CENTRAL MASSACHUSETTS

METROPOLITAN PLANNING ORGANIZATION

Berlin:
Route 62 Corridor Profile

August 2022

Document Prepared by:
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(508) 756-7717

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1.0 Introduction

A Corridor Profile combines the information produced by the transportation Management Systems along a particular highway corridor, most times in multiple host communities, and analyzes performance-based data, suggests both operational and physical improvements, and often identifies candidate projects for further study.

Utilizing the range of data and analyses produced by the ongoing transportation Management Systems maintained by the staff of the Central Massachusetts Regional Planning Commission (CMRPC) and overseen by the Central Massachusetts Metropolitan Planning Organization (CMMPO), Corridor Profile efforts allow for comprehensive integration through the consideration of a broad range of key transportation planning factors.

Ultimately, a range of suggested improvement options are compiled for the consideration of the host communities and the Massachusetts Department of Transportation (MassDOT), Highway Division. When local consensus is achieved, proposed improvement projects supported by the community eligible for federal-aid funding have the potential to be selected by the CMMPO for programming in the annual Transportation Improvement Program (TIP) document.

As the Corridor Profile study series has evolved, it has become increasingly multi-modal and intermodal. The Management Systems have also served as the foundation for the full consideration of performance-based planning. Performance-based planning seeks to measure the value of investments made in the region's transportation infrastructure. US DOT's required national focus areas include reducing congestion, improving pavement, reducing vehicle crashes and, in the spirit of the state's Complete Streets Program, increasing the use of other modes such as transit, bicycling, and walking.

The Route 62 Corridor Profile includes the analysis and interpretation of Management System data, which includes the following:

Traffic Counting: Daily Automatic Traffic Recorder (ATR) counts and MassDOT Highway Division count data.

Congestion Management Process (CMP): Current Travel Time & Delay studies along Route 62; current peak-hour Turning Movement Counts (TMC) at focus intersections and associated Level-of-Service (LOS) analyses for intersections and roadway segments.

Freight Planning: Peak hour percentages of heavy vehicles utilizing the Route 62 focus intersections.

Transportation Safety Planning Program: In-depth vehicle crash research using crash data provided by MassDOT, utilizing a three-year history of reported crashes and subsequent analysis.

Pavement Management System (PMS): Observation of pavement surface distress and extent in the field along with subsequent analysis and calculated Overall Condition Index (OCI).

Bridge Management System (BMS): Bridge condition data available through MassDOT Highway Division; GIS-based inventory of major roadway drainage structures, such as culverts, as well as staff observations in the field using standardized condition assessment techniques.

Depending on local sentiment and available funding, the technical work necessary to compile a Corridor Profile is supplemented by customized public outreach efforts. This can range from basic meetings with local officials to the formation of a Technical Advisory Group to guide the effort. As determined necessary, special meetings can also be held with various stakeholder groups.

1.1 Performance Management

Reaffirmed by the new Bipartisan Infrastructure Law (BIL), the CMMPO is continuing the evolution of the development of performance-driven, multimodal TIP projects in the planning region. Performance Based Planning & Programming (PBP&P) is intended to improve public transparency, fiscal accountability, and investment decisions affecting the condition and performance of the nation's transportation system.

The CMMPO's evolving Performance Management program includes both federal transportation performance management requirements as well as the MPO's established goals and objectives. These goals and objectives are then integrated through the Federal Transportation Planning Emphasis Areas. The areas are safety, security, state of good repair, congestion, multimodality, GHG/sustainability, equity, economic vitality, stormwater management & resiliency, and travel & tourism. Each goal and objective have corresponding performance metrics that are monitored and the progress towards these established goals is reported annually. A Performance Measures Scoresheet was created to assess both currently programmed and candidate future-year TIP projects to determine to what extent they address regional goals. Those projects that rank high often provide substantive measurable outcomes for each goal, and thus have an increased regional impact.

The findings from this Corridor Profile Report resulted in the compilation of a list of suggested improvement options. Ideally, these suggested improvements will encourage a TIP project that can positively influence regional performance. A table integrating the suggested improvements

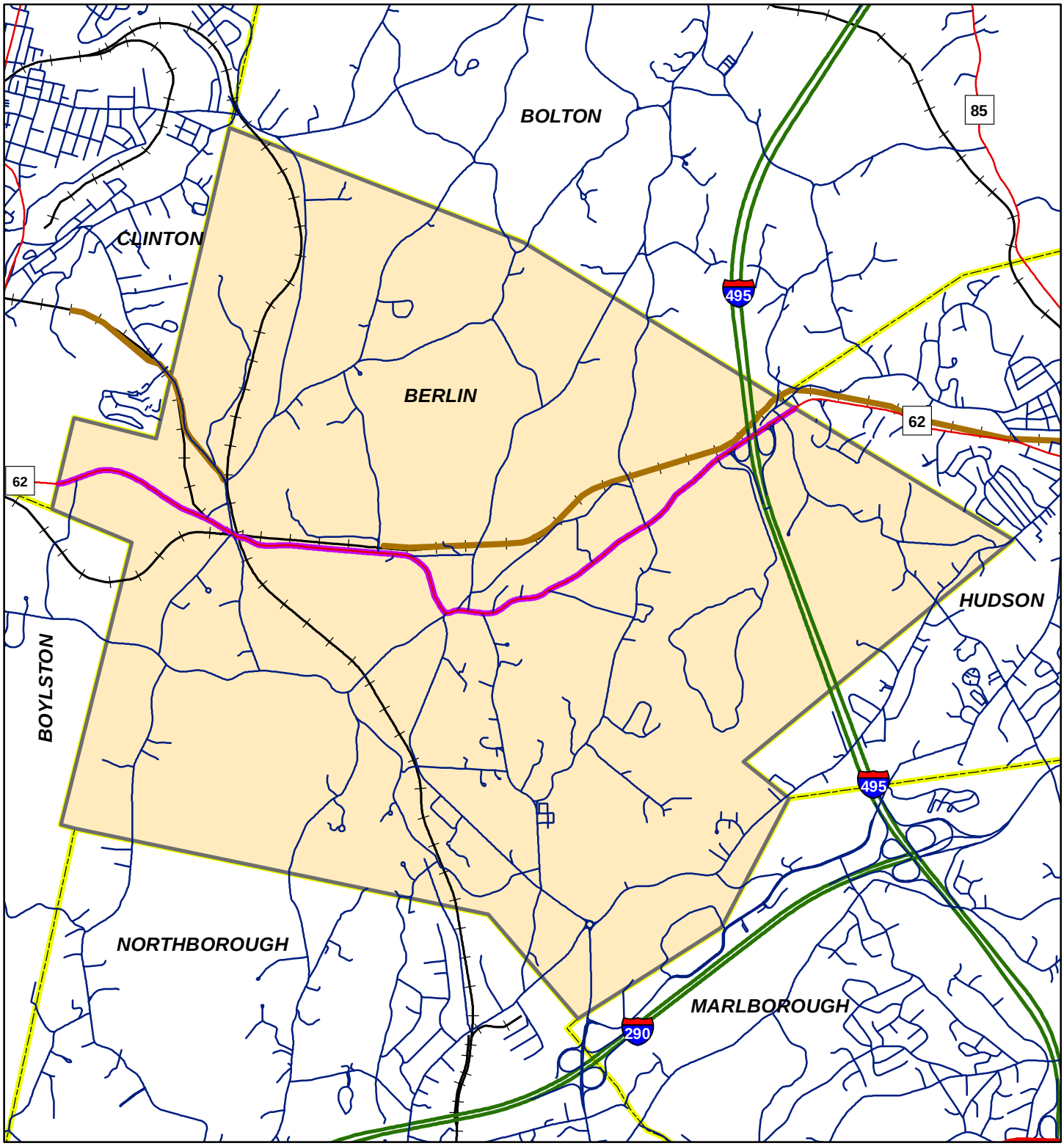
and how they can realistically support the goals and objectives for each federal emphasis area is included in the Overall Findings chapter of this report.

1.2 Route 62 Corridor Profile: Berlin

The Route 62 Corridor Profile was completed based on a request from town of Berlin officials. The Management Systems data was collected and analyzed and, in turn, the town can use the findings to pursue roadway improvements along the Route 62 corridor. Route 62 is a federal-aid roadway that is eligible for US DOT improvement funding. Since the corridor is fairly heavily traveled, the goals of this Corridor Profile effort include improving roadway safety, reducing congestion, preserving and improving roadway pavement, maintaining drainage structures as well as determining how to improve the roadway for the accommodation of bicycles and pedestrians. The Route 62 study corridor is shown in **Figure 1** along with other significant aspects of the region's multi-modal transportation network, including long distance trails and railroad lines.

The study limits of this Corridor Profile are between the Clinton town line and the Hudson town line. Route 62 connects with Interstate 495 in the eastern part of town while continuing easterly into the town of Hudson. Heading west, Route 62 travels into Clinton, where its joins with Route 70. Within the study area, the majority of Route 62 is a two-lane roadway with only a small segment near Interstate 495 that has three to four travel lanes. Route 62 is mostly residential with some commercial and municipal land uses.

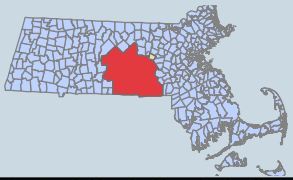
The roadway study segment of Route 62 is 4.5 miles in length. Most of Route 62 is maintained by the town of Berlin except near Interstate 495, which is maintained by MassDOT. The MassDOT Roadway Inventory File (RIF) indicates that for most of its length the right-of-way width for Route 62 is 50 feet, the exception being near Interstate 495, where it is 100 feet in width.

