling fluid during drilling. Distance from bridge deck to river surface measured at 16.5' upon completion of the boring.

140# Wt x 30" fall on 2" OD SS Sampler

Proportions Used		Sampler Type	Cohesionless	Density	Cohesive	Consistency
trace	0 to 10%	SS - Split Spoon	0 - 10	Loose	0 - 4	Soft
little	10 to 20%	UT - Shelby Tube	10 - 30	Medium Dense	4 - 8	Firm
some	20 to 35%	UP - Fixed Position	30 - 50	Dense	8 - 15	Stiff
and	35 to 50%	C - Rock Core	50 +	Very Dense	15 - 30	Very Stiff
					30 +	Hard

RIC # : 2019-EH-024 WO#2
Boring No. : SB-101
Date Completed : 3/3/20
Database ID No. :

APPENDIX D

USGS GEOLOGY MAPS

PROJECT SITE

PROJECT SITE

APPENDIX E

LABORATORY TESTING RESULTS

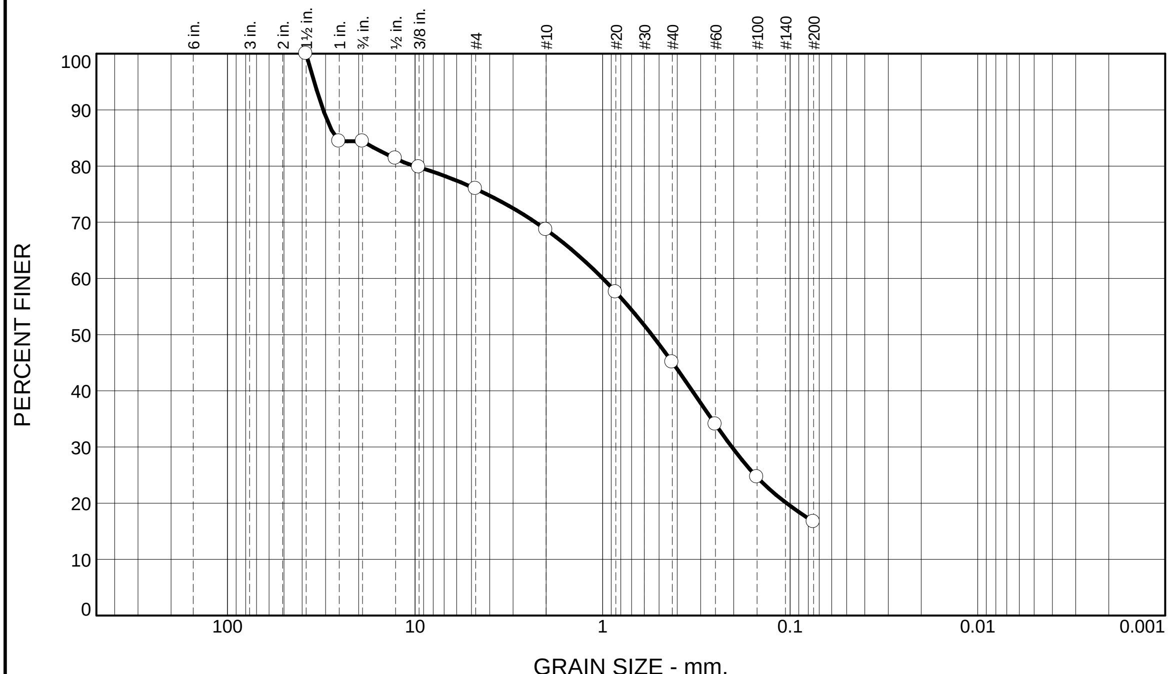
THIELSCH ENGINEERING	195 Frances Avenue Cranston RI, 02910 Phone: (401)-467-6454 Fax: (401)-467-2398 thielsch.com *Let's Build a Solid Foundation*	Client Information: GZA GeoEnvironmental Providence, RI PM: Alexander Haag Assigned By: Nicholas Hetland Collected By: Nicholas Hetland	Project Information: **Newell Bridge** **Cumberland, RI** GZA Project Number: 03.0034674.00 Summary Page: 1 of 1 Report Date: 03.12.2020

LABORATORY TESTING DATA SHEET, Report No.: 7420-C-111

Boring ID	Sample No.	Depth (ft)	Laboratory No.	Identification Tests						Corrosivity Tests								Laboratory Log and Soil Description
				As Received Water Content %	LL %	PL %	Gravel %	Sand %	Fines %	Resitivity (Mohms-cm)	Sulfate (mg/kg)	Chloride (mg/kg)	Sulfide (mg/kg)	Redox Potential (mv)	pH	Electrical Resist. As Received Ohm-cm @ 60°F	Electrial Resist. Saturated Ohm-cm @ 60°F	
				D2216	D4318		D6913			EPA						G57		
GZ-1	S-3	6-8	20-S-665				24.1	59.2	16.7									Light Red Brown f-c SAND, some f-c Gravel, little Silt
GZ-1	S-8	16-18	20-S-666				37.0	55.8	7.2									Brown f-c SAND and f-c GRAVEL, trace Silt
GZ-1	S-11	22-24	20-S-667				20.5	61.8	17.7									Red Brown f-c SAND, some fine Gravel, little Silt
GZ-1	S-4	8-10	20-S-668							0.013	205	155			8.69			Analytical Only
GZ-1	S-12	24-26	20-S-669							0.002	68	ND			7.89			Analytical Only

Date Received: *03.05.2020*　　Reviewed By: ________　　Date Reviewed: *03.12.2020*

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	15.6	8.5	7.2	23.6	28.4	16.7	

Test Results (D6913 & ASTM D 1140)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1-1/2"	100.0		
1"	84.4		
3/4"	84.4		
1/2"	81.4		
3/8"	79.8		
#4	75.9		
#10	68.7		
#20	57.6		
#40	45.1		
#60	34.0		
#100	24.6		
#200	16.7		

* (no specification provided)

Material Description

Light Red Brown f-c SAND, some f-c Gravel, little Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 30.8565 D_{85}= 26.2856 D_{60}= 0.9979
D_{50}= 0.5474 D_{30}= 0.2043 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 03.05.2020 **Date Tested:** 03.09.2020

Tested By: IA

Checked By: Steven Accetta

Title: Laboratory Coordinator

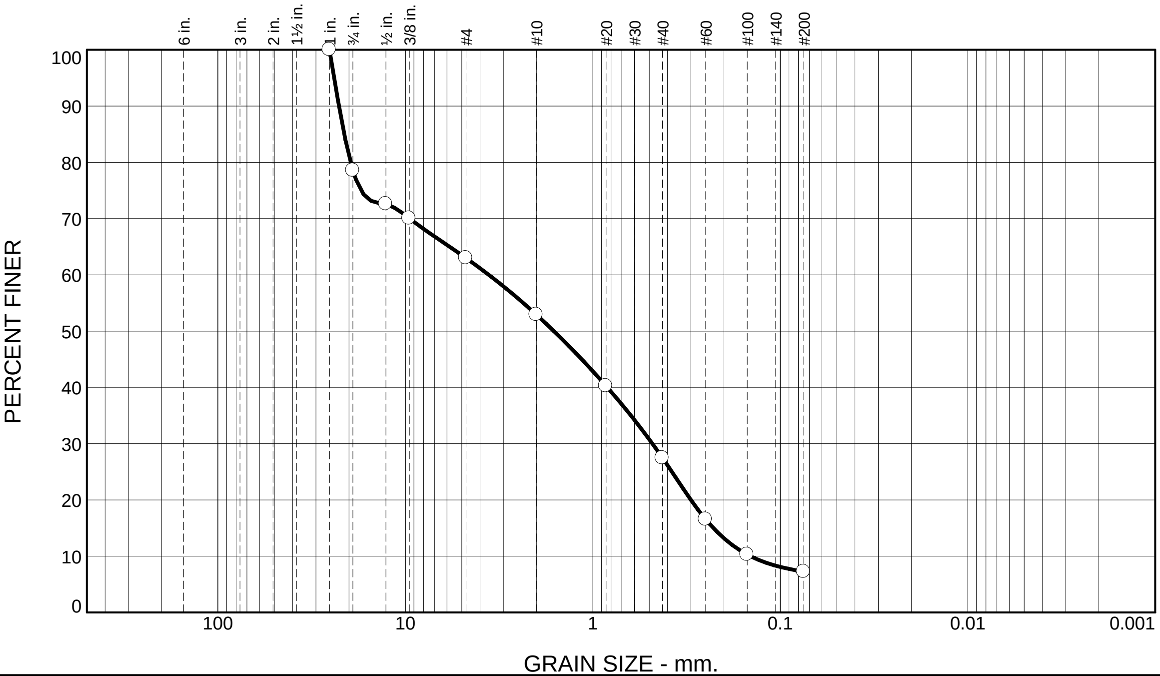
Source of Sample: GZ-1 **Depth:** 6-8' **Date Sampled:**
Sample Number: S-3

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Newell Bridge
Cumberland, RI
Project No: 03.0034674.00 **Figure** 20-S-665

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	21.5	15.5	10.1	25.4	20.3	7.2	

Test Results (D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
1"	100.0		
0.75"	78.5		
0.5"	72.6		
0.375"	70.0		
#4	63.0		
#10	52.9		
#20	40.2		
#40	27.5		
#60	16.5		
#100	10.3		
#200	7.2		

* (no specification provided)

Material Description

Brown f-c SAND and f-c GRAVEL, trace Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SP-SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 22.5993	D_{85}= 21.1771	D_{60}= 3.5871
D_{50}= 1.6131	D_{30}= 0.4812	D_{15}= 0.2275
D_{10}= 0.1443	C_u= 24.85	C_c= 0.45

Remarks

Date Received: 03.05.2020 **Date Tested:** 03.09.2020

Tested By: IA

Checked By: Steven Accetta

Title: Laboratory Coordinator

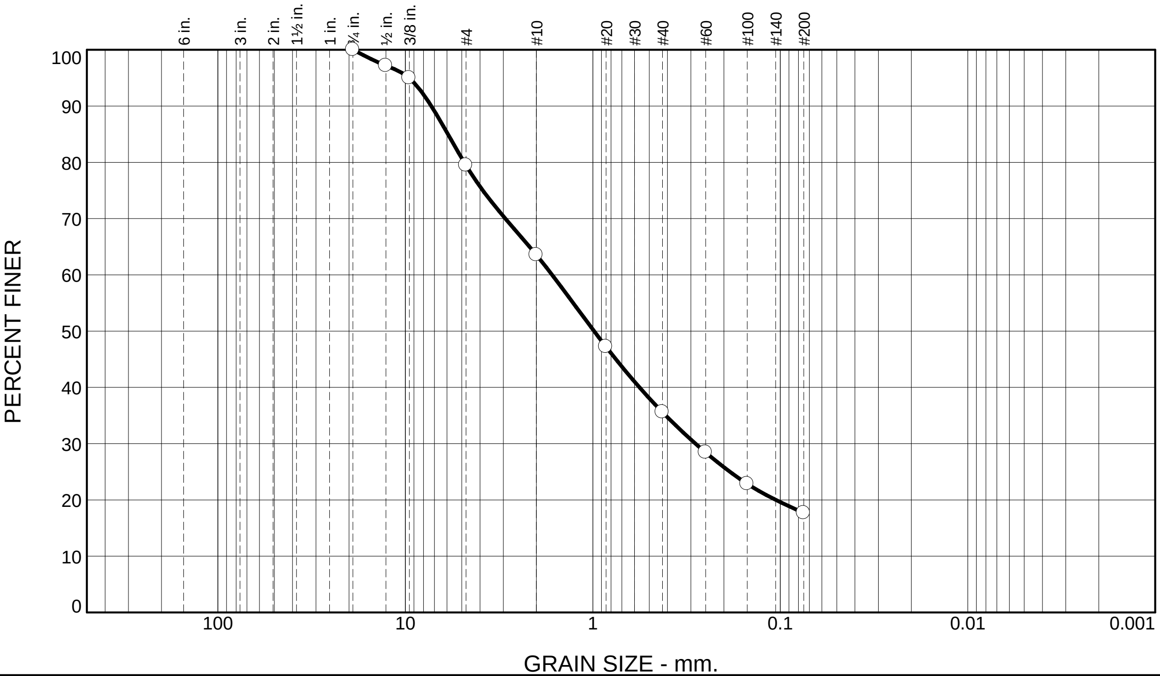
Source of Sample: GZ-1 **Depth:** 16-18' **Date Sampled:**
Sample Number: S-8

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Newell Bridge
Cumberland, RI
Project No: 03.0034674.00 **Figure** 20-S-666

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	20.5	16.0	27.9	17.9	17.7	

Test Results (D6913 & ASTM D 1140)			
Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
0.75"	100.0		
0.5"	97.2		
0.375"	95.0		
#4	79.5		
#10	63.5		
#20	47.2		
#40	35.6		
#60	28.4		
#100	22.9		
#200	17.7		

* (no specification provided)

Material Description

Red Brown f-c SAND, some fine Gravel, little Silt

Atterberg Limits (ASTM D 4318)

PL= NP **LL=** NV **PI=** NP

Classification

USCS (D 2487)= SM **AASHTO (M 145)=** A-1-b

Coefficients

D_{90}= 7.2643 D_{85}= 5.9293 D_{60}= 1.6481
D_{50}= 0.9849 D_{30}= 0.2832 D_{15}=
D_{10}= C_u= C_c=

Remarks

Date Received: 03.05.2020 **Date Tested:** 03.09.2020

Tested By: IA

Checked By: Steven Accetta

Title: Laboratory Coordinator

Source of Sample: GZ-1 **Depth:** 22-24' **Date Sampled:**
Sample Number: S-11

Thielsch Engineering Inc.

Cranston, RI

Client: GZA GeoEnvironmental
Project: Newell Bridge
Cumberland, RI
Project No: 03.0034674.00 **Figure** 20-S-667

CERTIFICATE OF ANALYSIS

Steve Accetta
Thielsch Engineering, Inc.
195 Frances Avenue
Cranston, RI 02910

RE: Newell Bridge - GZA (0.0034674.00)
ESS Laboratory Work Order Number: 20C0188

This signed Certificate of Analysis is our approved release of your analytical results. These results are only representative of sample aliquots received at the laboratory. ESS Laboratory expects its clients to follow all regulatory sampling guidelines. Beginning with this page, the entire report has been paginated. This report should not be copied except in full without the approval of the laboratory. Samples will be disposed of thirty days after the final report has been delivered. If you have any questions or concerns, please feel free to call our Customer Service Department.

Laurel Stoddard
Laboratory Director

REVIEWED
By ESS Laboratory at 2:27 pm, Mar 11, 2020

Analytical Summary

The project as described above has been analyzed in accordance with the ESS Quality Assurance Plan. This plan utilizes the following methodologies: US EPA SW-846, US EPA Methods for Chemical Analysis of Water and Wastes per 40 CFR Part 136, APHA Standard Methods for the Examination of Water and Wastewater, American Society for Testing and Materials (ASTM), and other recognized methodologies. The analyses with these noted observations are in conformance to the Quality Assurance Plan. In chromatographic analysis, manual integration is frequently used instead of automated integration because it produces more accurate results.

The test results present in this report are in compliance with TNI and relative state standards, and/or client Quality Assurance Project Plans (QAPP). The laboratory has reviewed the following: Sample Preservations, Hold Times, Initial Calibrations, Continuing Calibrations, Method Blanks, Blank Spikes, Blank Spike Duplicates, Duplicates, Matrix Spikes, Matrix Spike Duplicates, Surrogates and Internal Standards. Any results which were found to be outside of the recommended ranges stated in our SOPs will be noted in the Project Narrative.

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: Newell Bridge - GZA

ESS Laboratory Work Order: 20C0188

SAMPLE RECEIPT

The following samples were received on March 05, 2020 for the analyses specified on the enclosed Chain of Custody Record.

The client did not deliver the samples in a cooler.

Lab Number	Sample Name	Matrix	Analysis
20C0188-01	GZ-1 S-4 8-10ft	Soil	9038, 9045, 9050A, 9250
20C0188-02	GZ-1 S-12 24-26ft	Soil	9038, 9045, 9050A, 9250

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: Newell Bridge - GZA

ESS Laboratory Work Order: 20C0188

PROJECT NARRATIVE

No unusual observations noted.

End of Project Narrative.

DATA USABILITY LINKS

To ensure you are viewing the most current version of the documents below, please clear your internet cookies for www.ESSLaboratory.com. Consult your IT Support personnel for information on how to clear your internet cookies.

Definitions of Quality Control Parameters

Semivolatile Organics Internal Standard Information

Semivolatile Organics Surrogate Information

Volatile Organics Internal Standard Information

Volatile Organics Surrogate Information

EPH and VPH Alkane Lists

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: Newell Bridge - GZA

ESS Laboratory Work Order: 20C0188

CURRENT SW-846 METHODOLOGY VERSIONS

Analytical Methods

1010A - Flashpoint
6010C - ICP
6020A - ICP MS
7010 - Graphite Furnace
7196A - Hexavalent Chromium
7470A - Aqueous Mercury
7471B - Solid Mercury
8011 - EDB/DBCP/TCP
8015C - GRO/DRO
8081B - Pesticides
8082A - PCB
8100M - TPH
8151A - Herbicides
8260B - VOA
8270D - SVOA
8270D SIM - SVOA Low Level
9014 - Cyanide
9038 - Sulfate
9040C - Aqueous pH
9045D - Solid pH (Corrosivity)
9050A - Specific Conductance
9056A - Anions (IC)
9060A - TOC
9095B - Paint Filter
MADEP 04-1.1 - EPH
MADEP 18-2.1 - VPH

Prep Methods

3005A - Aqueous ICP Digestion
3020A - Aqueous Graphite Furnace / ICP MS Digestion
3050B - Solid ICP / Graphite Furnace / ICP MS Digestion
3060A - Solid Hexavalent Chromium Digestion
3510C - Separatory Funnel Extraction
3520C - Liquid / Liquid Extraction
3540C - Manual Soxhlet Extraction
3541 - Automated Soxhlet Extraction
3546 - Microwave Extraction
3580A - Waste Dilution
5030B - Aqueous Purge and Trap
5030C - Aqueous Purge and Trap
5035A - Solid Purge and Trap

SW846 Reactivity Methods 7.3.3.2 (Reactive Cyanide) and 7.3.4.1 (Reactive Sulfide) have been withdrawn by EPA. These methods are reported per client request and are not NELAP accredited.

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: Newell Bridge - GZA
Client Sample ID: GZ-1 S-4 8-10ft
Date Sampled: 03/05/20 16:00
Percent Solids: 91

ESS Laboratory Work Order: 20C0188
ESS Laboratory Sample ID: 20C0188-01
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Chloride	**WL 155** (33)		9250		1	EEM	03/09/20 12:41	mg/kg dry	DC00913
Corrosivity (pH)	**8.69** (N/A)		9045		1	JLK	03/05/20 19:03	S.U.	DC00565
Corrosivity (pH) Sample Temp	**Soil pH measured in water at 20.2 ºC.**								
Resistivity	**WL 0.013** (N/A)		9050A		1	CCP	03/09/20 12:30	Mohms-cm	DC00921
Sulfate	**WL 205** (55)		9038		1	JLK	03/09/20 19:01	mg/kg dry	DC00950

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: Newell Bridge - GZA
Client Sample ID: GZ-1 S-12 24-26ft
Date Sampled: 03/05/20 16:00
Percent Solids: 88

ESS Laboratory Work Order: 20C0188
ESS Laboratory Sample ID: 20C0188-02
Sample Matrix: Soil

Classical Chemistry

Analyte	Results (MRL)	MDL	Method	Limit	DF	Analyst	Analyzed	Units	Batch
Chloride	**WL** ND (34)		9250		1	EEM	03/09/20 12:46	mg/kg dry	DC00913
Corrosivity (pH)	**7.89** (N/A)		9045		1	JLK	03/05/20 19:03	S.U.	DC00565
Corrosivity (pH) Sample Temp	**Soil pH measured in water at 20.0 ºC.**								
Resistivity	**WL 0.002** (N/A)		9050A		1	CCP	03/09/20 12:30	Mohms-cm	DC00921
Sulfate	**WL 68** (57)		9038		1	JLK	03/09/20 19:01	mg/kg dry	DC00950

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: Newell Bridge - GZA

ESS Laboratory Work Order: 20C0188

Quality Control Data

Analyte	Result	MRL	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Qualifier
				Classical Chemistry						
Batch DC00913 - General Preparation										
Blank										
Chloride	ND	3	mg/kg wet							
LCS										
Chloride	32		mg/L	30.00		106	90-110			
Batch DC00950 - General Preparation										
Blank										
Sulfate	ND	5	mg/kg wet							
LCS										
Sulfate	10		mg/L	9.988		98	80-120			

CERTIFICATE OF ANALYSIS

Client Name: Thielsch Engineering, Inc.
Client Project ID: Newell Bridge - GZA

ESS Laboratory Work Order: 20C0188

Notes and Definitions

Z-10a	Soil pH measured in water at 20.2 ºC.
Z-10	Soil pH measured in water at 20.0 ºC.
WL	Results obtained from a deionized water leach of the sample.
U	Analyte included in the analysis, but not detected
ND	Analyte NOT DETECTED at or above the MRL (LOQ), LOD for DoD Reports, MDL for J-Flagged Analytes
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
MDL	Method Detection Limit
MRL	Method Reporting Limit
LOD	Limit of Detection
LOQ	Limit of Quantitation
DL	Detection Limit
I/V	Initial Volume
F/V	Final Volume
§	Subcontracted analysis; see attached report
1	Range result excludes concentrations of surrogates and/or internal standards eluting in that range.
2	Range result excludes concentrations of target analytes eluting in that range.
3	Range result excludes the concentration of the C9-C10 aromatic range.
Avg	Results reported as a mathematical average.
NR	No Recovery
[CALC]	Calculated Analyte
SUB	Subcontracted analysis; see attached report
RL	Reporting Limit
EDL	Estimated Detection Limit
MF	Membrane Filtration
MPN	Most Probably Number
TNTC	Too numerous to Count
CFU	Colony Forming Units

ESS LABORATORY CERTIFICATIONS AND ACCREDITATIONS

ENVIRONMENTAL

Rhode Island Potable and Non Potable Water: LAI00179
http://www.health.ri.gov/find/labs/analytical/ESS.pdf

Connecticut Potable and Non Potable Water, Solid and Hazardous Waste: PH-0750
http://www.ct.gov/dph/lib/dph/environmental_health/environmental_laboratories/pdf/OutofStateCommercialLaboratories.pdf

Maine Potable and Non Potable Water, and Solid and Hazardous Waste: RI00002
http://www.maine.gov/dhhs/mecdc/environmental-health/dwp/partners/labCert.shtml

Massachusetts Potable and Non Potable Water: M-RI002
http://public.dep.state.ma.us/Labcert/Labcert.aspx

New Hampshire (NELAP accredited) Potable and Non Potable Water, Solid and Hazardous Waste: 2424
http://des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm

New York (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: 11313
http://www.wadsworth.org/labcert/elap/comm.html

New Jersey (NELAP accredited) Non Potable Water, Solid and Hazardous Waste: RI006
http://datamine2.state.nj.us/DEP_OPRA/OpraMain/pi_main?mode=pi_by_site&sort_order=PI_NAMEA&Select+a+Site:=58715

United States Department of Agriculture Soil Permit: P330-12-00139

Pennsylvania: 68-01752
http://www.dep.pa.gov/Business/OtherPrograms/Labs/Pages/Laboratory-Accreditation-Program.aspx

ESS Laboratory

Division of Thielsch Engineering, Inc.
185 Frances Avenue, Cranston, RI 02910-2211
Tel. (401) 461-7181 Fax (401) 461-4486
www.esslaboratory.com

CHAIN OF CUSTODY

ESS LAB PROJECT ID 2000188

Turn Time Standard _X_ Rush___ Approved By: ______

Reporting Limits -

State where samples were collected: **RI**

Is this project for any of the following: (please circle)
MA-MCP CT-RCP RGP DOD Other______

Electonic Deliverable Yes_X__ No____
Format: Excel___ Access___ PDF_X_ Other_____

Project Manager: Steve Accetta
Company: Thielsch Engineering
Address: 195 Frances Ave, Cranston, RI 02910

Project # 03.0034674.00
Project Name/Client Name: Newell Bridge/ GZA GeoEnvironmental
Contract Pricing _x_
Special Pricing WO#: ______

ESS Lab Sample ID	Date	Collection Time	Grab -G Composite-C	Matrix	Sample Identification	# of Jar	pH	Sulfate	Chloride	Resistivity							Comment #
1	03.05.2020	1600	C	S	GZ-1 / S-4 / 8'-10'	1	X	X	X	X							
2	03.05.2020	1600	C	S	GZ-1 / S-12 / 24'-26'	1	X	X	X	X							
Preservation Code: 1-NP, 2-HCl, 3-H2SO4, 4-HNO3, 5-NaOH, 6-MeOH, 7-Asorbic Acid, 8-ZnAct, 9-_CH_3OH____							1	1	1	1							
Container Type: P-Poly G-Glass AG-Amber Glass S-Sterile V-VOA							G	G	G	G							

Matrix: S-Soil SD-Solid D-Sludge WW-Wastewater GW-Groundwater SW-Surface Water DW-Drinking Water O-Oil W-Wipes F-Filter

Cooler Present ____Yes X No
Seals Intact ____ Yes ____No NA: X
Cooler Temperature: 22.1

Sampled by : Nicholas Hetland

Comments: Please send report to: Rroth@thielsch.com, Saccetta@thielsch.com, mcolman@thielsch.com

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature] 03.05.2020 4:55PM		[signature] 3/5/20 1655			
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Please E-mail all changes to Chain of Custody in writing.

Page ____ of ____

THIELSCH ENGINEERING	195 Frances Avenue Cranston RI, 02910 Phone: (401)-467-6454 Fax: (401)-467-2398 thielsch.com *Let's Build a Solid Foundation*	Client Information: GZA GeoEnvironmental Providence, RI PM: Alexander Haag Assigned By: Nicholas Hetland Collected By: Nicholas Hetland	Project Information: **Newell Bridge** **Cumberland, RI** GZA Project Number: 03.0034674.00 Summary Page: 1 of 1 Report Date: 03.10.2020

LABORATORY TESTING DATA SHEET, Report No.: 7420-C-110

Boring No.	Sample No.	Depth (ft)	Laboratory No.	Specimen Data						Compressive Strength Tests								Rock Formation or Description or Remarks
				Mohs Hard-ness	Diameter (in)	Length (in)	(1) Unit Weight (PCF)	(2) Wet Density (PCF)	Bulk G_s	(3) Other Tests	(4) Strength PSI	(5) Strain %	(6) E sec PSI EE+06	(7) Poisson's Ratio	στ PSI	Is_{50} PSI	(8) s_c PSI	
SB-101	C-2	37.3-38	20-S-663		1.989	4.692	163.7				4708							Arkosic Conglomerate
Break was fresh that went around some lithics.																		
SB-101	C-4	47-47.9	20-S-664		1.983	4.613	170.7				6200							Arkosic Conglomerate
Break was fresh.																		