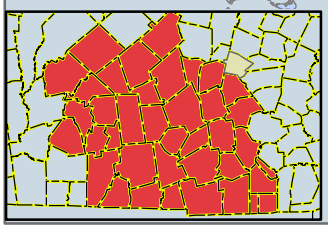


ROUTE 62 CORRIDOR PROFILE

Host Communiy of Berlin

Figure 1





Legend

- Route 62 Corridor Profile
- Interstate
- State Route
- Roads
- Mass Central Rail Trail
- Railroads

Miles

0 0.25 0.5 1 1.5 2

C M R P C
Central Massachusetts Regional Planning Commission

Source: Data provided by the US Census Bureau, Central Massachsuetts Regional Planning Commission (CMRPC), massDOT Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information MassGIS), Commonwealth of Massachusetts, Information Technology Division.

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1.3 Corridor Profile Work Activities Defined in UPWP

This Corridor Profile effort has been completed as part of CMRPC's Unified Planning Work Program (UPWP). The following provides an overview of the major tasks that were included within the defined scope of the Route 62 Corridor Profile effort:

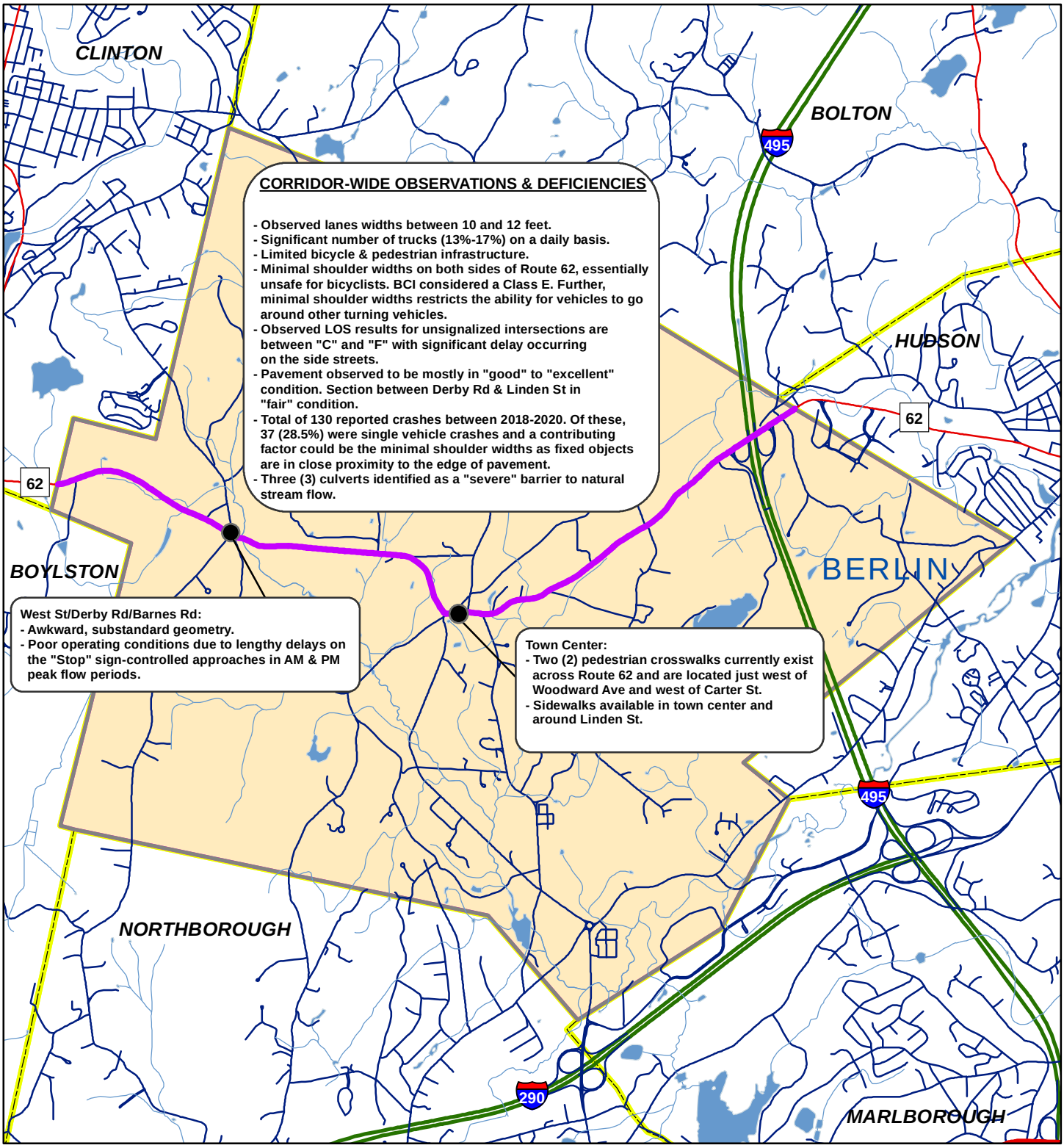
- CMRPC coordination on an entire range of Corridor Profile aspects including data collection and analysis.
- Vehicle crash analyses completed using MassDOT-maintained vehicle crash data.
- Completion of an "Environmental Profile" for the entire Route 62 study corridor in Berlin. This consists of GIS-based maps featuring overlays developed by the Massachusetts Department of Conservation & Recreation (DCR), the Massachusetts Department of Environmental Protection (DEP), and the National Heritage & Endangered Species Program (NHESP).
- Range of suggested improvement options compiled for host community consideration.
- Preparation of report document, complete with color graphics and maps, along with accompanying Technical Appendix.
- If needed, attend meetings with host communities involved in study.

1.4 Route 62 Observations & Existing Deficiencies

The following observations and existing deficiencies, also shown in **Figure 2**, were summarized for the entire length of the Route 62 study corridor:

- Observed lane widths are between 10 and 12 feet. Traffic flows include a significant number of observed large trucks, ranging from 13% to 17% on a daily basis on Route 62 in Berlin.
- Very limited bicycle and pedestrian infrastructure along Route 62 corridor through Berlin. Two (2) pedestrian crosswalks currently exist across Route 62. Both are located within the town center area, just west of Woodward Avenue and west of Carter Street.
- Minimal shoulder widths along both sides of Route 62 in Berlin. As a minimal shoulder width of 5 feet is practically non-existent along the corridor, it is essentially unsafe for bicyclists – other than highly skilled riders. The Bicycle Compatibility Index (BCI) score is considered a Class "E", the second lowest defined ranking. Further, the minimal existing shoulder widths often restrict the ability for vehicles to go around other turning vehicles as well as, for example, delivery and rubbish removal trucks.
- Observed Level of Service (LOS) results for the four unsignalized intersections are between a "C" and "F" with significant delay occurring on the side streets.
- Pavement observed to be mostly in "good" to "excellent" condition. The only section of road determined to be in "fair" condition is between Derby Road and Linden Street.

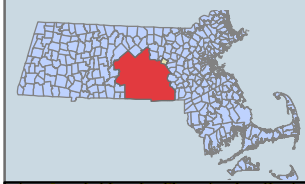
- A total of 130 reported vehicle crashes occurred on Route 62 in Berlin during the three (3) year period of 2018, 2019 and 2020. Of these, there were 37 single vehicle crashes (28.5%); the existing minimal Route 62 roadway shoulder widths can be considered a contributing factor due to fixed objects and embankments in close proximity to the edge of pavement.
- Awkward, substandard geometry at the Route 62 / West Street / Derby Road / Barnes Road intersection should be addressed due to poor observed operating conditions, resulting from lengthy delays on the "Stop" sign-controlled approaches during both the morning and evening peak flow periods.
- Through field observations and subsequent analysis, three (3) culverts along Route 62 in Berlin have been identified as "severe" barriers to natural stream flow. As a severe barrier, besides often adversely impacting both fish and wildlife passage, culvert water flows could be increasingly restricted and lead to both pipe and roadway failure under severe weather conditions.

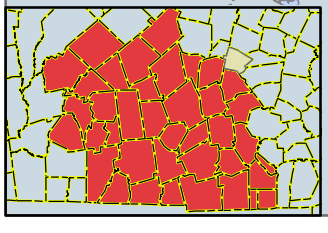


ROUTE 62 CORRIDOR PROFILE

Observations & Deficiencies

Figure 2





Legend

- Route 62 Corridor Profile
- Interstate
- U.S. Route
- State Route
- Water

0 0.25 0.5 1 1.5 2 Miles

CMRPC
Central Massachusetts Regional Planning Commission

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2.0 Route 62 Environs

2.1 Natural Environment

Major features of the natural environment were identified as part of the Route 62 Corridor Profile effort and were used to create Environmental Profile maps for the greater study area. Such maps are compiled in order to view major environmental systems beyond the focus roadway that have impacts on such concerns as drainage, water quality and wildlife migration.

The following Environmental Profile Maps produced for the Route 62 Corridor Profile study include environmental features such as vernal pools, wetlands, impaired waters and wellhead protection areas. Vernal pools are small, shallow ponds characterized by lack of fish and by periods of dryness. Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year. Under the Clean Water Act, states, territories, and authorized tribes are required to develop lists of impaired waterways. These are waters that are too polluted or otherwise degraded to meet the water quality standards set by states, territories, or authorized tribes. The law requires that these jurisdictions establish priority rankings for waters on the lists and develop a Total Maximum Daily Load (TMDL) for these waters. A TMDL is the calculated limit of the maximum amount of pollutant that a waterbody can receive on a daily basis and still safely meet water quality standards. A wellhead protection area is that area of an aquifer which contributes water to a given well under the most severe pumping and recharge conditions that can be realistically anticipated.

These maps of the study area showing major environmental features were compiled from the following key resources:

Department of Conservation and Recreation (DCR)

The mission of the DCR is to protect, promote and enhance the state's wealth of natural, cultural and recreational resources. Geographic Data layers are managed by various divisions within DCR.

- **Division of State Parks and Recreation -** This division protects land and resources on privately and municipally held land through technical assistance, grant and planning programs, policy development, and other services.
- **Forest Stewardship Program -** This non-regulatory program is designed to help landowners protect the inherent ecosystem values of their forests.
- **Division of Water Supply Protection -** Manages and protects the drinking water supply watersheds for the greater Boston area.

Department of Environmental Protection (DEP)

MassDEP is responsible for ensuring clean air and water, the safe management and recycling of solid and hazardous wastes, the timely cleanup of hazardous waste sites and spills, as well as the preservation of wetlands and coastal resources. MassDEP includes:

- **Division of Watershed Management (DWM)**
- **Watershed Planning Program (WPP) -** Contaminated water adversely impacts drinking water supplies, degrades the state's recreational water resources and destroys wildlife habitat. Water that does not soak into the ground is called runoff. Proper animal manure management and runoff management will protect or improve water quality in any community and watershed. The geographic data layers used are from an integrated list from DWM and WPP and include:
    - **Impaired Waterways (typically due to phosphorous, metals, and pathogens from sewage and farming's use of manure as well as other contaminants)**
    - **Impaired Waterbodies**
    - **Monitored Waterways**
    - **Zone II (Wellhead Protection Areas)**
- **Bureau of Resource Protection (BRP) -** The Wetlands Protection Act protects wetlands and the public interests they serve, including flood control, prevention of pollution and storm damage, and protection of public & private water supplies, groundwater supply, fisheries, land containing shellfish, and wildlife habitat. These public interests are protected by requiring a careful review of proposed work that may alter wetlands or associated buffer zones.

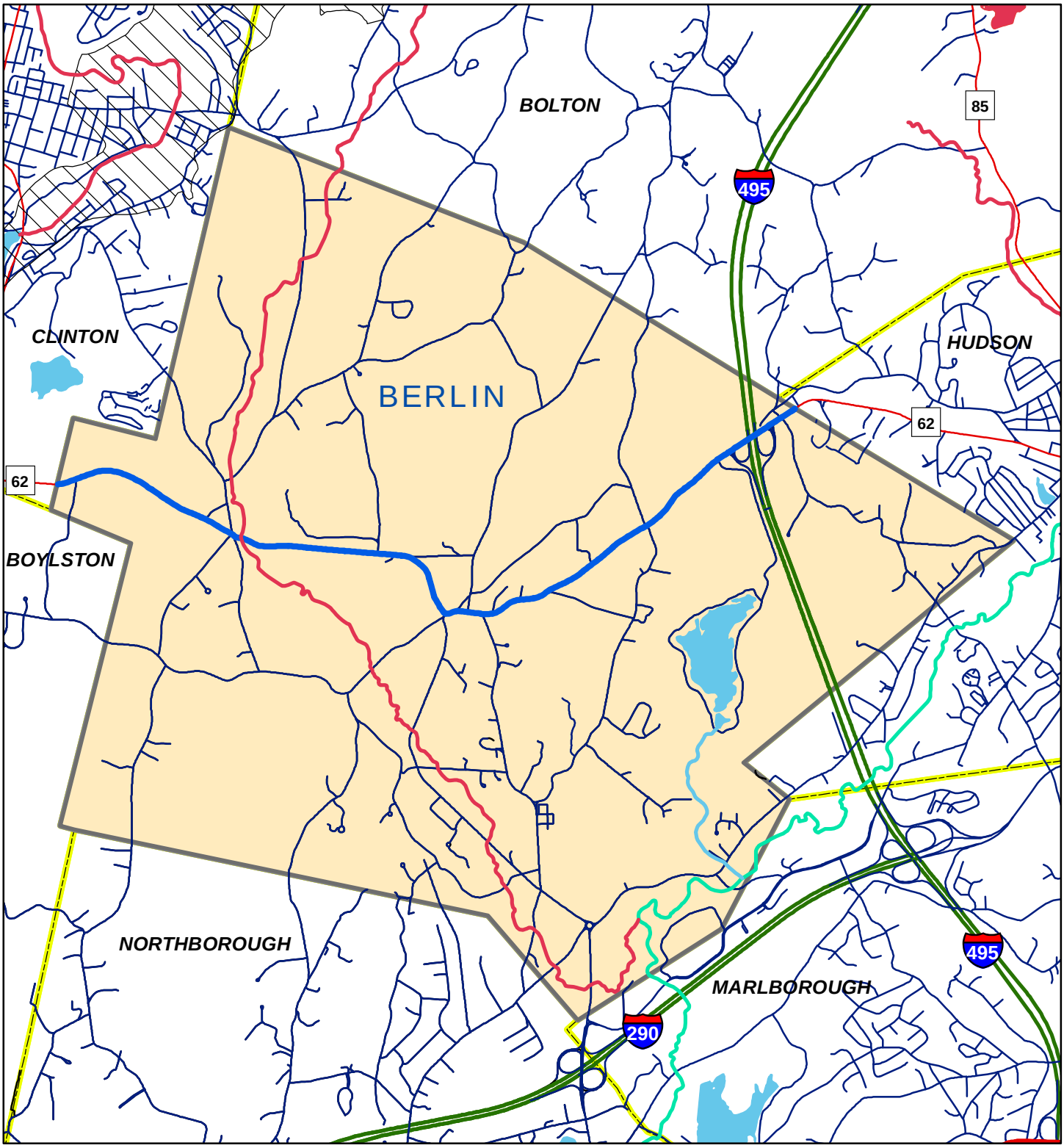
National Heritage & Endangered Species Program (NHESP)

The overall goal of the NHESP is the protection of the state's wide range of native biological diversity. NHESP is responsible for the conservation and protection of hundreds of species that are not hunted, fished, trapped, or commercially harvested in the state. Available geographic data layers include:

- **Certified Vernal Pools**
- **Potential Vernal Pools**
- **BioMap Core Habitat** - This depicts the most viable habitats for rare species in Massachusetts.
- **BioMap Supporting Natural Landscape**
- **Priority Habitats of Rare Species** - These are the geographical extents of habitat for all state-listed rare species, both plants and animals. Priority habitats are officially referenced under the Massachusetts Endangered Species Act (MESA).

Impaired Waterways and Wellhead Protection Areas

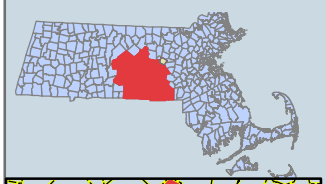
Figure 3 shows impaired waterways and wellhead protection areas in the study area in the town of Berlin. In Berlin, there are no wellhead protection areas within the study corridor. As for impaired waters, North Brook, located in the western part of the community, is unimpaired for some uses, but not assessed for others. Additionally, Gates Pond, located south of Route 62 and just west of Interstate 495, has insufficient information to make assessments for any uses.

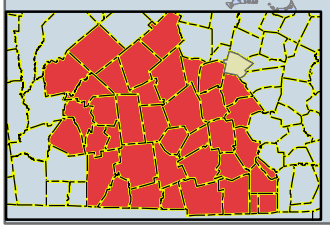


ROUTE 62 CORRIDOR PROFILE

Berlin Impaired Waters & Wellhead Protection Areas

Figure 3





Legend

- Route 62 Corridor Profile
- Local Roads
- Interstate
- State Route
- DEP Aproved Zone II's

Water Body (Rivers, Lakes and Ponds) Category

- 2 Attaining Some Uses
- 3 No Uses Assessed
- 4A TMDL is Completed
- 4C Impairment not Caused by a Pollutant
- 5 Waters Requiring a TMDL