(1) Volume Determined By Measuring Dimensions (2) Determined by Measuring Dimensions and Weight of Saturated Sample	Notes	(3) PLD=Point Load (diametrical), PLA= Point Load (Axial) ST= Splitting Tensile U= Unconfined Compressive Strength (4) Taken at Peak Deviator Stress	Notes	(5) Strain at Peak Deviator Stress (6) Represents Secant Modulus at 50% of Total Failure Stress (7) Represents Secant Poisson's Ratio at 50% of Total Failure Stress (8) Estimated UCS from Table 1 of ASTM D5731 for NX cores (Is x 24)

Date Received: *03.05.2020*   Reviewed By: Sth Ho   Date Reviewed: *03.12.2020*

APPENDIX F

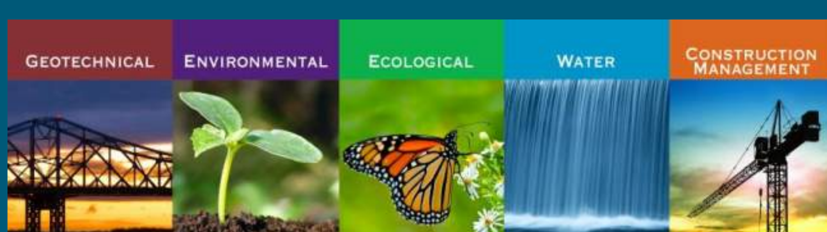
ROCK CORE PHOTOS

BORING NO.	CORE RUN	APPROX. DEPTHS OF RUN		RECOVERY			ROCK QUALITY DESIGNATION (RQD)
		TOP	BOTTOM	CORE LENGTH	REC. LENGTH	PERCENT	
		[ft]	[ft]	[in]	[in]	[%]	
SB-101	C-1	30.0	34.0	48	47	97.9	16.7
	C-2	34.0	39.0	60	60	100.0	93.3
	C-3	39.0	44.0	60	60	100.0	51.7
	C-4	44.0	49.0	60	60	100.0	95.8

DRY CONDITION

WET CONDITION

GZA GeoEnvironmental Inc. Engineers and Scientists www.gza.com	PROJ MGR: AH DESIGNED BY: AH REVIEWED BY:DYB	RIDOT BRIDGE GROUP 17C - MAJOR BRIDGE REHABILITATION NEWELL BRIDGE (NO. 020451) DIAMOND HILL ROAD, CUMBERLAND, RHODE ISLAND	RIDOT WO_02-BG17C APRIL 2020
	PREPARED BY: NEH DATE: 3/10/2020	ROCK CORE PHOTOGRAPHS SB-101: C-1 THROUGH C-4	FIGURE: F-001



GZA GeoEnvironmental, Inc.

Appendix G

Asbestos Abatement Plan From RI Analytical

Asbestos Abatement Plan - Water Pipe Removal

Site: Newell Bridge #020401
RIDOT Bridge On-Call – Bridge Group 17C, Cumberland, RI 02864

Prepared for:
VHB
1 Cedar Street, Suite 400, Providence, RI 02903

Owner:
Rhode Island Department of Transportation
Two Capitol Hill, Providence, RI 02908

RI Analytical Project #2023135

DATE: June 11, 2024

R.I. ANALYTICAL
Specialists in Environmental Services

R.I. ANALYTICAL
41 Illinois Avenue - Warwick, RI 02888
P: (401) 737-8500 F: (401) 732-8034

TRANSMITTAL to RIDOH

To: Ms. Bonnie Cassani-Brandt
RI Department of Health, Asbestos Program
Three Capitol Hill, 206 Cannon Building
Providence, RI 02908

P: 401.222.7784
E: Bonnie.cassanibrandt@health.ri.gov

cc: Mr. Andrew Reeder, PE, PMP, Structural Engineer
VHB
1 Cedar Street, Suite 400
Providence, RI 02903

P: 401.457.2011
E: AReeder@VHB.com

From: Kenneth Davis

Date: June 11, 2024

RE: Asbestos Abatement Plan – Water Pipe Removal
Site: Newell Bridge #020401, Cumberland, RI 02864
VHB #73500.01 - RI Analytical Project #2023135

Ms. Cassani-Brandt:

Attached to this Transmittal, please find the following.
(1) Asbestos Abatement Plan for your review and approval.

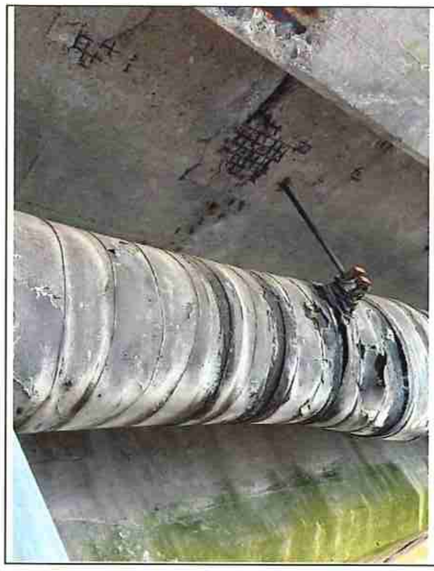
Table 2 below summarizes the **ACM**[1] identified that is to be abatement at the Site.

Table 2 –ACM Inventory Summary

Line#	HM #	Material Type	ACM Location	Sample # / Asbestos Content	Condition	Estimated Quantity/Notes
15/16	**7**	**Sealer (black) on pipe, metal suspension anchors and on adjacent outer ACM paper pipe wrap at 4 hanger locations**	**Newell Bridge No. 204 - pipe that runs between the North and South concrete abutment walls and into concrete conduits on the East side of the bridge and that is anchored to the underside of the concrete bridge deck above with metal suspension hangers**	**7A, 7B** **5-15% Chrysotile**	**I, NF**	**4 SF** (1 SF x 4 anchors) This ACM black sealer is on the hangers at and adhered to the outer ACM black paper layer of the pipe and cannot be separated. The metal anchor needs to be cut and disposed of as ACM. [See photographs below]
17/21/25	**8**	**Paper (black), thick** Paper (black), thin Insulation (wool-type) (brown) Rope (light brown), wrapped around insulation Metal pipe		**8A, 8B, 8C** **5-15% Chrysotile**	**D, NF**	**25 LF** (~4-6" Ø interior metal pipe with 18"-24" outside Ø of pipe with insulation, 25' length of pipe) All layers must be treated as ACM as they are adhered to and cannot be separated. There may be ACM mastic adhered to the metal pipe that may be difficult to remove. Any pipe to remain must be thoroughly cleaned and spray encapsulated. [See photographs below]

HM = Homogenous Material; F = **Friable**[2]; NF = Non-Friable; I = Intact; D = Damaged (i.e. <10% of the material is damaged); SD = Significantly Damaged (i.e. >10% of the material is damaged); EA = Each; LF = Linear Feet; SF = Square Feet; CF = Cubic Feet

[1] **ACM** = Asbestos-Containing Material, i.e., material found to contain >1% asbestos by PLM laboratory analysis
[2] **Friable** = Material that, when dry, can be crumbled, shattered, pulverized or reduced to powder by hand pressure



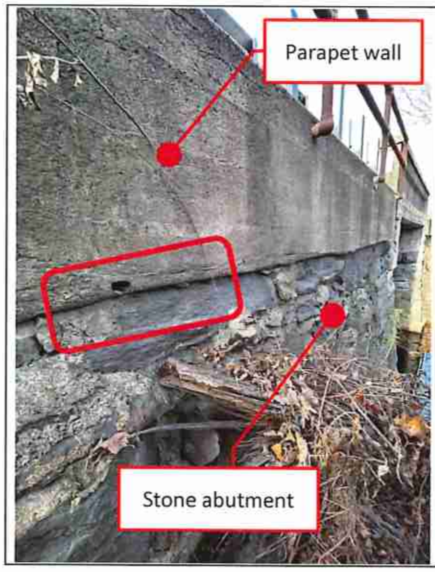
NESHAP Units Calculation

NESHAP unit/RIDOH Abatement Plan Fee Calculation - 1 NESHAP unit = 260 LF+160 SF+35 CF or combination thereof.	25 LF/ 260 LF + 4 SF / 160 SF = 0.125 NESHAP units. *The RIDOH abatement plan filing fee is waived for Rhode Island State Agencies including RIDOT.*

Table 3 below summarizes the **ACWM**[3] that will remain after completion of this asbestos abatement project. These materials will be managed in place by the Owner in accordance with the Long-Term Management Plan included in the attached Asbestos Abatement Plan.

[3] **ACWM** = Asbestos-Containing Waste Materials, and materials contaminated with asbestos or materials found to contain ≤1% asbestos by PLM laboratory analysis

Table 3 – ACWM to Remain						
Line#	HM #	Material Type	ACM Location	Sample # / Asbestos Content	Condition	Estimated Quantity/Notes
1/2	1	**Paper (black, thick) between concrete parapet wall and stone abutment**	**Newell Bridge No. 204 – on the East and West sides of the bridge and North and South abutments**	**1A, 1B** / **Trace Chrysotile**	**D, NF**	**1,680 SF** [(~20' L x 42' W) x 2 North and South side of bridge] The precise extent and locations of this ACWM are not known. The ACWM paper likely covers the area where the concrete parapet wall meets the stone abutment on both the north and south abutments and spanning the width of the bridge. This ACWM can be demolished with the bridge using dust suppression water mist methods (i.e., no visible emissions during demolition activities) as well as methods for compliance with the OSHA Asbestos in Construction Standard (29CFR1926.1101) and EPA NESHAP asbestos regulation 40CFR61 Subpart M. The waste transported and disposed of at **RIRRC**[4]



<u>The following waivers are requested for ACM removal</u>:

1. Waiver for no clearance air sampling for exterior materials removal where no work containment enclosure will be constructed – plastic wrap with "candy-stripe" duct tape and glue and glovebag removal at sufficient points along the pipe to safely cut the pipe out in sections – followed by disposal of the pipe with wrap materials as ACM.

[4] **RIRRC** = Rhode Island Resource Recovery Corporation – Central Landfill, 65 Shun Pike, Johnston, RI 02919.

In lieu of clearance air sampling, the asbestos abatement contractor will conduct worker OSHA compliance Excursion Limit and 8-hour TWA PCM air sampling, and RI Analytical (or other licensed asbestos consultant) will conduct upwind and downwind work zone perimeter PCM air sampling during the work [216-RICR-50-15-1 §1.14.8 K.].

RHODE ISLAND DEPARTMENT OF HEALTH

NOTARIZED CERTIFICATION OF ASBESTOS ABATEMENT PLAN

Facility/Building: Water Pipe - RIDOT Bridge - BG 17C - Newell Bridge #020401 Cumberland, RI 02864

Address: Diamond Hill Road off Nate Whipple Highway - over the East Sneech Brook

City/Town: Cumberland, RI ZIP: 02864 Amendment Phase No: ____________

Abatement Plan Prepared By: Kenneth Davis RIDOH License No.: APD00510

Summary of specific waivers/variances being requested:

(1) 1. Waiver for no clearance air sampling for exterior materials removal where no work containment enclosure will be constructed – plastic wrap with "candy-stripe" duct tape and glue and glovebag removal at sufficient points along the pipe to safely cut the pipe out in sections – followed by disposal of the pipe with wrap materials as ACM. In lieu of clearance air sampling, the asbestos abatement contractor will conduct worker OSHA compliance Excursion Limit and 8-hour TWA PCM air sampling, and RI Analytical (or other licensed asbestos consultant) will conduct upwind and downwind work zone perimeter PCM air sampling during the work [216-RICR-50-15-1 §1.14.8 K.].

Abatement Information

Abatement Method: (Check all that apply)

- ☐ Removal
- ☐ Encapsulation
- ☐ Enclosure
- ☐ Demolition
- ☑ Glovebag
- ☐ Asphalt Roofing
- ☑ Other (specify): Exterior ACM removal where no work containment enclosure will be constructed – plastic wrap with "candy-stripe" duct tape and glue and glovebag removal at sufficient points along the pipe to safely cut the pipe out in sections – followed by disposal of the pipe with wrap materials as ACM. Contractor OSHA air samples + upwind/downwind air samples.

Asbestos Contractor: To be determined RIDOH License No.: ____________

Estimated Starting Date: July 15, 2024

Pre-Abatement Sampling Information

Bulk samples collected by: Jennifer Jencks RIDOH License No.: AI01191

Bulk samples analyzed by: RI Analytical Laboratories, Inc. RIDOH License No.: PLM00142

Air samples collected by: None to be collected for exterior work RIDOH License No.: N/A

Air samples analyzed by: None to be collected for exterior work RIDOH License No.: N/A

Clearance Air Sampling Information

Air samples to be collected by: To be determined

Air samples to be analyzed by: To be determined RIDOH License No.: ____________

CERTIFICATION

I certify that: this asbestos abatement plan is prepared and submitted under the provisions of Rhode Island General Laws Chapter 23-24.5 and the Rules and Regulations for Asbestos Control (216-RICR-50-15-1); all abatement/ management activities performed in conjunction with this plan will be in compliance with the specifications prescribed in this plan (when approved) and the most current revision of all applicable federal and state regulations; and the asbestos abatement/management activities described in this plan will be performed by a Rhode Island licensed asbestos abatement contractor.

State of Rhode Island, County of Providence. On this 17 day of July, 2024 before me, the undersigned notary public, personally appeared Nelia Piscopio (name of document signer), and proved to me through satisfactory evidence of identification to be the person whose name is signed on the preceding or attached document, and acknowledged that they signed it voluntarily for its stated purpose.

Nelia Piscopio — Nelia Piscopio

Signature of Building Owner or Agent — Printed Name of Building Owner or Agent

Cynthia M. Parker

(official signature and stamp of notary)

CYNTHIA M. PARKER NOTARY PUBLIC STATE OF RHODE ISLAND

Cynthia M. Parker #75250 — My Commission expires: 12/20/26

Printed Name, ID Number Notary Public

Form ASB-16B **Revised June 2022**

RHODE ISLAND DEPARTMENT OF HEALTH
Center for Healthy Homes and Environment – Asbestos Program

ABATEMENT PLAN APPLICATION

1. Owner/Contact Name: Ms. Nelia Piscopio
   Title: Project Manager I
   If owned by an organization, organization name: RIDOT
   Address: 2 Capitol Hill
   City/State: Providence, RI ZIP: 02903
   Phone: 401.563.4566 Email: Nelia.Piscopio@DOT.RI.GOV

---

2. Application prepared by:
   Name: Kenneth Davis RIDOH License No.: APD00510
   Phone: 401.737.8500 x120 Email: kdavis@rianalytical.com

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4. Location of abatement work:
   Facility/Building Name: Water Pipe - RIDOT Bridge - BG 17C - Newell Bridge #020401 Cumberland, RI 02864
   Street Address: Diamond Hill Road off Nate Whipple Highway - over the East Sneech Brook
   City/Town: Cumberland, RI ZIP: 02864

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5. Reason for Application: (Check all that apply)
   - [ ] Emergency Plan No. ____________
   - [x] Standard Plan
   - [ ] Annual Plan
   - [ ] Response to a Notice or Order (attach copy)

---

6. Asbestos contractor (if known):
   Name: To be determined RIDOH License No.: ____________

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7. Estimated Abatement Work Dates

Start Date: June 15, 2024 Completion Date: June 15, 2025

8. Abatement Method: **(Check all that apply)**

- [ ] Removal
- [ ] Encapsulation
- [ ] Enclosure
- [ ] Demolition
- [x] Other (Specify): Exterior ACM removal where no work containment enclosure will be constructed – plastic wrap with "candy-stripe" duct ~~tape and glue and glovebag removal at sufficient points along the pipe to safely cut the pipe out in sections~~ – followed by disposal of the pipe with wrap materials as ACM. Contractor OSHA air samples + upwind/downwind air samples.
- [x] Glovebag
- [ ] Asphalt Roofing
- [ ] Operations & Maintenance Only

9. Facility Type: **(Check one)**

- ○ Child Care Facility
- ○ College/University
- ○ Hospital
- ● Other (Specify): Public road bridge over brook
- ○ Private Residential Dwelling
- ○ Public Housing
- ○ School/School Building

10. Building Access: **(Check one)**

- ● Public Access
- ○ Limited Public Access
- ○ No Public Access
- ○ Other (specify)

11. Bulk Sampling:

A. Samples collected by:

Name: Jennifer Jencks RIDOH License No.: AI01191

B. Sampling Methodology: **(Check one)**

- ○ EPA AHERA Sampling requirements [40 CFR 763.86].
- ● Other (Specify): Guidance for Controlling Asbestos Containing Materials – 1985 Edition (EPA-560-5-85-024)

C. Analytical Service:

Name: RI Analytical RIDOH License No.: PLM00142

D. Analytical Method: **(Check one)**

- ● PLM (Phase Light Microscopy)
- ○ TEM (Transmission Electron Microscopy)
- ○ Other (Specify):

12. Pre-Abatement Air Sampling:
   A. Samples collected by:
      Name: None to be collected for exterior work RIDOH License No.: N/A
      Affiliation: N/A
   B. Analytical Service:
      Name: RI Analytical Laboratories, Inc. RIDOH License No.: PCM00142
   C. Analytical Method: **(Check one)**
      ○ PCM (Phase Contrast Microscopy)
      ○ TEM (Transmission Electron Microscopy)
      ● Other (Specify): None to be collected for exterior work

---

13. Removal and Disposal of Asbestos-Containing Material (ACM):
   A. How will ACM be removed from the abatement site? If a hauler or broker will be used to transport the ACM to a disposal site, they must also be identified.

      RACM will be removed by glovebag method and by wrap & remove method and asbestos materials waste will be placed in double 6-mil plastic lined dumpster & transported by licensed hauler (to be determined) to a licensed asbestos waste facility.

   B. Provide the name and location of the authorized asbestos waste facility where the ACM will be transferred for disposal (if known).

      To be determined.

---

14. Project Monitor: **(not required)**
   Name: To be determined RIDOH License No.:
   Affiliation: To be determined

---

15. In-Process & Clearance Air Sampling:
   A. Describe in an attachment the type, number and location of air samples that will be collected outside the work area during the abatement project.

   B. Describe in an attachment the plan of action to be followed if the Indoor Non-Occupational Air Exposure Standard for Asbestos (0.01 fibers per cubic centimeter) is exceeded outside the work area during the abatement project.

   C. Describe in an attachment the type, number and location of air samples that will be collected as part of the final clearance testing.

   D. Describe in an attachment the plan of action to be followed if the Indoor Non-Occupational Air Exposure Standard for Asbestos (0.01 fiber per cubic centimeter) is exceeded during final clearance testing.

---

16. A separate and fully completed Form ASB-16A must be submitted for ***each area*** to be abated. List below the entry in Item 1 from each attached ASB-16A.

(1) Area 1 – Exterior

---

17. Asbestos Abatement Plan Application Fee:

☑	State Agency, fee waived	$0
☐	Operation & Maintenance Program Only	$75
☐	Up to One (1) NESHAP Unit	$75
☐	Between One (1) & Ten (10) NESHAP Units	$300
☐	Between Ten (10) & Fifty (50) NESHAP Units	$600
☐	Over Fifty (50) NESHAP Units	$900
☐	Annual Plan	N/A

One (1) NESHAP Unit = 260 linear feet or 160 square feet or 35 cubic meters

---

18. I certify that this plan was prepared by me, and I am responsible for its content.

Name: Kenneth Davis RIDOH License No.: APD00510

Signature: [signature] Date: June 11, 2024

Affiliation: RI Analytical Laboratories, Inc.

Email: kdavis@rianalytical.com Phone: 401.737.8500 x120

RHODE ISLAND DEPARTMENT OF HEALTH
Center for Healthy Homes and Environment – Asbestos Program

ASBESTOS ABATEMENT PLAN APPLICATION

Supplemental Information: Area Description and Proposed Plan

Facility/Building: Water Pipe - RIDOT Bridge - BG 17C - Newell Bridge #020401 Cumberland, RI 02864

INSTRUCTIONS:
A separate and fully completed Form ASB-16A must be submitted for ***each area*** to be abated. All items on this form must be addressed. All references to attachments must be clearly identified. All attachments must be marked with the specific item numbers on this form to which they pertain.

1. Area Location/Identification (Room Name/No., etc.):
   (1) Area 1 – Exterior

2. Attach a description of each type (e.g., pipe, ceiling, etc.) of asbestos-containing material (ACM) in this area, including condition, location, quantity, and asbestos content. Attach a copy of the laboratory report(s) for all samples. All laboratory reports must include the name of the building(s) and the location(s) of the sample(s).

3. Attach a current scale drawing of this area, showing direction of North and East, which has been clearly annotated to show the type, location, and quantity of all ACM in this area. This drawing must include a legend which acts as a guide to the scale, symbols and nomenclature used in the drawing. If a master plan or multiple drawings are provided, indicate the specific location(s) and drawing number(s) which depict this area. The location of the decontamination chamber must also be so indicated on the appropriate drawing(s).

4. Proposed Plan:
   A. Attach a description of the interim Operations and Maintenance Plan that will be implemented in accordance with 1.17.2(B).

   B. Will any portion of this area be abated by use of 1.14 work procedures?
   (●) Yes ( ) No

   If yes, indicate below which ACM in this area will be abated by use of the following 1.14 work procedures: **(Check all that apply)**

   ☐ 1.14.2 & 1.14.3 Removal ____________________

☐	1.14.2 & 1.14.4	Encapsulation	
☐	1.14.2 & 1.14.5	Enclosure	
☐	1.14.6	Demolition	
☑	1.14.7	Glovebag	See Table 2 - ACM Inventory Summary and "Other" below
☐	1.14.8	Asphalt Roofing	
☑		Other (Specify)	See Table 2 - ACM Inventory Summary

C. Are you requesting any waivers to the above selected 1.14 procedure for any of the abatement activities in this area?

◉ Yes ○ No

If yes, attach a detailed description of the waivers requested you are proposing to utilize. ***All items must be keyed to the specific section(s) of the regulations for which waivers are requested.***

D. Are you proposing alternative procedures under 1.16 for any of the abatement activities in this area?

◉ Yes ○ No [See ATTACHMENT #5]

If yes, attach a detailed description of the alternate procedures requested you are proposing to utilize. ***Alternate procedures must include a justification for not following specific section(s) of the regulations and be as protective of public health.***

E. Will any ACM remain in this area after abatement?

○ Yes ◉ No ○ Beyond scope of inspection

If yes, attach a description of the ACM that will remain and the details of the on-going Operations and Maintenance Plan that will be implemented in accordance with 1.17.2(B).

ATTACHMENT #1

ASB-16A – 1

Scope of Work:

The following Table 1 summarizes the materials suspected of containing asbestos that the Owner designated were likely to be impacted by the scope of work of the project. These materials were sampled prior to commencement of any work in order to determine if they contained asbestos so that appropriate work practices could be implemented. The laboratory analytical reports are located in Attachment #2.

EPA, OSHA, and RIDOH define a material that contains greater than one percent (>1%) asbestos utilizing PLM analysis as an **ACM**[1]. Any materials found to contain ≤1% asbestos by PLM laboratory analysis and materials contaminated with asbestos are defined as **ACWM**[2] and must be handled appropriately.

The sample results are summarized in **Table 1** below. Materials determined to be ACM are highlighted in **yellow**. Materials determined to be ACWM are highlighted in **green**. The laboratory analytical reports and chain-of-custody forms are attached.

Table 1 – Suspect Materials - Laboratory Analytical Data Summary

Line #	HM#/ Sample #	Material	Location	Asbestos Result
Work Order #2312-20324 Collected December 1, 2023				
1	**1A**	**Paper (black, thick) between concrete bridge and stone foundation**	**Newell Bridge No. 204, East side of bridge, SE abutment**	**Trace Chrysotile**
2	**1B**	**Paper (black, thick) between concrete bridge and stone foundation**	**Newell Bridge No. 204, East side of bridge, SE abutment**	**Trace Chrysotile**
3	2A	Concrete (light brown) on stone and in between stone cracks of abutment	Newell Bridge No. 204, East side of bridge, SE abutment	Not Detected
4	2B	Concrete (light brown) on stone and in between stone cracks of abutment	Newell Bridge No. 204, East side of bridge, SE abutment	Not Detected
5	3A	Mortar (white/gray) on stone and in between stone cracks of abutment	Sneech Pond Road Culvert No. 124501, South side of bridge, SW abutment	Not Detected
6	3B	Mortar (white/gray) on stone and in between stone cracks of abutment	Sneech Pond Road Culvert No. 124501, South side of bridge, SW abutment	Not Detected
Work Order #2401-00855 Collected January 15, 2024				
7	4A	Caulk (clear) between white PVC pipe conduit and black PVC pipe.	Newell Bridge No. 204, West side of bridge, South abutment – top pipe under bridge deck that runs from North to South	Not Detected
8	4B	Caulk (clear) between white PVC pipe conduit and black PVC pipe.	Newell Bridge No. 204, West side of bridge, South abutment – top pipe under bridge deck that runs from North to South	Not Detected
9	5A	Paper (black) on #6A	Newell Bridge No. 204, West side of bridge, South abutment – top pipe under bridge deck that runs from North to South	Not Detected
10	6A	Paper (brown) under #5A on metal pipe	Newell Bridge No. 204, West side of bridge, South abutment – top pipe under bridge deck that runs from North to South	Not Detected
11	5B	Paper (black) on #6B	Newell Bridge No. 204, West side of bridge, South abutment – top pipe under bridge deck that runs from North to South	Not Detected

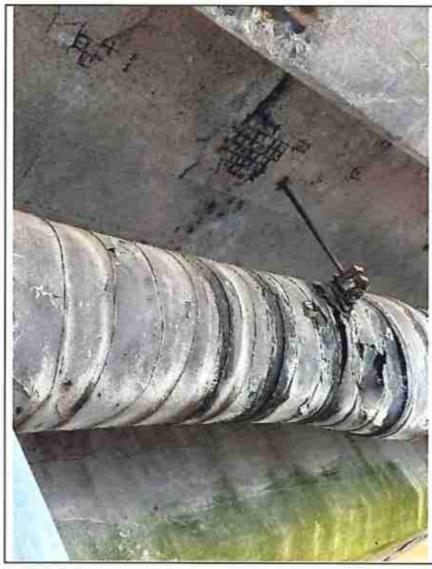
[1] **ACM** = Asbestos-Containing Materials
[2] **ACWM** = Asbestos-Containing Waste Materials

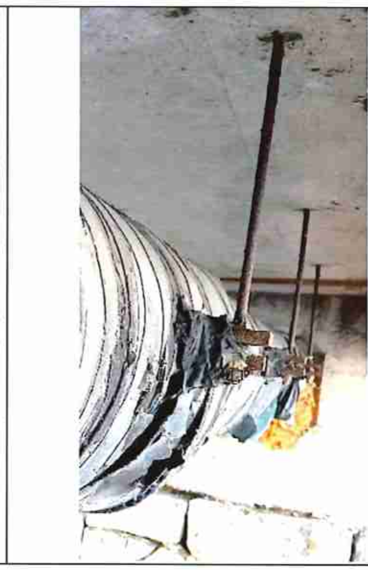
Table 1 – Suspect Materials - Laboratory Analytical Data Summary				
Line #	**HM#/ Sample #**	**Material**	**Location**	**Asbestos Result**
12	6B	Paper (brown) under #5B on metal pipe	Newell Bridge No. 204, West side of bridge, South abutment – top pipe under bridge deck that runs from North to South	Not Detected
13	5C	Paper (black) on #6C	Newell Bridge No. 204, West side of bridge, South abutment – top pipe under bridge deck that runs from North to South	Not Detected
14	6C	Paper (brown) under #5C on metal pipe	Newell Bridge No. 204, West side of bridge, South abutment – top pipe under bridge deck that runs from North to South	Not Detected
15	**7A**	**Sealer (black) on metal anchor**	**Newell Bridge No. 204, East side of bridge, South abutment – 1st anchor from south on pipe under bridge deck that runs from North to South**	**5-15% Chrysotile**
16	**7B**	**Sealer (black) on metal anchor**	**Newell Bridge No. 204, East side of bridge, South abutment – 1st anchor from south on pipe under bridge deck that runs from North to South**	**5-15% Chrysotile**
17	**8A**	**Paper (black), thick on #9A**	**Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South**	**5-15% Chrysotile**
18	9A	Paper (black), thin under #8A and on #10A	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	Not Detected
19	10A	Insulation (wool-type) under #9A	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	Not Detected
20	11A	Rope (light brown), fibrous wrapped around #10A and under #9A on metal pipe	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	Not Detected
21	**8B**	**Paper (black), thick on #9B**	**Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South**	**5-15% Chrysotile**
22	9B	Paper (black), thin under #8B and on #10B	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	Not Detected
23	10B	Insulation (wool-type) under #9B	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	Not Detected
24	11B	Rope (light brown), fibrous wrapped around #10B and under #9B on metal pipe	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	Not Detected
25	**8C**	**Paper (black), thick on #9C**	**Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South**	**5-15% Chrysotile**
26	9C	Paper (black), thin under #8C and on #10C	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	Not Detected
27	10C	Insulation (wool-type) under #9C	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	Not Detected
28	11C	Rope (light brown), fibrous wrapped around #10C and under #9C on metal pipe	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	Not Detected

The ACM identified by the results of the inspection and laboratory analysis that are to be abated are summarized in the Table of ACM (**Table 2**) below.