0 0.275 0.55 1.1 1.65 2.2 Miles

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N

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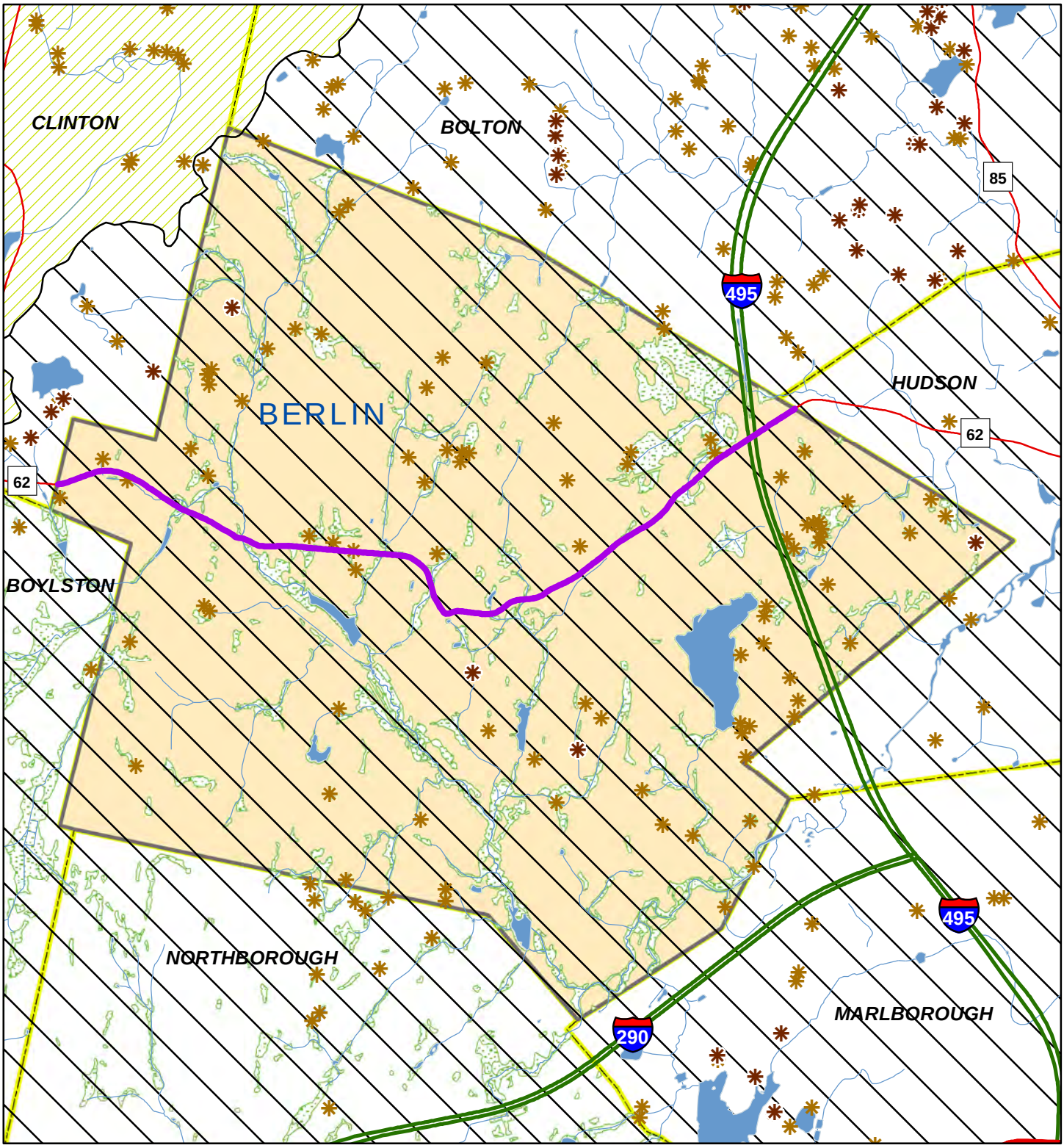
Major Watershed Areas, Vernal Pools, and Wetlands

Figure 4 shows major watershed areas, vernal pools, and wetlands within the Route 62 study area in Berlin. The entire study corridor is within the Concord River Watershed. Further, there are numerous wetlands near the Berlin study corridor as well as numerous potential vernal pools. It appears that further study would be needed to investigate the types of species that inhabit both the wetlands and potential vernal pools within the Route 62 study area, and if any potential suggested improvements would be detrimental to their existence.



ROUTE 62 CORRIDOR PROFILE

Berlin Major Watersheds, Vernal Pools & Wetlands

Figure 4

Legend

Route 62 Corridor Profile

Concord River Watershed

Nashua River Watershed

DEP Wetlands

NHESP Certified Vernal Pools

Potential Vernal Pools

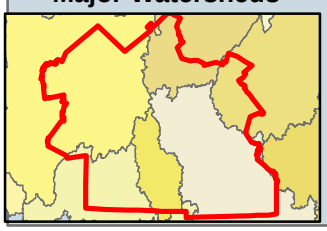
Water Bodies

Streams

Miles

0 0.25 0.5 1 1.5 2

Major Watersheds



CMRPC Central Massachusetts Regional Planning Commission

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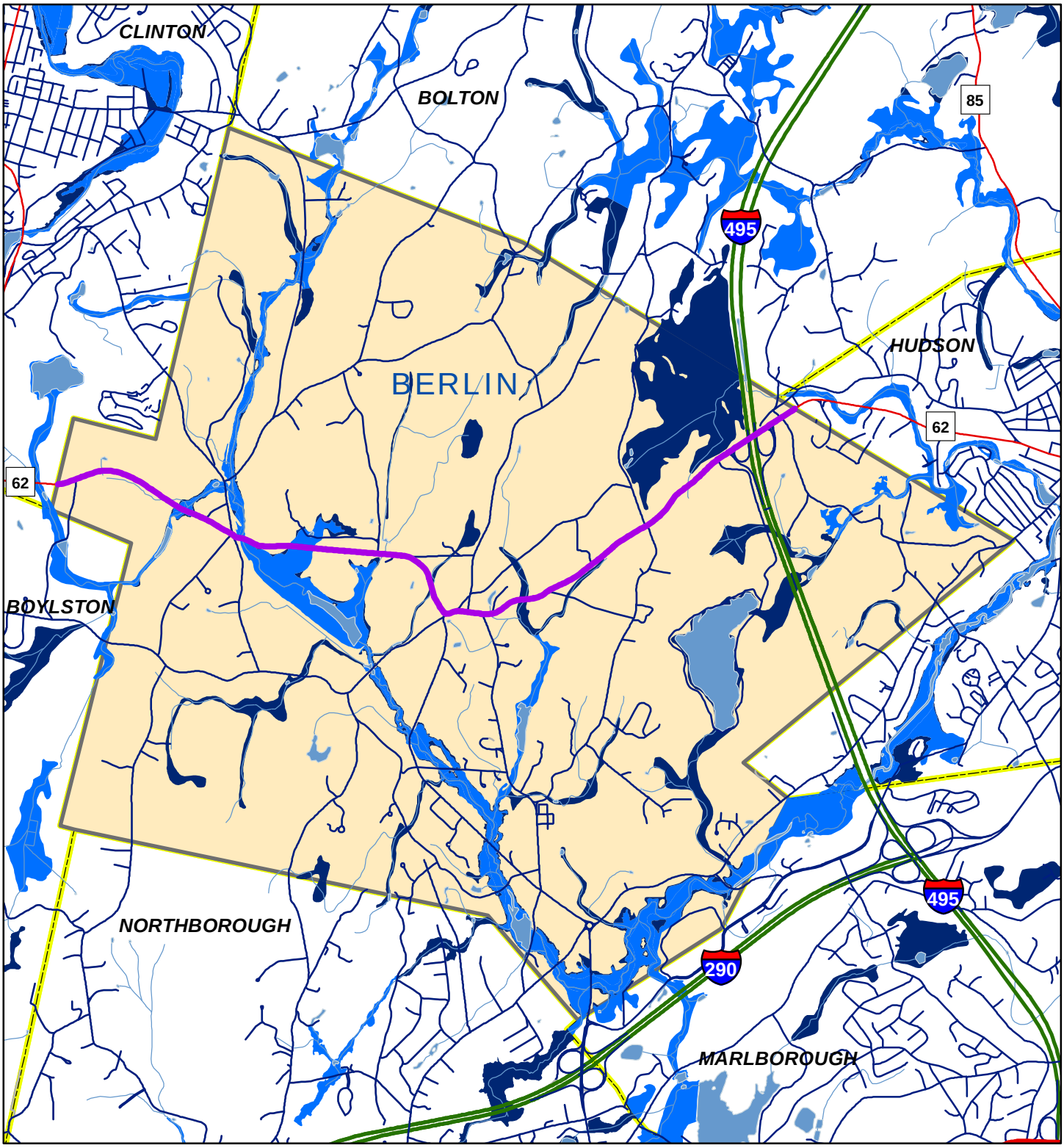
2.2 Flood Zones

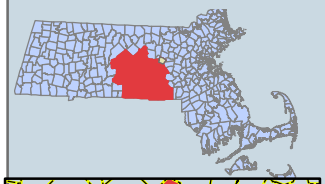
Created by the Federal Emergency Management Agency (FEMA) in regards to National Flood Insurance Rates, **Figure 5** shows the 100 and 500-year flood zones near the study area. The 100-year flood zone means that there is a one percent annual chance of a flood within that defined area. The 500-year flood zone means that there is a 0.2 percent annual chance for a flood. The closer something is to the flooding source (e.g., river, stream, pond, etc.), the greater the risk of flooding. As such, defined flood zones are used to calculate flood insurance rates for the homes and businesses within the zones.

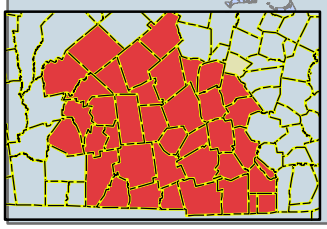
In Berlin, there are 100-year flood zones around the North Brook, especially near the West Street / Barnes Road / Derby Road intersection. Also near the study area there is a large 500-year flood zone just north of Route 62 and west of Interstate 495.



ROUTE 62 CORRIDOR PROFILE

Berlin Flood Zones
Figure 5





Legend

- Route 62 Corridor Profile
- Interstate
- State Route
- Local Roads
- Streams
- Water Bodies
- 100 Year Flood Zone
- 500 Year Flood Zone

Miles

0 0.25 0.5 1 1.5 2

C M R P C
Central Massachusetts Regional Planning Commission

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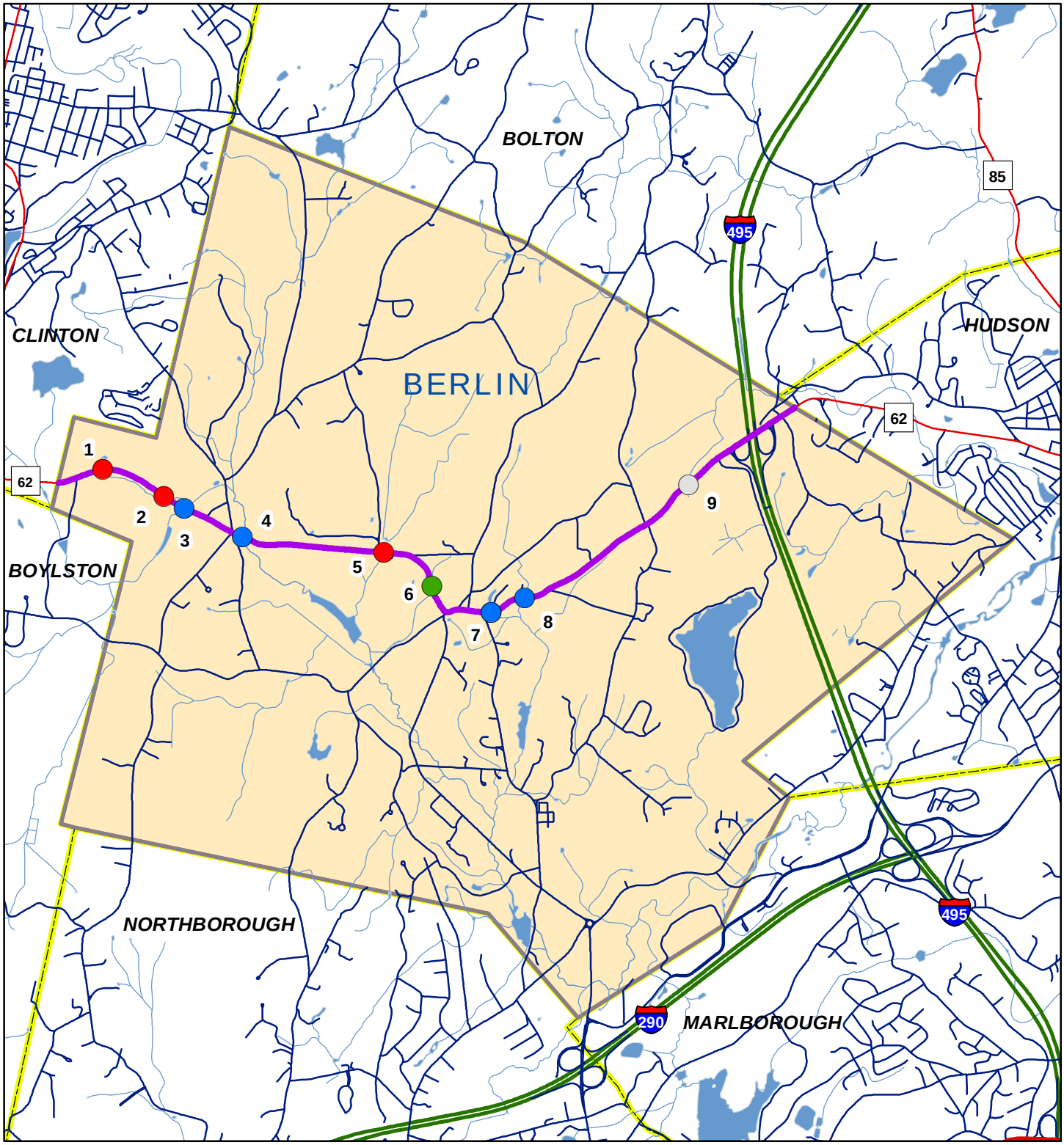
2.3 Route 62 Major Drainage Structures

Major drainage structures, like culverts and small bridges, play a vital role in the region's transportation network and ecological sustainability, providing the ability to maintain connections within watersheds, as well as protecting property and other infrastructure from floods and storm damage. In coordination with the Massachusetts Department of Environmental Restoration (MassDER) and the North Atlantic Aquatic Connectivity Collaborative (NAACC), a number of CMRPC staff have been trained to assess the condition and non-tidal aquatic passability of culverts based on the established Massachusetts Stream Crossing Standards. To date, the NAACC has assessed over 6,400 culverts and small bridges (both tidal and non-tidal) across the Commonwealth. These assessments have been used to support many projects that restore both tidal and non-tidal aquatic connectivity while also providing resiliency benefits.

The major drainage structures intersecting Route 62 were identified through a GIS analysis. This mapping exercise allowed for the identification of major stream crossings along the length of the Route 62 study area in the town of Berlin. **Figure 6** shows the location and current barrier status of each identified drainage structure. As seen in the figure, the current barrier status is provided for each culvert based on the NAACC passability scores. The breakdown of these scores is shown in **Table 1**.

Table 1
NAACC Culvert Aquatic Passability Scoring

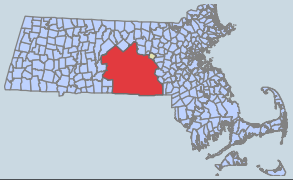
Aquatic Passability Score	Barrier Type
1.0	No Barrier
0.80 – 0.99	Insignificant Barrier
0.60 – 0.79	Minor Barrier
0.40 – 0.59	Moderate Barrier
0.20 – 0.39	Significant Barrier
0.00 – 0.19	Severe Barrier

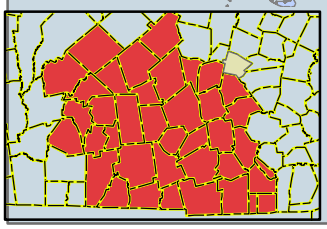


ROUTE 62 CORRIDOR PROFILE

Berlin Major Drainage Structures

Figure 6





Legend

- Route 62 Corridor Profile
- Interstate
- State Route
- Streams
- Water Bodies
- Severe barrier
- Significant barrier
- Moderate barrier
- Minor barrier
- Insignificant barrier
- No Score/Not Accessible

Miles

0 0.25 0.5 1 1.5 2

CMRPC

Source: Data provided by the US Census Bureau, Central Massachsuetts Regional Planning Commission (CMRPC), massDOT Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information MassGIS), Commonwealth of Massachusetts, Information Technology Division.

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In order to assess the total of 9 identified drainage structures, staff conducted field visits and filled out the NAACC Non-Tidal Aquatic Connectivity Survey Data Form for each structure. (The completed assessment forms can be found in the study's Technical Appendix.) **Table 2** summarizes key information for each of the major drainage structures surveyed in the field. This information includes: assigned map #, host community, structure materials, pipe diameter and length, NAACC passability score, and any additional observations.

There was a mix of observed conditions for the 9 structures along the Route 62 study corridor. There are three structures (#1, #2 & #5) that are considered as a "severe" barrier. Next, there are four structures (#3, #4, #7 & #8) that are a "moderate" barrier. There is also one structure (#6) that is an insignificant barrier in Berlin and one structure (#9) that the structure was unable to be assessed and scored. For this structure, the outlet pipe could not be found. All structures are made of either concrete, metal, or rock/stone and range in length between 36 feet to 60 feet. Following the table, **Figures 7A & 7B** show photos taken in the field of the major drainage structures assessed along Route 62.

Table 2
Route 62
Inventory of Major Drainage Structures

Assigned Map #	Host Community	Structure Materials	Approx. Pipe Size	Approx. Length	NAACC Passability Score	Additional Notes
1	Berlin	Metal	1' x 1'	42'	0.079	Culvert located near 113 Boylston Rd. Outlet in poor condition.
2	Berlin	Metal	2' x 2'	58'	0.186	Culvert located near 85 Boylston Rd. Outlet in poor condition.
3	Berlin	Metal	5' x 5'	45'	0.634	Culvert located near 83 Boylston Rd. Outlet in poor condition and structure is rusting.
4	Berlin	Concrete	5' x 10'	40'	0.776	Culvert located just east of Derby Rd.
5	Berlin	Concrete	2' x 2'	36'	0.186	Culvert located near 68 West St. Two structures and one is in poor condition.
6	Berlin	Concrete	4' x 2'	49'	0.901	Culvert located near 38 West St.
7	Berlin	Metal	4' x 4'	50'	0.693	Culvert located to the west of Brewer Rd. Fencing across stream on outlet side.
8	Berlin	Concrete	2' x 2'	60'	0.657	Culvert located to the east of Oak St.
9	Berlin	Rock/Stone	3' x 3'	Unknown	No Score	Culvert located to the west of I-495 SB ramps. Large scour pool on inlet side. Outlet side not found. Assessment not complete.

Figure 7A

Berlin

Route 62 Major Drainage Structures Photos

Culvert #1 – Outlet Side

Culvert #2 – Outlet Side

Culvert #3 –Inlet Side

Culvert #4 – Outlet Side

Culvert #5 – Inlet Side

Culvert #6 – Outlet Side

Figure 7B

Berlin

Route 62 Major Drainage Structures Photos

Culvert #7 – Inlet Side

Culvert #8 – Outlet Side

Culvert #9 – Inlet Side

Based on the observations made in the field, the following provides a brief listing of specific maintenance and suggested improvement options that target the inspected and assessed Route 62 drainage structures:

- Regularly inspect & clean.
- Clear trash, vegetation, branches and other blockages.
- Inspect for adverse wildlife activity, ex. animal nests, beaver dams.
- As appropriate, maintain passage for aquatic & land animals.
- Install safety fencing where needed.
- As necessary, institute a planned, prioritized reconstruction and replacement program.
- Consider assessing all culverts in the host community using the NAACC Non-Tidal Aquatic Connectivity protocol to determine their aquatic passability and condition.

A potential state funding source, MassDEP has a Culvert Replacement Municipal Assistance Grant Program for communities. Information about this program can be found on the MassDEP Website. At this time, the FY 2023 applications deadline has passed. Awarded funds typically range from $25,000 to $400,000, depending on project phase and the scope of work proposed. Eligible projects must be a culvert or bridge replacement on a public way, owned and maintained by the applying municipality, and must cross a natural freshwater, non-tidal river or stream channel. The stream channel may be either intermittent or perennial and the project must meet the Massachusetts Stream Crossing Standards.