Table 2 –ACM[3] Inventory Summary						
Line#	HM #	Material Type	ACM Location	Sample # / Asbestos Content	Condition	Estimated Quantity/Notes
15/16	**7**	**Sealer (black) on pipe, metal suspension anchors and on adjacent outer ACM paper pipe wrap at 4 hanger locations**	**Newell Bridge No. 204 - pipe that runs between the North and South concrete abutment walls and into concrete conduits on the East side of the bridge and that is anchored to the underside of the concrete bridge deck above with metal suspension hangers**	**7A, 7B** **5-15% Chrysotile**	**I, NF**	**4 SF** (1 SF x 4 anchors) This ACM black sealer is on the hangers at and adhered to the outer ACM black paper layer of the pipe and cannot be separated. The metal anchor needs to be cut and disposed of as ACM. [See photographs below]
17/21/ 25	**8**	**Paper (black), thick** Paper (black), thin Insulation (wool-type) (brown) Rope (light brown), wrapped around insulation Metal pipe		**8A, 8B, 8C** **5-15% Chrysotile**	**D, NF**	**25 LF** (~4-6" Ø interior metal pipe with 18"-24"outside Ø of pipe with insulation, 25' length of pipe) All layers must be treated as ACM as they are adhered to and cannot be separated. There may be ACM mastic adhered to the metal pipe that may be difficult to remove. Any pipe to remain must be thoroughly cleaned and spray encapsulated. [See photographs below]

HM = Homogenous Material; F = **Friable**[4]; NF = Non-Friable; I = Intact; D = Damaged (i.e. <10% of the material is damaged); SD = Significantly Damaged (i.e. >10% of the material is damaged); EA = Each; LF = Linear Feet; SF = Square Feet; CF = Cubic Feet





NESHAP Units Calculation

NESHAP unit/RIDOH Abatement Plan Fee Calculation - 1 NESHAP unit = 260 LF+160 SF+35 CF or combination thereof.	25 LF/ 260 LF + 4 SF / 160 SF = 0.125 NESHAP units. *The RIDOH abatement plan filing fee is waived for Rhode Island State Agencies including RIDOT.*

Table 3 below summarizes the **ACWM**[5] that will remain after completion of this asbestos abatement project. These materials will be managed in place by the Owner in accordance with the Long-Term Management Plan included in the attached Asbestos Abatement Plan.

[3] **ACM** = Asbestos-Containing Material, i.e., material found to contain >1% asbestos by PLM laboratory analysis

[4] **Friable** = Material that, when dry, can be crumbled, shattered, pulverized or reduced to powder by hand pressure

[5] **ACWM** = Asbestos-Containing Waste Materials, and materials contaminated with asbestos or materials found to contain ≤1% asbestos by PLM laboratory analysis

Table 3 – ACWM to Remain						
Line#	HM #	Material Type	ACM Location	Sample # / Asbestos Content	Condition	Estimated Quantity/Notes
1/2	1	Paper (black, thick) between concrete parapet wall and stone abutment	Newell Bridge No. 204 – on the East and West sides of the bridge and North and South abutments	1A, 1B / Trace Chrysotile	D, NF	**1,680 SF** [(~20' L x 42' W) x 2 North and South side of bridge] The precise extent and locations of this ACWM are not known. The ACWM paper likely covers the area where the concrete parapet wall meets the stone abutment on both the north and south abutments and spanning the width of the bridge. This ACWM can be demolished with the bridge using dust suppression water mist methods (i.e., no visible emissions during demolition activities) as well as methods for compliance with the OSHA Asbestos in Construction Standard (29CFR1926.1101) and EPA NESHAP asbestos regulation 40CFR61 Subpart M. The waste transported and disposed of at **RIRRC**[6]

Notes:

1. {F} = Friable (materials not shown as friable, and those shown as non-friable, that may become friable during the course of the work must be considered as friable.
2. **Quantities are approximate - it is the Asbestos Abatement Contractor's responsibility to verify quantities as well as site conditions prior to submitting a bid.**
3. Refer to Owner's Contract Documents including bid forms, drawings, and specifications - the strictest interpretation of all documents and regulations shall apply where conflicts in the documents arise. The Asbestos Abatement Contractor will comply with the Owner's Contract Documents including drawings.
4. Remove and dispose of ACM identified in the abatement plan in accordance with all applicable federal, state and local rules and regulations including EPA, OSHA, RIDEM and RIDOH rules and regulations.
5. All workers are to use protective clothing and respiratory protection as well as comply with all regulations, including OSHA regulations for asbestos abatement and building renovation. It is the Asbestos Abatement Contractor's

[6] **RIRRC** = Rhode Island Resource Recovery Corporation – Central Landfill, 65 Shun Pike, Johnston, RI 02919.

responsibility to correctly select personnel protective equipment and respiratory protection and medical surveillance for all hazardous materials likely to be encountered.

6. Asbestos Abatement Contractor is responsible for all regulatory (including OSHA) compliance for all hazardous materials, including regulations related to disturbing paint that may contain lead or other hazardous materials. The Owner, its sub-consultants and their agents and sub-contractors are not responsible for the Asbestos Abatement Contractor's means and methods and regulatory compliance.

7. The Asbestos Abatement Contractor must consult with Owner prior to submitting a bid regarding who will supply water, power and drains required to complete the work. GFCI cords and panels, hoses and shut off valves are to be provided by the Asbestos Abatement Contractor.

8. Install barriers in a manner to avoid damage to finishes and surfaces. Pre-clean (prior to barrier installation) and post clean (after barrier removal) work areas. The Asbestos Abatement Contractor will ensure that no bridge components or equipment are damaged by the Asbestos Abatement Contractor's work methods.

9. Unless otherwise directed by the Owner's Representative or IH, critical barriers shall comprise a wood stud frame wall with outside ¼" smooth plywood or hardboard sheeting installed from the floor up to the ceiling and covered on the interior side (abatement work side) with 2 layers of 6-mil polyethylene (poly) sheeting, with gaps sealed with foam, spray adhesive, and plastic.

10. The Asbestos Abatement Contractor will use an opaque encapsulant and/or add dye to the encapsulant, if requested by the Owner's Representative, at no extra cost. <u>The encapsulant product data sheet shall be provided to the Owner for approval of compatibility with the new and existing finishes, materials and building components</u>. A bridging encapsulant shall be used if requested by the Owner at no additional cost.

11. The Asbestos Abatement Contractor shall designate 1 (one) asbestos abatement site supervisor for the project that shall be licensed by and in good standing with the RIDOH. The supervisor shall have a minimum of 5 (five) years of experience as an asbestos abatement site supervisor without violations, citations, or legal judgments. The asbestos abatement site supervisor shall attend pre-construction meetings as required by Owner. The designated asbestos abatement site supervisor shall be on site at all times during the work. The Asbestos Abatement Contractor shall maintain a licensed asbestos abatement worker outside the containment areas at all times during the work. The Owner reserves the right to immediately dismiss any Asbestos Abatement Contractor employee from the site for any reason whatsoever.

12. **The Asbestos Abatement Contractor will ensure that no water escapes work areas and leaks into adjacent non-work areas. All water shall be turned off and disconnected at the sources at the end of each work shift and verified as not leaking. The Asbestos Abatement Contractor is responsible for water damage as a result of their setup and failure to monitor and shut off the water.**

13. The Asbestos Abatement Contractor shall post signs around the perimeter of the work area and at all entry points to the work area identifying the locations and nature of the work in accordance with RIDOH regulations Subparagraph B.8.2 (g).

14. The Asbestos Abatement Contractor shall coordinate work with Owner's Representative, General Contractor, and other trades to ensure work areas are not disturbed and the integrity of the bridge is maintained and protected from weather and unauthorized entry.

15. Containment setups, Decontamination facility locations and HEPA unit quantities and locations on the attached drawing are schematic only and site conditions, availability of water, power and drains, as well as scheduling and other requirements may require modifications to be made, which must be reviewed in advance with the IH.

16. Costs associated with amendments to the RIDOH approved abatement plan and change notifications to RIDOH and EPA and any associated delays are the responsibility of the Asbestos Abatement Contractor.

17. Phasing/scheduling of the work shall meet the requirements of the Owner.

18. The Asbestos Abatement Contractor will clean by HEPA vacuuming and damp wiping with amended water and move any free-standing and stored items in the way of abatement activities into adjacent non-work areas prior to commencement of setup.
19. Protect all piping (electrical, communication, water, gas, etc.). The Asbestos Abatement Contractor is responsible for damage to these items.
20. The Asbestos Abatement Contractor shall immediately comply and abide by all directives and stop work orders from Owner, Owner's representative or on-site IH/Project Monitor without prejudice and at no cost to Owner, Owner's representative or on-site IH/Project Monitor.
21. The Asbestos Abatement Contractor shall provide a copy of all permits and notifications to the Owner and IH/Project Monitor at the time of submission to applicable agencies, including to EPA and RIDOH. No work or preparation for work shall be undertaken prior to receipt of these permits and notifications.
22. The Asbestos Abatement Contractor shall construct staging below and to the side of the bridge with a work platform and safety rails in order to safely access and abate the identified ACM.
23. The scope of work included the inspection for materials suspected of containing asbestos, collection of bulk samples and determination of types of ACM found. Reasonable efforts were made to discover hidden suspect materials that will be impacted by the project, however, some hidden materials containing asbestos may only be discovered during demolition, at which time work must stop until the suspect materials can be inspected and sampled for asbestos by a licensed inspector, or the suspect materials can be presumed to be ACM and removed and disposed in accordance with federal and state regulations.

ATTACHMENT #2

Bulk Asbestos Laboratory Analytical Reports and Chain-of-Custody Forms

R.I. ANALYTICAL
Specialists in Environmental Services

LABORATORY REPORT

R.I. Analytical Laboratories
Attn:
E.A.M. Division
15 Lark Industrial Parkway
Smithfield, RI 02828

Date Received: 12/1/2023
Date Reported: 12/4/2023
Work Order #: 2312-20324

Site Location: RIDOT-BG 17 EAM #2023135

Enclosed please find your sample(s) analysis results for asbestos content. The six asbestos types include amosite, chrysotile, crocidolite, anthophyllite, tremolite, and actinolite.

Analysis by Polarized Light Microscopy (PLM) was performed in accordance with EPA 40 CFR Appendix E to Subpart E of Part 763 and/or EPA 600/R-93/116.

R.I. Analytical Laboratories, Inc. maintains bulk asbestos fiber NVLAP accreditation under Lab Code 101440-0. This report does not serve as a product certification, approval, and/or endorsement by NVLAP, NIST, or any federal agency.

The sample(s) submitted for analysis were accepted by R.I. Analytical unless otherwise noted in the report. If a sample is found to be inhomogeneous, individual components will be analyzed separately. If individual components cannot be separated, the sample will be homogenized and a single result will be provided. These results only pertain to the samples submitted for this Work Order # and this report shall not be reproduced except in its entirety.

In accordance with EPA guidelines, vermiculite materials should be assumed to contain asbestos even if PLM analysis reports asbestos not detected. All NOB (Non-Friable Organically Bound) materials such as vinyl floor tile, vinyl sheet flooring, glues, and mastics, that test as <1% asbestos, trace asbestos and no asbestos detected, should be further analyzed by TEM (Transmission Electron Microscopy).

Samples submitted for analysis will be retained for three months for future reference.

We certify that the following results are true and accurate to the best of our knowledge. If you have questionsor need further assistance, please contact our Customer Service Department.

Approved by:

Eric Neff

Asbestos Signatory

R.I. Analytical Laboratories, Inc.

LABORATORY REPORT

R.I. Analytical Laboratories
Date Received: 12/1/2023
Work Order #: 2312-20324
Site Location:RIDOT-BG 17 EAM #2023135

METHOD: EPA 600/R-93/116

SAMPLE NO.	SAMPLE DESCRIPTION	PARAMETER	SAMPLE RESULTS / UNITS		DATE ANALYZED	ANALYST
001	1A Paper between concrete bridge and stone foundation	PLM Fiber Analysis				
		Asbestos	Detected		12/4/2023	EDN
		Chrysotile	Trace	%	12/4/2023	EDN
		Glass Fiber	1-5	%	12/4/2023	EDN
		Non-fibrous	95-99	%	12/4/2023	EDN
		Sample Color	Black		12/4/2023	EDN
002	1B Paper between concrete bridge and stone foundation	PLM Fiber Analysis				
		Asbestos	Detected		12/4/2023	EDN
		Chrysotile	Trace	%	12/4/2023	EDN
		Glass Fiber	1-5	%	12/4/2023	EDN
		Non-fibrous	95-99	%	12/4/2023	EDN
		Sample Color	Black		12/4/2023	EDN
003	2A Concrete on stone and abutment cracks	PLM Fiber Analysis				
		Asbestos	Not Detected		12/4/2023	EDN
		Non-fibrous	100	%	12/4/2023	EDN
		Sample Color	Brown		12/4/2023	EDN
004	2B Concrete on stone and abutment cracks	PLM Fiber Analysis				
		Asbestos	Not Detected		12/4/2023	EDN
		Non-fibrous	100	%	12/4/2023	EDN
		Sample Color	Brown		12/4/2023	EDN
005	3A Mortar on stone and abutment cracks	PLM Fiber Analysis				
		Asbestos	Not Detected		12/4/2023	EDN
		Non-fibrous	100	%	12/4/2023	EDN
		Sample Color	Gray		12/4/2023	EDN

R.I. Analytical Laboratories, Inc.