2.4 Performance Management

The regional Performance Measure of Stormwater Management & Resiliency pertains to this chapter. The goal is to create a transportation network that is resilient to the impacts of stormwater. For any new CMMPO Transportation Improvement Program (TIP) projects, it is important to consider the use of Green Infrastructure or Nature-Based Solutions to help manage stormwater. Also, older culverts should be upgraded to new, modern structures that can adequately handle the heavy water flows from stronger storms with increasing frequency. A higher priority should be given to areas that are within a 100 or 500-year flood zone. By effectively applying these best-practice approaches, the goal of a stormwater resilient transportation network in the planning region is obtainable.

3.0 Congestion Management Process (CMP)

Congestion management is the application of strategies to improve transportation system performance and reliability by reducing the adverse impacts of congestion on the movement of people and goods. A Congestion Management Process (CMP) is a systematic and regionally-accepted approach for managing congestion that provides accurate, up-to-date information on transportation system performance and assesses alternative strategies for congestion management that meet both state and local needs. The CMP is intended to move these congestion management strategies into the funding and implementation stages.

The CMP, as defined in federal regulation, is intended to serve as a systematic process that provides for safe and effective integrated management and operation of the multimodal transportation system. The process includes:

- Development of congestion management objectives
- Establishment of measures of multimodal transportation system performance
- Collection of data and system performance monitoring to define the extent and duration of congestion and determine the causes of congestion
- Identification of congestion management strategies
- Implementation activities, including identification of an implementation schedule and possible funding sources for each strategy
- Evaluation of the effectiveness of implemented strategies

The Congestion Management System (CMS) was first introduced by the **Intermodal Surface Transportation Efficiency Act** (ISTEA) of 1991 and continued under the successor law, the **Transportation Equity Act for the 21st Century** (TEA-21). The CMS was intended to augment and support effective decision making as part of the overall metropolitan planning process. In 2006, the **Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users** (SAFETEA-LU) called for the CMS to evolve into a Congestion Management Process (CMP), with a greater focus on the implementation of operational improvements to the highway system to mitigate congestion. In 2012, the **Moving Ahead for Progress in the 21st Century Act** (MAP-21) called for the continuation of the CMP program while also requiring a transition to performance-based planning. This was reaffirmed by 2015's successor national legislation **Fixing America's Surface Transportation** (FAST) **Act**. At this time, the CMP continues as part of the new 2021 **Bipartisan Infrastructure Law** (BIL)

3.1 Daily Traffic Volumes

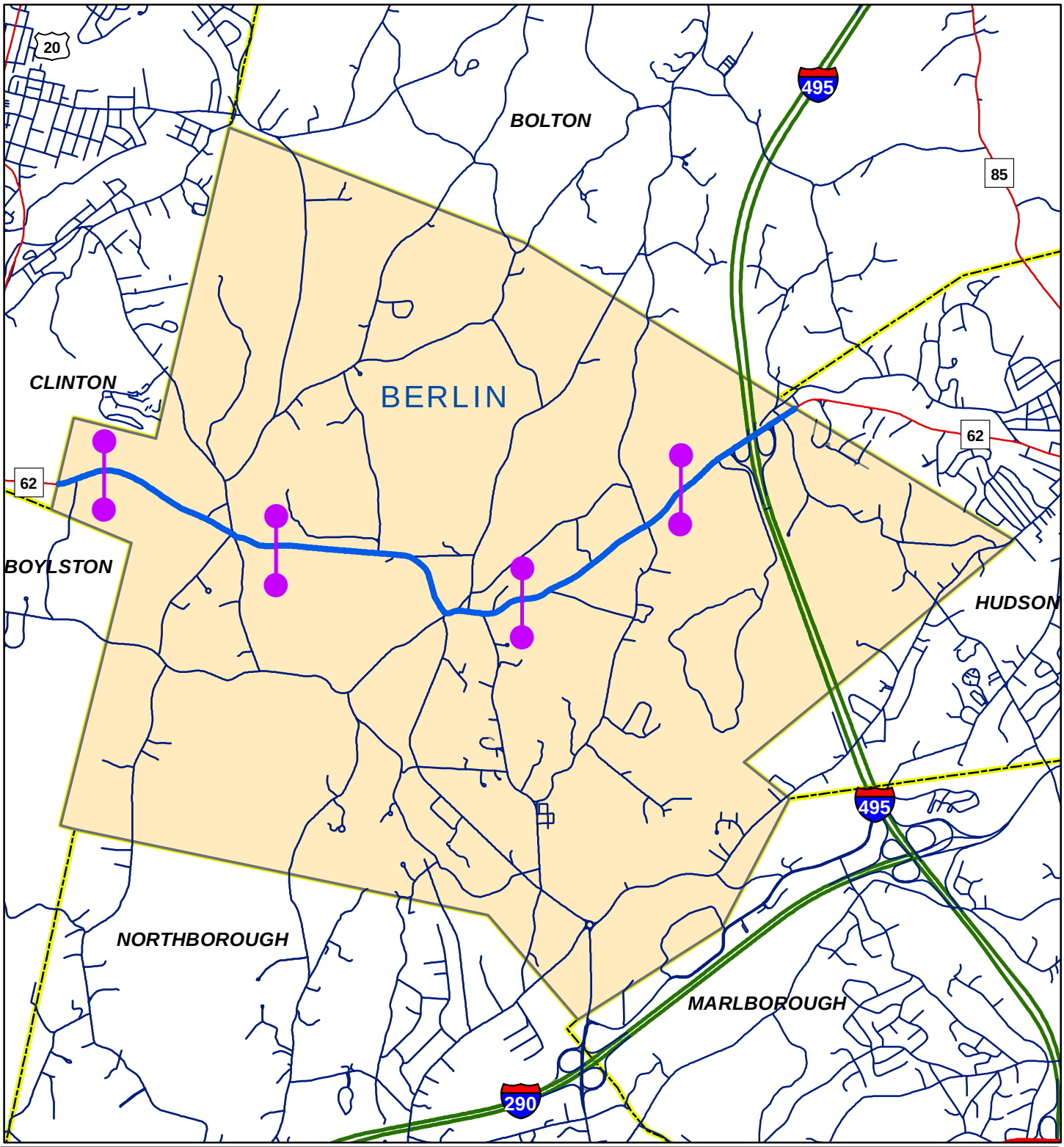
Figure 8 shows locations along Route 62 in the town of Berlin where CMRPC placed Automatic Traffic Recorders (ATRs) to determine the daily volume of traffic. All counts were completed in June 2022. The ATRs were installed along the roadway and left in place for at least 48 hours.

There were four (4) count locations completed for this Corridor Profile. **Table 3** shows the traffic volume results from the Route 62 ATR locations. As the data shows, the highest traffic volumes are on the easterly section of Route 62, near and adjacent to the Interstate 495 interchange. The lowest volumes observed on Route 62 are near the Clinton town line.

Table 3
Route 62 Daily Traffic Volumes

ATR Location	Date	Volume*
Route 62 at Clinton Town Line	6/8/2022	5,300
Route 62 east of Derby Road	6/8/2022	10,950
Route 62 east of Pleasant Street	6/8/2022	11,100
Route 62 west of Interstate 495	6/16/2022	11,875

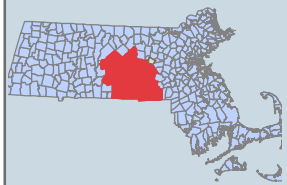
*Vehicles Per Day (VPD)

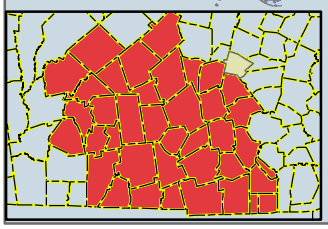


ROUTE 62 CORRIDOR PROFILE

Berlin Traffic Count Locations

Figure 8





Legend

- Route 62 Corridor Profile
- Interstate
- State Route
- US Route
- Local Roads
- ATR Locations

0 0.225 0.45 0.9 1.35 1.8 Miles

C M R P C
Central Massachusetts Regional Planning Commission

Source: Data provided by the US Census Bureau, Central Massachsuetts Regional Planning Commission (CMRPC), massDOT Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information MassGIS), Commonwealth of Massachusetts, Information Technology Division.