LABORATORY REPORT

R.I. Analytical Laboratories
Date Received: 12/1/2023
Work Order #: 2312-20324
Site Location:RIDOT-BG 17 EAM #2023135

METHOD: EPA 600/R-93/116

SAMPLE NO.	SAMPLE DESCRIPTION	PARAMETER	SAMPLE RESULTS / UNITS		DATE ANALYZED	ANALYST
006	3B Mortar on stone and abutment cracks	PLM Fiber Analysis				
		Asbestos	Not Detected		12/4/2023	EDN
		Non-fibrous	100	%	12/4/2023	EDN
		Sample Color	Gray		12/4/2023	EDN

R.I. ANALYTICAL
41 Illinois Avenue - Warwick, RI 02888
P: (401) 737-8500 F: (401) 732-8034

SAMPLE DATA SHEET & CHAIN OF CUSTODY

Project: VHB - RIDOT Bridge On-Call - BG 17C		**Client PO #:**	VHB #73500.01
Address: Cumberland, RI		**RI Analytical EAM Project #:**	2023135
Area: Newell Bridge No. 204 & Sneech Pond Road Culvert No. 124501		**RI Analytical Work Order #:**	2312-20324
Sampled By: Jennifer Jencks	**License #** AI01191	**Inspection date:** 12/1/2023	Page 1 of 1

Line	Sample #	Description	Location	Notes
1	1A	Paper (black, thick) between concrete bridge and stone foundation	Newell Bridge No. 204, East side of bridge, SE abutment	
2	1B	Paper (black, thick) between concrete bridge and stone foundation	Newell Bridge No. 204, East side of bridge, SE abutment	
3	2A	Concrete (light brown) on stone and in between stone cracks of abutment	Newell Bridge No. 204, East side of bridge, SE abutment	
4	2B	Concrete (light brown) on stone and in between stone cracks of abutment	Newell Bridge No. 204, East side of bridge, SE abutment	
5	3A	Mortar (white/gray) on stone and in between stone cracks of abutment	Sneech Pond Road Culvert No. 124501, South side of bridge, SW abutment	
6	3B	Mortar (white/gray) on stone and in between stone cracks of abutment	Sneech Pond Road Culvert No. 124501, South side of bridge, SW abutment	
7				
8				
9				
10				
11				
12				
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17				
18				
19				
20				

COMMENTS: Email report to: Name: Jennifer Jencks ; Email to: jjencks & kdavis @rianalytical.com
A. (1) Analysis = ☒ PLM, Asbestos (EPA 600/R-93/116); ☒ PLM NOB as needed; ☐ 400 point count if friable and <10% ASB; ☐ TEM NOB
(2) TAT = 3-day ; (3) No. samples submitted = 6 ; (4) ☐ Y or ☒ N - Positive stop by Homogeneous # shown.
Notes:

RELINQUISHED BY: (SIGNATURE) Jennifer Jencks — Jennifer Jencks	**DATE/TIME** 12/1/23 – 14:09	**RECEIVED BY:** (SIGNATURE) [signature]	**DATE/TIME** 12/1/23
RELINQUISHED BY: (SIGNATURE)	**DATE/TIME**	**RECEIVED BY:** (SIGNATURE)	**DATE/TIME**

LABORATORY REPORT

R.I. Analytical Laboratories
Attn:
E.A.M. Division
15 Lark Industrial Parkway
Smithfield, RI 02828

Date Received: 1/15/2024
Date Reported: 1/18/2024
Work Order #: 2401-00855

Site Location: VHB-RIDOT - BG17C EAM #2023135

Enclosed please find your sample(s) analysis results for asbestos content. The six asbestos types include amosite, chrysotile, crocidolite, anthophyllite, tremolite, and actinolite.

Analysis by Polarized Light Microscopy (PLM) was performed in accordance with EPA 40 CFR Appendix E to Subpart E of Part 763 and/or EPA 600/R-93/116.

R.I. Analytical Laboratories, Inc. maintains bulk asbestos fiber NVLAP accreditation under Lab Code 101440-0. This report does not serve as a product certification, approval, and/or endorsement by NVLAP, NIST, or any federal agency.

The sample(s) submitted for analysis were accepted by R.I. Analytical unless otherwise noted in the report. If a sample is found to be inhomogeneous, individual components will be analyzed separately. If individual components cannot be separated, the sample will be homogenized and a single result will be provided. These results only pertain to the samples submitted for this Work Order # and this report shall not be reproduced except in its entirety.

In accordance with EPA guidelines, vermiculite materials should be assumed to contain asbestos even if PLM analysis reports asbestos not detected. All NOB (Non-Friable Organically Bound) materials such as vinyl floor tile, vinyl sheet flooring, glues, and mastics, that test as <1% asbestos, trace asbestos and no asbestos detected, should be further analyzed by TEM (Transmission Electron Microscopy).

Samples submitted for analysis will be retained for three months for future reference.

We certify that the following results are true and accurate to the best of our knowledge. If you have questionsor need further assistance, please contact our Customer Service Department.

Approved by:

Eric Neff

Asbestos Signatory

R.I. Analytical Laboratories, Inc.

LABORATORY REPORT

R.I. Analytical Laboratories
Date Received: 1/15/2024
Work Order #: 2401-00855
Site Location:VHB-RIDOT - BG17C EAM #2023135

METHOD: EPA 600/R-93/116

SAMPLE NO.	SAMPLE DESCRIPTION	PARAMETER	SAMPLE RESULTS / UNITS		DATE ANALYZED	ANALYST
001	4A Caulk between white PVC pipe conduit and black PVC pipe	PLM Fiber Analysis				
		Asbestos	Not Detected		1/17/2024	EDN
		Non-fibrous	100	%	1/17/2024	EDN
		Sample Color	Clear		1/17/2024	EDN
002	4B Caulk between white PVC pipe conduit and black PVC pipe	PLM Fiber Analysis				
		Asbestos	Not Detected		1/17/2024	EDN
		Non-fibrous	100	%	1/17/2024	EDN
		Sample Color	Clear		1/17/2024	EDN
003	5A Paper (black) on 6A	PLM Fiber Analysis				
		Asbestos	Not Detected		1/17/2024	EDN
		Non-fibrous	100	%	1/17/2024	EDN
		Sample Color	Black		1/17/2024	EDN
004	6A Paper (brown) under 5A on metal pipe	PLM Fiber Analysis				
		Asbestos	Not Detected		1/17/2024	EDN
		Non-fibrous	100	%	1/17/2024	EDN
		Sample Color	Brown		1/17/2024	EDN
005	5B Paper (black) on 6B	PLM Fiber Analysis				
		Asbestos	Not Detected		1/17/2024	EDN
		Non-fibrous	100	%	1/17/2024	EDN
		Sample Color	Black		1/17/2024	EDN
006	6B Paper (brown) under 5B on metal pipe	PLM Fiber Analysis				
		Asbestos	Not Detected		1/17/2024	EDN
		Non-fibrous	100	%	1/17/2024	EDN
		Sample Color	Brown		1/17/2024	EDN

R.I. Analytical Laboratories, Inc.

LABORATORY REPORT

R.I. Analytical Laboratories
Date Received: 1/15/2024
Work Order #: 2401-00855
Site Location:VHB-RIDOT - BG17C EAM #2023135

METHOD: EPA 600/R-93/116

SAMPLE NO.	SAMPLE DESCRIPTION	PARAMETER	SAMPLE RESULTS	UNITS	DATE ANALYZED	ANALYST
007	5C Paper (black) on 6C	PLM Fiber Analysis				
		Asbestos	Not Detected		1/17/2024	EDN
		Non-fibrous	100	%	1/17/2024	EDN
		Sample Color	Black		1/17/2024	EDN
008	6C Paper (brown) under 5C on metal pipe	PLM Fiber Analysis				
		Asbestos	Not Detected		1/17/2024	EDN
		Non-fibrous	100	%	1/17/2024	EDN
		Sample Color	Brown		1/17/2024	EDN
009	7A Sealer (black) on metal anchor	PLM Fiber Analysis				
		Asbestos	Detected		1/17/2024	EDN
		Chrysotile	5-15	%	1/17/2024	EDN
		Non-fibrous	85-95	%	1/17/2024	EDN
		Sample Color	Black		1/17/2024	EDN
010	7B Sealer (black) on metal anchor	PLM Fiber Analysis				
		Asbestos	Detected		1/17/2024	EDN
		Chrysotile	5-15	%	1/17/2024	EDN
		Non-fibrous	85-95	%	1/17/2024	EDN
		Sample Color	Black		1/17/2024	EDN
011	8A Paper (black, thick) on 9A	PLM Fiber Analysis				
		Asbestos	Detected		1/17/2024	EDN
		Chrysotile	5-15	%	1/17/2024	EDN
		Non-fibrous	85-95	%	1/17/2024	EDN
		Sample Color	Black		1/17/2024	EDN
012	9A Paper (black, thin) under 8A and on 10A	PLM Fiber Analysis				
		Asbestos	Not Detected		1/17/2024	EDN
		Non-fibrous	100	%	1/17/2024	EDN
		Sample Color	Black		1/17/2024	EDN

R.I. Analytical Laboratories, Inc.

LABORATORY REPORT

R.I. Analytical Laboratories
Date Received: 1/15/2024
Work Order #: 2401-00855
Site Location:VHB-RIDOT - BG17C EAM #2023135

METHOD: EPA 600/R-93/116

SAMPLE NO.	SAMPLE DESCRIPTION	PARAMETER	SAMPLE RESULTS / UNITS		DATE ANALYZED	ANALYST
013	10A Insulation under 9A	PLM Fiber Analysis				
		Asbestos	Not Detected		1/17/2024	EDN
		Non-fibrous	100	%	1/17/2024	EDN
		Sample Color	Brown		1/17/2024	EDN
014	11A Rope wraped around 10A and under 9A on metal pipe	PLM Fiber Analysis				
		Asbestos	Not Detected		1/17/2024	EDN
		Non-fibrous	100	%	1/17/2024	EDN
		Sample Color	Brown		1/17/2024	EDN
015	8B Paper (black, thick) on 9B	PLM Fiber Analysis				
		Asbestos	Detected		1/17/2024	EDN
		Chrysotile	5-15	%	1/17/2024	EDN
		Non-fibrous	85-95	%	1/17/2024	EDN
		Sample Color	Black		1/17/2024	EDN
016	9B Paper (black, thin) under 8B and on 10B	PLM Fiber Analysis				
		Asbestos	Not Detected		1/17/2024	EDN
		Non-fibrous	100	%	1/17/2024	EDN
		Sample Color	Black		1/17/2024	EDN
017	10B Insulation under 9B	PLM Fiber Analysis				
		Asbestos	Not Detected		1/17/2024	EDN
		Non-fibrous	100	%	1/17/2024	EDN
		Sample Color	Brown		1/17/2024	EDN
018	11B Rope wraped around 10B and under 9B on metal pipe	PLM Fiber Analysis				
		Asbestos	Not Detected		1/17/2024	EDN
		Non-fibrous	100	%	1/17/2024	EDN
		Sample Color	Brown		1/17/2024	EDN

R.I. Analytical Laboratories, Inc.

LABORATORY REPORT

R.I. Analytical Laboratories
Date Received: 1/15/2024
Work Order #: 2401-00855
Site Location:VHB-RIDOT - BG17C EAM #2023135

METHOD: EPA 600/R-93/116

SAMPLE NO.	SAMPLE DESCRIPTION	PARAMETER	SAMPLE RESULTS / UNITS		DATE ANALYZED	ANALYST
019	8C Paper (black, thick) on 9C	PLM Fiber Analysis				
		Asbestos	Detected		1/17/2024	EDN
		Chrysotile	5-15	%	1/17/2024	EDN
		Non-fibrous	85-95	%	1/17/2024	EDN
		Sample Color	Black		1/17/2024	EDN
020	9C Paper (black, thin) under 8C and on 10C	PLM Fiber Analysis				
		Asbestos	Not Detected		1/17/2024	EDN
		Non-fibrous	100	%	1/17/2024	EDN
		Sample Color	Black		1/17/2024	EDN
021	10C Insulation under 9C	PLM Fiber Analysis				
		Asbestos	Not Detected		1/17/2024	EDN
		Non-fibrous	100	%	1/17/2024	EDN
		Sample Color	Brown		1/17/2024	EDN
022	11C Rope wraped around 10C and under 9C on metal pipe	PLM Fiber Analysis				
		Asbestos	Not Detected		1/17/2024	EDN
		Non-fibrous	100	%	1/17/2024	EDN
		Sample Color	Brown		1/17/2024	EDN

R.I. ANALYTICAL
41 Illinois Avenue - Warwick, RI 02888
P: (401) 737-8500 F: (401) 732-8034

SAMPLE DATA SHEET & CHAIN OF CUSTODY

Project: VHB - RIDOT Bridge On-Call - BG 17C		**Client PO #:**	VHB #73500.01
Address: Cumberland, RI		**RI Analytical EAM Project #:**	2023135
Area: Newell Bridge No. 204		**RI Analytical Work Order #:**	2401-00855
Sampled By: Jennifer Jencks	**License #** AI01191	**Inspection date:** 1/15/2024	Page 1 of 2

Line	Sample #	Description	Location	Notes
1	4A	Caulk (clear) between white PVC pipe conduit and black PVC pipe.	Newell Bridge No. 204, West side of bridge, South abutment – top pipe under bridge deck that runs from North to South	
2	4B	Caulk (clear) between white PVC pipe conduit and black PVC pipe.	Newell Bridge No. 204, West side of bridge, South abutment – top pipe under bridge deck that runs from North to South	
3	5A	Paper (black) on #6A	Newell Bridge No. 204, West side of bridge, South abutment – top pipe under bridge deck that runs from North to South	
4	6A	Paper (brown) under #5A on metal pipe	Newell Bridge No. 204, West side of bridge, South abutment – top pipe under bridge deck that runs from North to South	
5	5B	Paper (black) on #6B	Newell Bridge No. 204, West side of bridge, South abutment – top pipe under bridge deck that runs from North to South	
6	6B	Paper (brown) under #5B on metal pipe	Newell Bridge No. 204, West side of bridge, South abutment – top pipe under bridge deck that runs from North to South	
7	5C	Paper (black) on #6C	Newell Bridge No. 204, West side of bridge, South abutment – top pipe under bridge deck that runs from North to South	
8	6C	Paper (brown) under #5C on metal pipe	Newell Bridge No. 204, West side of bridge, South abutment – top pipe under bridge deck that runs from North to South	
9	7A	Sealer (black) on metal anchor	Newell Bridge No. 204, East side of bridge, South abutment – 1st anchor from south on pipe under bridge deck that runs from North to South	
10	7B	Sealer (black) on metal anchor	Newell Bridge No. 204, East side of bridge, South abutment – 1st anchor from south on pipe under bridge deck that runs from North to South	
11	8A	Paper (black), thick on #9A	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	
12	9A	Paper (black), thin under #8A and on #10A	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	
13	10A	Insulation (wool-type) under #9A	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	

COMMENTS: Email report to: Name: Jennifer Jencks; Email to: jjencks & kdavis, jprincipi @rianalytical.com
A. (1) Analysis = ☒ PLM, Asbestos (EPA 600/R-93/116); ☒ PLM NOB as needed; ☒ 400 point count if friable and <10% ASB; ☐ TEM NOB
(2) TAT = 3-day; (3) No. samples submitted = 22; (4) ☐ Y or ☒ N - Positive stop by Homogeneous # shown.
Notes:

RELINQUISHED BY: (SIGNATURE) Jennifer Jencks *Jennifer Jencks*	**DATE/TIME** 1/15/24 – 16:30	**RECEIVED BY:** (SIGNATURE)	**DATE/TIME** 1,15,24
RELINQUISHED BY: (SIGNATURE)	**DATE/TIME**	**RECEIVED BY:** (SIGNATURE)	**DATE/TIME**

R.I. ANALYTICAL
41 Illinois Avenue - Warwick, RI 02888
P: (401) 737-8500 F: (401) 732-8034

SAMPLE DATA SHEET & CHAIN OF CUSTODY

Project: VHB - RIDOT Bridge On-Call - BG 17C			**Client PO #:**	VHB #73500.01	
Address: Cumberland, RI			**RI Analytical EAM Project #:**	2023135	
Area: Newell Bridge No. 204			**RI Analytical Work Order #:**	2401-00855	
Sampled By:	Jennifer Jencks	**License #** AI01191	**Inspection date:**	1/15/2024	Page 2 of 2

Line	Sample #	Description	Location	Notes
14	11A	Rope (light brown), fibrous wrapped around #10A and under #9A on metal pipe	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	
15	8B	Paper (black), thick on #9B	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	
16	9B	Paper (black), thin under #8B and on #10B	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	
17	10B	Insulation (wool-type) under #9B	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	
18	11B	Rope (light brown), fibrous wrapped around #10B and under #9B on metal pipe	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	
19	8C	Paper (black), thick on #9C	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	
20	9C	Paper (black), thin under #8C and on #10C	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	
21	10C	Insulation (wool-type) under #9C	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	
22	11C	Rope (light brown), fibrous wrapped around #10C and under #9C on metal pipe	Newell Bridge No. 204, East side of bridge, South abutment – on pipe under bridge deck that runs from North to South	
23				
24				
25				
26				
27				
28				
29				

COMMENTS: Email report to: Name: Jennifer Jencks; Email to: jjencks & kdavis, jprincipi @rianalytical.com
A. (1) Analysis = ☒ PLM, Asbestos (EPA 600/R-93/116); ☒ PLM NOB as needed; ☒ 400 point count if friable and <10% ASB; ☐ TEM NOB
(2) TAT = 3-day; (3) No. samples submitted = 22; (4) ☐ Y or ☒ N - Positive stop by Homogeneous # shown.
Notes:

RELINQUISHED BY: (SIGNATURE) Jennifer Jencks *Jennifer Jencks*	**DATE/TIME** 1/15/24 – 16:30	**RECEIVED BY:** (SIGNATURE) *[signature]*	**DATE/TIME** 1.15.24
RELINQUISHED BY: (SIGNATURE)	**DATE/TIME**	**RECEIVED BY:** (SIGNATURE)	**DATE/TIME**

ATTACHMENT #3

ASB-16A – 3A

Operations & Maintenance (O&M) Plan

Interim Operations & Maintenance Plan

Contractors and personnel associated with the bridge are aware of the presence and location of ACM within the above stated areas through review of the Asbestos Inspection Report and this Asbestos Abatement Plan. They have been instructed not to disturb the material due to the potential health hazards if fibers become airborne. The Owner will follow regulatory requirements if a disturbance occurs. If previously unidentified, suspect building materials are discovered, a RIDOH-licensed Asbestos Inspector shall be summoned to evaluate the situation and take appropriate actions.

1. Notification

All personnel, including any contractors, entering the area and/or premises to perform work, shall be notified of the presence and location of ACM and cautioned regarding disturbance of the material(s). If an emergency fiber release occurs, the following procedures shall be initiated.

2. Fiber Release Episodes

A. Minor Release Episode

If a minor fiber release episode occurs (release of less than 10 linear feet or 25 square feet of material), trained maintenance staff or an Asbestos Abatement Contractor may perform the cleaning. Access to the area shall be restricted during clean up. All debris shall be thoroughly wetted using amended water and placed in labeled, double six-mil polyethylene bags. The area shall then be cleaned using HEPA filtered vacuums and/or wet cleaning methods. Damaged material must be cleaned and repaired with non-asbestos-containing material. The area shall then be evaluated to decide if further action is necessary.

B. Major Release Episode

If a major fiber release episode occurs (falling or dislodging of more than 10 linear feet or 25 square feet of ACBM), the cleaning must be carried out and directed by persons accredited to conduct and design response actions. After such an episode, the area shall be immediately restricted and entry to the area prevented. Warning signs shall be posted to caution people other than those qualified to deal with the problem. A response action shall be designed and carried out by qualified personnel.

3. Training

Any employee who, because of their work, may disturb ACM, shall be trained and certified as a Competent Person as described by the R.I. Rules and Regulations for Asbestos Control. The program coordinator shall ensure that the procedures described above to protect the personnel shall be followed for any operations and maintenance activities disturbing or involving ACM.

Long Term Operations and Maintenance Program – [216-RICR-50-15-1, §1.17.2]

The ACWM materials identified in Table 3 above will remain and are not included for removal. If the scope of work changes and these materials are to be removed, the Asbestos Abatement Plan may have to be amended with approval by RIDOH as is required by regulation, with amendment of the RIDOH and EPA start-work notification forms as needed.

All other areas and materials were beyond the scope of RI Analytical's work.

ATTACHMENT #5

Description of Waivers and Alternative Procedures

- **Description of Waivers**

The following waivers are requested for ACM removal:

1. Waiver for no clearance air sampling for exterior materials removal where no work containment enclosure will be constructed – plastic wrap with "candy-stripe" duct tape and glue and glovebag removal at sufficient points along the pipe to safely cut the pipe out in sections – followed by disposal of the pipe with wrap materials as ACM.

   In lieu of clearance air sampling, the asbestos abatement contractor will conduct worker OSHA compliance Excursion Limit and 8-hour TWA PCM air sampling, and RI Analytical (or other licensed asbestos consultant) will conduct upwind and downwind work zone perimeter PCM air sampling during the work [216-RICR-50-15-1 §1.14.8 K.].

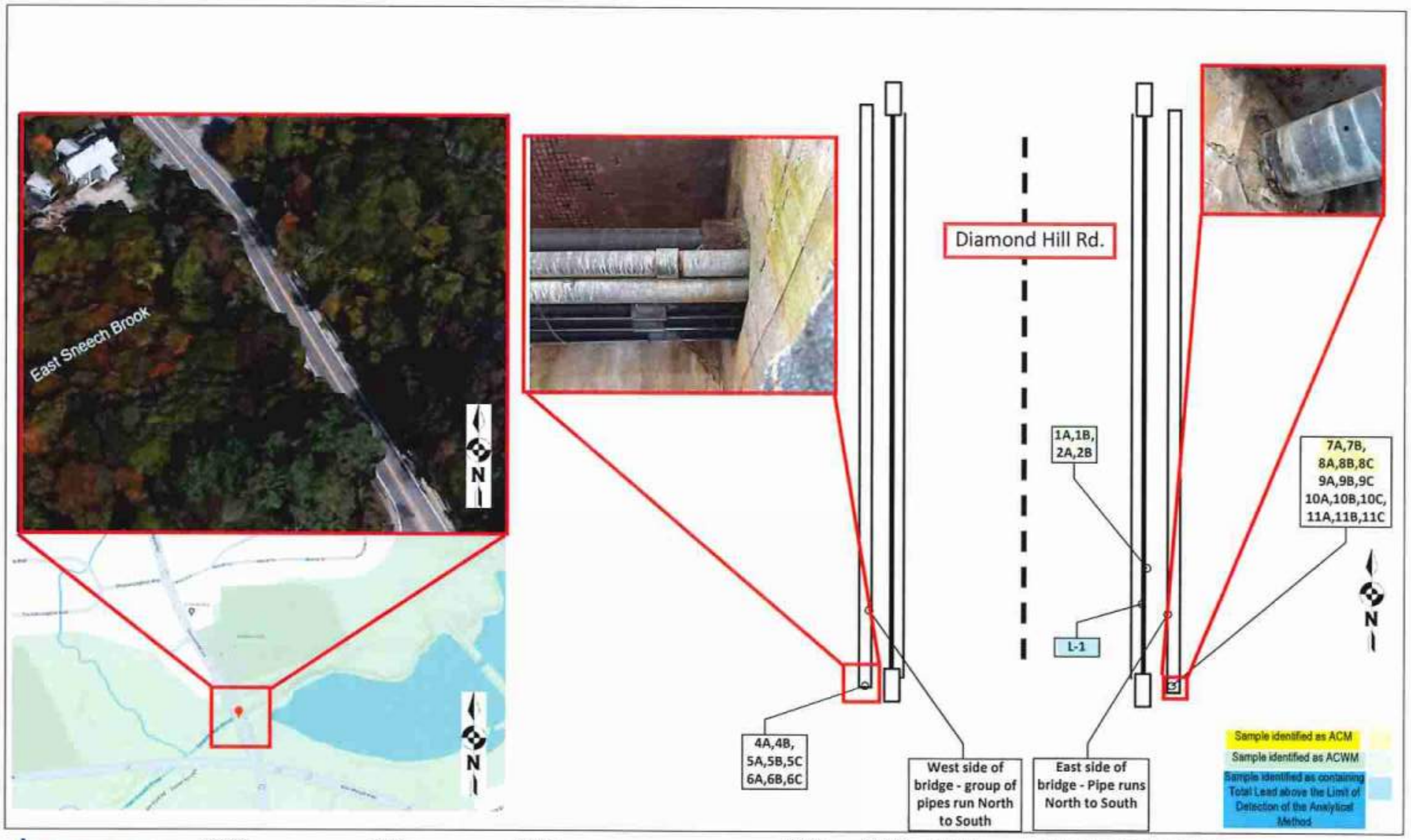
- **Alternative Procedures**

  Exterior ACM removal where no work containment enclosure will be constructed – plastic wrap with "candy-stripe" duct tape and glue and glovebag removal at sufficient points along the pipe to safely cut the pipe out in sections – followed by disposal of the pipe with wrap materials as ACM. Contractor OSHA air samples + upwind/downwind air samples.

ATTACHMENT #6

Drawings

Not to scale. Typical ACM setups - setups are not shown at all locations. Actual setup configuration will be determined by the Asbestos Abatement Contractor based on site conditions, access restrictions and Owner's requirements. Refer to contract documents including drawings for renovation/demolition areas as well as details and dimensions. There is potential for hidden ACM.

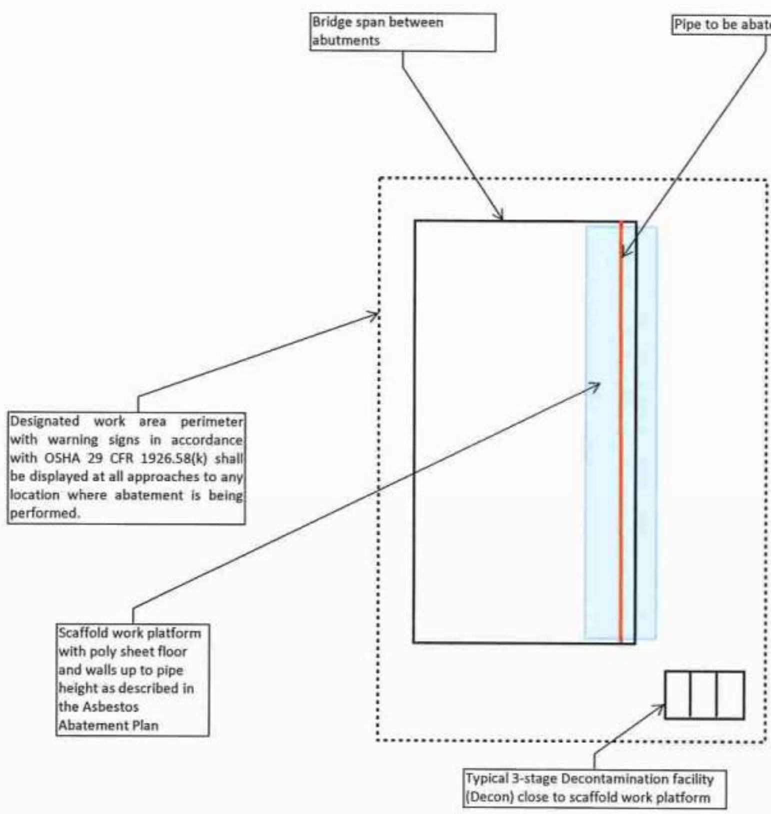


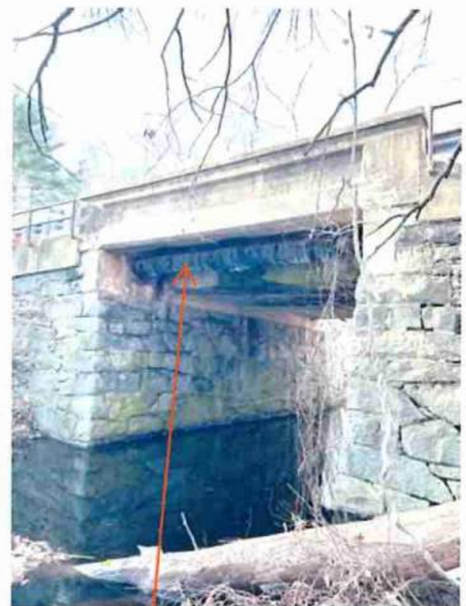
R. I. Analytical
Specialists in Environmental Services

COMPANY	CLIENT	PROJECT	PROJECT #	DRAWN BY	ISSUE Date
RI Analytical Laboratories, Inc. 15 Lark Industry Drive Smithfield, RI 02828 Tel: 401.737.8500	VHB 1 Cedar Street Suite 400 Providence, RI 02903	VHB # 73500.01 VHB-RIDOT Cumberland, RI Bridge Group 17C	2023135	JTP	2/6/2024

SAMPLE LOCATION DRAWING
BRIDGE #020401 - Newell Bridge
Over the East Sneech Brook

SL.02





Pipe under bridge deck - east side of bridge - looking from North to South

N

R. I. Analytical
Specialists in Environmental Services

COMPANY	CLIENT	PROJECT	PROJECT #	DRAWN BY	ISSUE DATE
RI Analytical Laboratories, Inc. 15 Lark Industry Drive Smithfield, RI 02828 Tel: 401.737.8500	VHB 1 Cedar Street Suite 400 Providence, RI 02903 VHB #73500.01	Asbestos Abatement Plan – Water Pipe Removal Newell Bridge #020401, Cumberland, RI 02864	2023135	KD	6/11/2024

Typical Exterior Abatement Set-Up

AA.02

Appendix H

Asbestos Abatement Transmittal Letter From RI Analytical

R.I. ANALYTICAL
41 Illinois Avenue - Warwick, RI 02888
P: (401) 737-8500 F: (401) 732-8034

TRANSMITTAL TO OWNER

To: Mr. Andrew Reeder, PE, PMP
Structural Engineer
VHB
1 Cedar Street, Suite 400
Providence, RI 02903

P: 401.457.2011
E: **AReeder@VHB.com**

From: Kenneth Davis

Date: June 11, 2024

RE: Asbestos Abatement Plan – Water Pipe Removal
Site: Newell Bridge #020401, Cumberland, RI 02864
VHB #73500.01 - RI Analytical Project #2023135

This transmittal is intended to guide you through completing some items for the Asbestos Abatement Plan and submitting it to the **RIDOH** (Rhode Island Department of Health) for approval. *This transmittal is not for submission with the abatement plan to RIDOH*.