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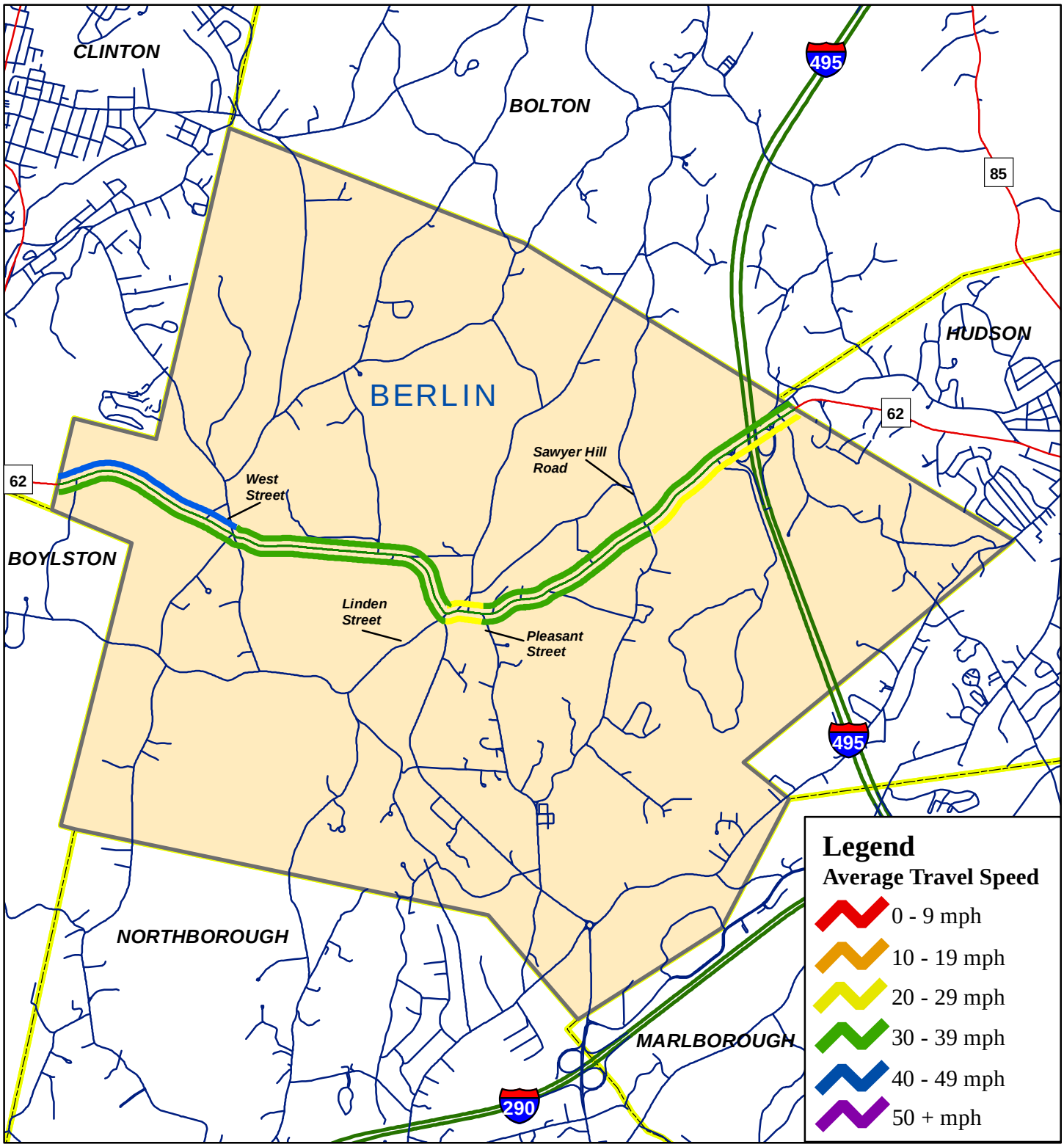
3.2 Route 62 Travel Time and Delay Study

CMRPC staff conducted one (1) travel time and delay study for this Corridor Profile effort. The travel time data was collected by CMRPC using a Global Positioning System (GPS) unit. The study occurred between 7:00 AM – 9:00 AM and 4:00 PM – 6:00 PM. After the field data was collected, it was downloaded into the *TravTime* software (developed by Geo Stats) in order to analyze the data. As indicated in **Table 4**, it takes between 7.4 and 8.4 minutes to travel on Route 62 during the AM peak period and nearly 8 minutes during the PM peak period. The "Congested Time" shown in the table is considered to be when observed vehicle speeds are below 20 MPH or 60% of the posted speed limit.

Table 4
Route 62 Travel Time and Delay Study Results

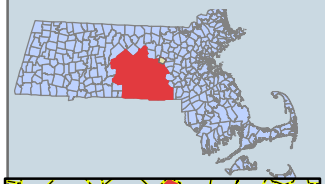
Peak Period	Direction	Study Year	Distance	Travel Time (average minutes)	Average Travel Speed	Congested Time (average minutes)
AM	Eastbound	2022	4.5 miles	8.4	32 mph	1.3
AM	Westbound	2022	4.5 miles	7.4	36 mph	0.5
PM	Eastbound	2022	4.5 miles	7.9	34 mph	0.9
PM	Westbound	2022	4.5 miles	7.7	35 mph	0.3

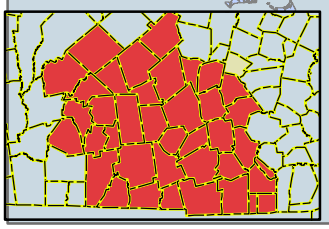
Figures 9 and 10 show average Route 62 travel speeds for each section of the study roadway from the travel time and delay study completed in May/June 2022. According to the above table, the average travel speed for the entirety of the study corridor is between 32 MPH and 36 MPH. Staff created four (4) checkpoints in order to divide the Route 62 corridor into five (5) study segments. The following maps show the average travel speeds for both directions for each defined segment. The slowest travel speeds in the AM peak period are between Linden Street and Pleasant Street for both directions. Additionally, the eastbound segment between Sawyer Hill Road and the Hudson town line also has slow observed speed as there are two traffic signals and many vehicles heading towards the interchange with Interstate 495. Along most of the segments, travel speeds are between 30 MPH and 39 MPH. For the PM peak period, average observed travel speeds are relatively the same as the AM period. The lowest speeds are again between Linden Street and Pleasant Street in both directions and along the eastbound segment between Sawyer Hill Road and the Hudson town line.



ROUTE 62 CORRIDOR PROFILE

AM Peak Period Average Travel Speed
Figure 9





Legend

- Interstate
- State Route
- Local Roads

0 0.25 0.5 1 1.5 2 Miles

CMRPC Central Massachusetts Regional Planning Commission

N

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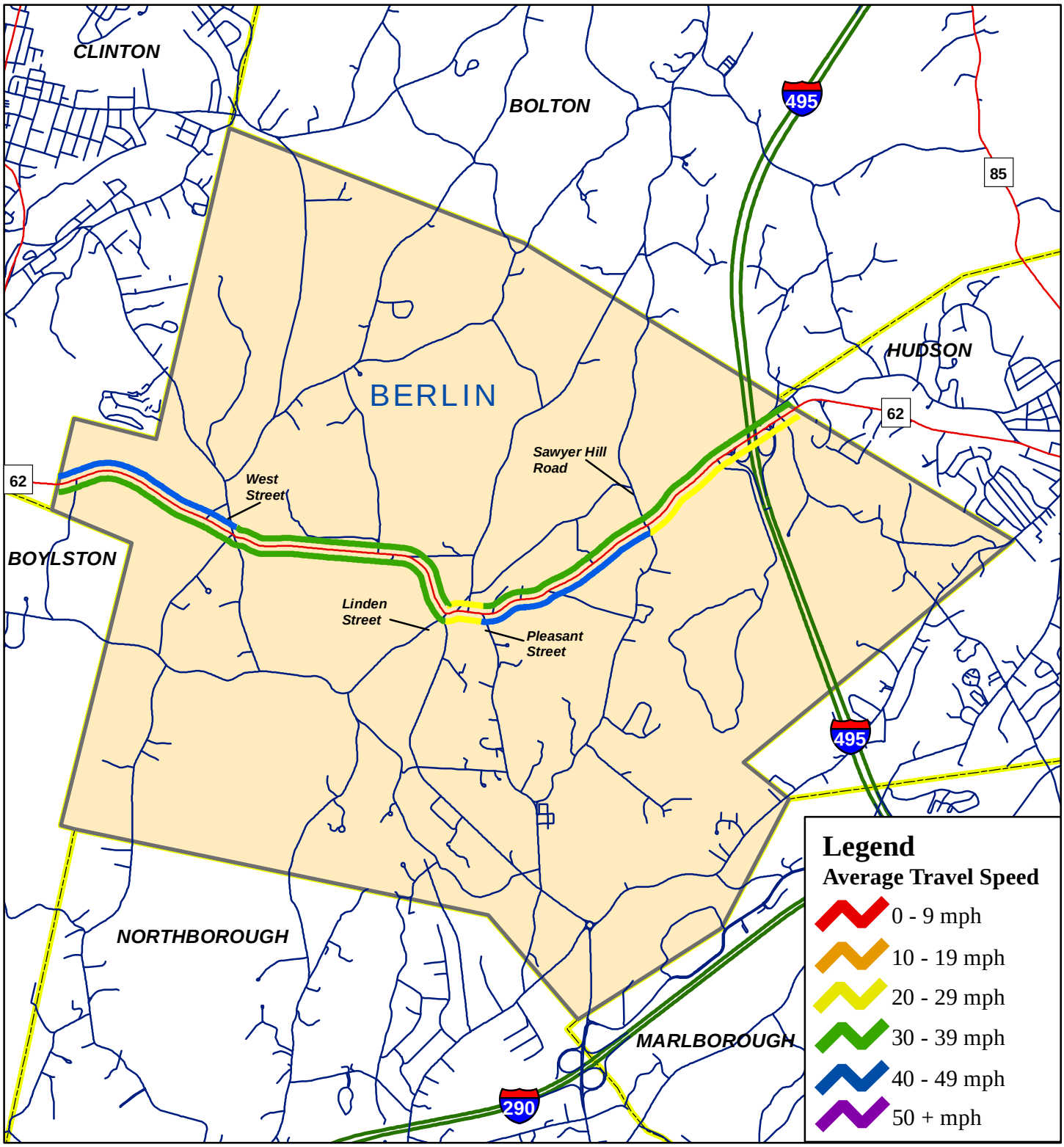
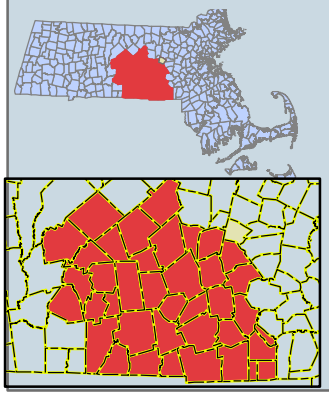