Attached to this transmittal, please find the following items for your review.

1. Asbestos Abatement Plan for submittal to RIDOH.

Once you have reviewed and approved this plan, if no changes are needed, please have signed with notary witness and embossing stamp, the Asbestos Abatement Plan one page entitled "Notarized Certification of Asbestos Abatement Plan" (**Form ASB-16B** in the bottom left corner)

Please call us to collect or mail this signed/notarized page to RI Analytical, Smithfield, RI office. We will then email the compiled Asbestos Abatement Plan to you and print and bind copies of the plan for distribution as follows.

One signed/notarized/embossed copy for:-

- RIDOH (with original signed/notarized form ASB-16B)

The RIDOH abatement plan filing fee is waived for Rhode Island State Agencies including RIDOT.

Once the abatement plan has been reviewed and approved by RIDOH, the Owner (and RI Analytical) will receive an *abatement plan approval letter* which must be copied to the asbestos abatement contractor.

This abatement plan, until such time as approved by RIDOH, is a draft plan subject to RIDOH review and modifications may be required by RIDOH.

Please note the following.

1. Two weeks (10 working days) prior to commencement of the asbestos abatement work, the abatement contractor must file start work notification forms with the **RIDOH** and **EPA** as required by regulation.
2. Other permits may also be required (e.g. town, police, fire department, etc.).
3. The RIDOH typically takes 1-2 weeks to review and approve abatement plans, after which an approval letter will be sent to the Owner.
4. The Asbestos Abatement Plan is only valid for a total period of 1 year, after which, if the asbestos abatement work has not been completed, it expires, and a new plan must be prepared and submitted for completion of the remainder of the asbestos abatement work. Work must also

commence within 6 months of the approval date or a re-activation application letter will need to be generated and submitted to RIDOH for approval.

5. The Asbestos Abatement Plan has been written based on information provided by Client and the inspection performed by RI Analytical.

6. Reasonable efforts were made to discover hidden suspect asbestos materials, however, some previously hidden or untested suspect materials may only be discovered during the work for this Asbestos Abatement Plan. Work must stop immediately upon discovery of previously hidden materials that are suspected of containing asbestos or materials not previously tested. The Owner must be notified immediately in order to test these suspect materials and quantify any additional **ACM** that would then have to be removed in accordance with all applicable regulations, including amendments to Asbestos Abatement Plan and RIDOH and EPA notifications as required. This would also apply if out of scope **ACM** are to be added to the work.

Appendix I

Northern Long-eared Bat and Tricolored Bat Flyers

Northern Long-Eared Bat

(*Myotis septentrionalis*)

NLEB Description:

The Northern Long-Eared Bat (NLEB) is between 3″ and 3.7″ long with a wingspan of 9″ to 10″. NLEB are medium to dark brown on back and have tawny to pale brown undersides. NLEB have long ears. NLEB are nocturnal, they are active at night and sleep during the day.

Hibernating NLEB by Ann Froschauer USFWS

Protection:

NLEB populations have been decimated by White-Nose Syndrome, a fungal disease that affects bats during hibernation. When a species experiences a significant population decline and is determined to be at risk, it may be listed under the Endangered Species Act (ESA). The NLEB was listed as endangered under the ESA in March of 2023. Endangered species are in danger of becoming extinct. This listing provides special protections for NLEB, which are intended to help the population recover.

Habitat:

NLEB habitat is found throughout Rhode Island. NLEB hibernate in caves and mines called hibernacula during winter. NLEB swarm in wooded areas surrounding hibernacula in fall. During late spring and summer NLEB roost and forage in upland forests. During the day NLEB roost under bark and in tree crevices of both live trees and snags (dead trees). NLEB sometimes also roost in caves and structures, like buildings and bridges.

RI DOT Conservation Measures:

RIDOT incorporates conservation measures into projects to protect the NLEB. The specific conservation measures for each project are found in the contract documents. Dead and sick bats of any species must immediately be reported to the RIDOT Natural Resources Unit (NRU), call 401-479-1327. Contact the RIDOT NRU for an explanation of NLEB conservation measures.

More NLEB Information:

To learn more about the NLEB visit the USFWS website and search for the species by name.

FHWA Programmatic Consultation Avoidance and Mitigation Measure (AMM) 1: Ensure all operators, employees, and contractors working in areas of known or presumed bat habitat are aware of all environmental commitments, including all applicable AMMs.

Tricolored Bat

(*Perimyotis subflavus*)

TCB Description:

The tricolored bat (TCB) is between 3″ and 3.5″ long with a wingspan of 8″ to 10″. TCB is distinguished by its unique tricolored fur that appears dark at the base, lighter in the middle and dark at the tip. The TCB often appears yellowish, varying from pale yellow to nearly orange, but may also appear silvery-gray, chocolate brown or black. TCB are nocturnal, they are active at night and sleep during the day.

TCB by Pete Pattavina USFWS

Protection:

TCB populations have been decimated by White-Nose Syndrome, a fungal disease that affects bats during hibernation. When a species experiences a significant population decline and is determined to be at risk, it may be listed under the Endangered Species Act (ESA). The TCB is proposed as endangered under the ESA. Endangered species are in danger of becoming extinct. This listing provides special protections for TCB, which are intended to help the population recover.

Habitat:

TCB habitat is found throughout Rhode Island. TCB hibernate in caves and mines called hibernacula during winter. TCB swarm in wooded areas surrounding hibernacula in fall. During late spring and summer TCB roost and forage in upland forests. During the day TCB roost under bark and in tree crevices of both live trees and snags (dead trees). TCB sometimes also roost in caves and structures, like buildings and bridges.

RI DOT Conservation Measures:

RIDOT incorporates conservation measures into projects to protect the TCB. The specific conservation measures for each project are found in the contract documents. Dead and sick bats of any species must immediately be reported to the RIDOT Natural Resources Unit (NRU), call 401-479-1327. Contact the RIDOT NRU for an explanation of TCB conservation measures.

More TCB Information:

To learn more about the TCB visit the USFWS website and search for the species by name.

FHWA Programmatic Consultation Avoidance and Mitigation Measure (AMM) 1: Ensure all operators, employees, and contractors working in areas of known or presumed bat habitat are aware of all environmental commitments, including all applicable AMMs.

Appendix J

Pavement Core Reports

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
MATERIALS AND QUALITY ASSURANCE
PAVEMENT CORE REPORT

File No: 285 Lab No: 20161405 Date: 12/14/2016

Contract No: 2017-EH-001 FAP No: N/A PTSID: ______ Project: 2017 PPEST DIAMOND HILL RD

Town / City: CUMBERLAND Cored By: CORINGCREW

Limits: BROADVIEW AVE TO RTE 120

P.E. ☑ Final ☐ Acceptance ☐ Special Projects ☐

Comments:

Core ID / Direction / Lane ID	Station: LATITUDE / Lateral Offset (ft.)	LONGITUDE	Composite Pavement / Curb Reveal (in.)	Depth / Material / Qualifier	Depth / Material / Qualifier	Depth / Material / Qualifier	Depth / Material / Qualifier	Depth / Material / Qualifier	Total Depth / Cored To / Core Notes	Soil: From / To
C-01	@ Pole #212			7.25"					7.25"	
NB	0.000000	0.000000	Composite: No	Class I-1						
E 114 NOR	3 Left of Curb									
C-02	50' N of Pole #230			8.5"					8.5"	
NB	0.000000	0.000000	Composite: No	Class I-1						
E 114 NOR	3 Left of EOP									
C-03	@ Pole #248			9"					9"	
NB	0.000000	0.000000	Composite: No	Class I-1						
E 114 NOR	5 Left of EOP									
C-04	across from Pole #270			9.5"					9.5"	
NB	0.000000	0.000000	Composite: No	Class I-1						
E 114 NOR	4 Left of EOP									
C-05	across from Pole #286			10"					10"	
NB	0.000000	0.000000	Composite: No	Class I-1						
E 114 NOR	5 Left of Curb									
C-06	@ Pole #274			7.5"					7.5"	
SB	0.000000	0.000000	Composite: No	Class I-1						
E 114 SOU	6 Left of EOP									
C-07	@ Pole #253			9"					9"	
SB	0.000000	0.000000	Composite: No	Class I-1						
E 114 SOU	5 Left of EOP									

Core ID	Station				Depth	Depth	Depth	Depth	Depth	Total Depth	Soil: From / To	
Direction	LATITUDE	LONGITUDE	Composite Pavement		Material	Material	Material	Material	Material	Cored To		
Lane ID	Lateral Offset (ft.)			Curb Reveal (in.)	Qualifier	Qualifier	Qualifier	Qualifier	Qualifier	Core Notes		
C-08	@ Pole #225				9"					9"		
SB	0.000000	0.000000	Composite: No		Class I-1							
E 114 SOU	5 Left of EOP											
C-09	@ Pole #40-K				12"					12"		
SB	0.000000	0.000000	Composite: No		Class I-1							
E 114 SOU	5 Left of Curb											
				Average Depth:	9.08"					9.08"		

Cores Requested By:

Measured By (Print / Sign) Date

Reviewed By (Print / Sign) Date

RHODE ISLAND DEPARTMENT OF TRANSPORTATION
MATERIALS AND QUALITY ASSURANCE
PAVEMENT CORE REPORT

File No: 3147 Lab No: 20220909 Date: 8/15/2022

Contract No: 2019-EH-024B FAP No: PTSID: 2602D Project: Bridge Group 17C Newell and Sneeeh

Town / City: Cumberland Cored By: Lenox

Limits: Sneeeh Pond Rd (1) Nate Whipple to Little Pond County Rd (2) Anna Mac Dr to Nate Whipple

P.E. ☑ Final ☐ Special Projects ☐

Comments:

Core ID	Station				Depth	Depth	Depth	Depth	Depth	Total Depth	Soil: From / To	
Direction	LATITUDE	LONGITUDE	Composite Pavement		Material	Material	Material	Material	Material	Cored To		
Lane ID	Lateral Offset (ft.)			Curb Reveal (in.)	Qualifier	Qualifier	Qualifier	Qualifier	Qualifier	Core Notes		
C-01	Sneech Rd-Pole #86				1.9"	2.1"	N/A	N/A	N/A	4"	4"	9"
EB	41.981570	-71.422670	Composite: No		HMA	HMA				Soil/Gravel		
Lane	4 Right EOP				Broken/Tar Smel	Broken				L1/L2 Bond Break		
C-02	Sneech Rd-Pole #97				1.3"	N/A	N/A	N/A	N/A	1.3"	1.3"	5.3"
EB	41.981700	-71.417950	Composite: No		HMA					Soil/Gravel		
Lane	7 Right EOP				Broken							
C-03	Sneech Rd-Pole #112				1.4"	N/A	N/A	N/A	N/A	1.4"	1.4"	5.4"
EB	41.982250	-71.411840	Composite: No		HMA					Soil/Gravel		
Lane	6 Right EOP				Broken							
C-04	Sneech Rd-Pole #95				1.3"	N/A	N/A	N/A	N/A	1.3"	1.3"	6.3"
WB	41.981890	-71.419220	Composite: No		HMA					Soil/Gravel		
Lane	7 Right EOP				Broken							
C-05	Sneech Rd-Pole #100				1.4"	0.7"	N/A	N/A	N/A	2.1"	2"	8"
WB	41.981270	-71.416490	Composite: No		HMA	Sand Mix				Soil/Gravel		
Lane	9 Right EOP					Broken				L1/L2 Bond Break		
C-06	Sneech Rd-Pole#114				1.6"	N/A	N/A	N/A	N/A	1.6"	1.6"	7.6"
WB	41.982720	-71.411090	Composite: No		HMA					Soil/Gravel		
Lane	6 Right EOP				Broken							

Core ID	Station				Depth	Depth	Depth	Depth	Depth	Total Depth	Soil: From / To
Direction	LATITUDE	LONGITUDE	Composite Pavement		Material	Material	Material	Material	Material	Cored To	
Lane ID	Lateral Offset (ft.)			Curb Reveal (in.)	Qualifier	Qualifier	Qualifier	Qualifier	Qualifier	Core Notes	
				Average Depth:	1.4"	1.4"	N/A	N/A	N/A		

Cores Requested By: Kyle Gagnon, Felipe Hernandez

Shannon Sherman 8-17-22
Measured By (Print / Sign) Date

Anita Marshall 8/17/22
Reviewed By (Print / Sign) Date