ROUTE 62 CORRIDOR PROFILE

PM Peak Period Average Travel Speed
Figure 10



Legend

- Interstate
- State Route
- Local Roads

0 0.25 0.5 1 1.5 2 Miles

CMRPC
Central Massachusetts Regional Planning Commission

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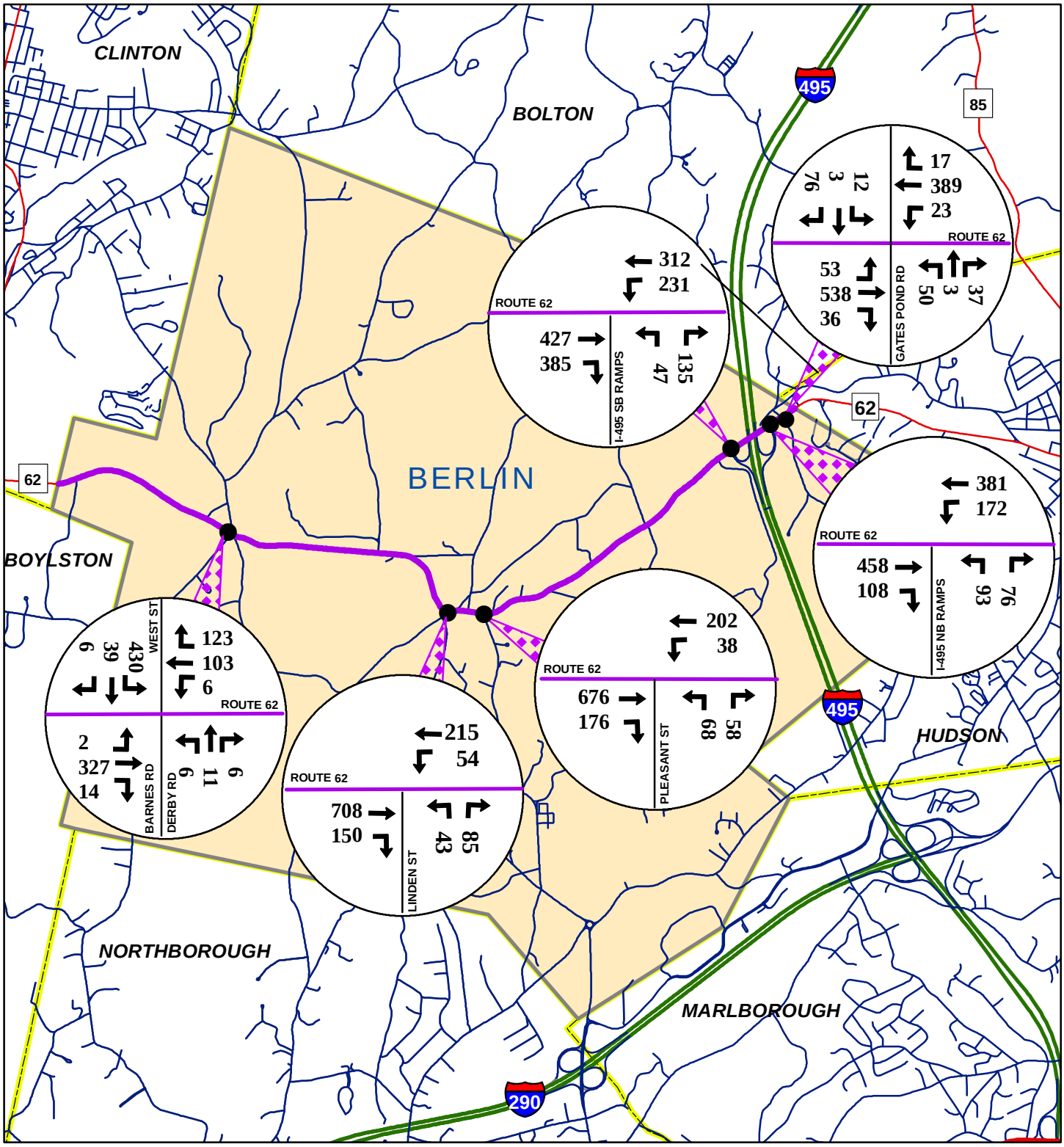
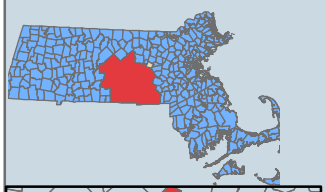
3.3 Route 62 Intersections Existing Peak Hour Traffic Volumes

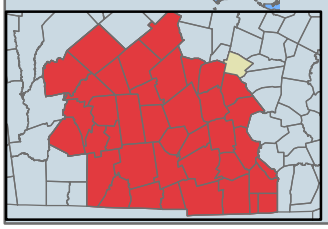
CMRPC staff conducted Turning Movement Counts (TMCs) at six (6) focus intersections for this Corridor Profile effort. All counts were completed in 2022 and during peak flow months while local schools were in session. The observed turning volumes are shown in **Figure 11** and **Figure 12**, respectively, as existing AM and PM peak hour traffic flows. (All TMC datasheets are provided in the document's Technical Appendix).



ROUTE 62 CORRIDOR PROFILE

Berlin Existing Traffic Flows
AM Peak Hour Period
Figure 11





Legend

- Route 62 Corridor Profile
- Interstate
- State Numbered Routes
- Local Roads

0 0.225 0.45 0.9 1.35 1.8 Miles

CMRPC
Central Massachusetts Regional Planning Commission

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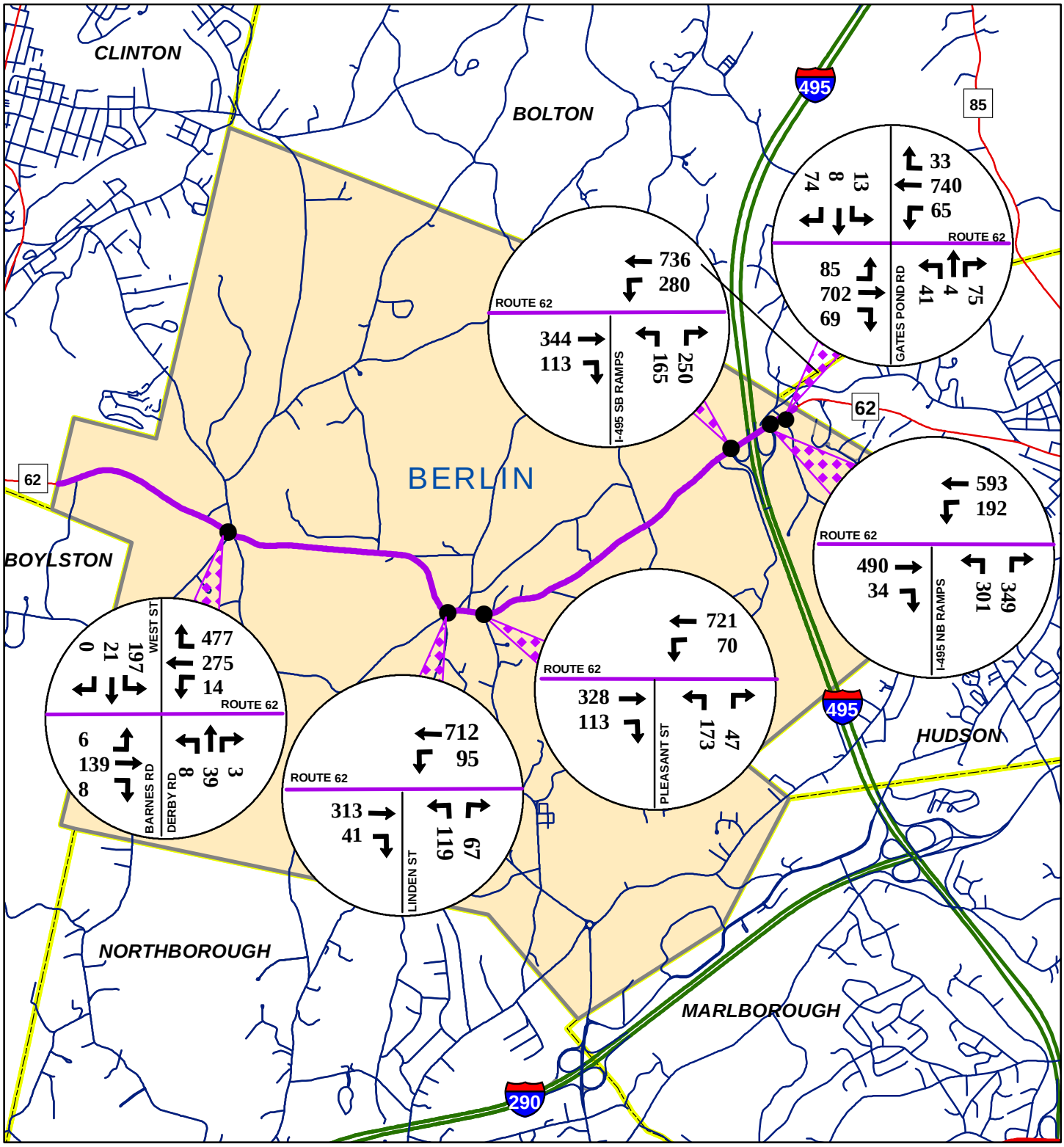
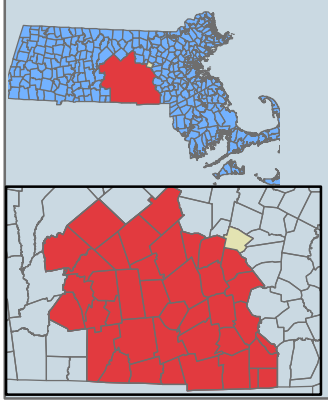


ROUTE 62 CORRIDOR PROFILE

Berlin Existing Traffic Flows
PM Peak Hour Period
Figure 12



Legend

- Route 62 Corridor Profile
- Interstate
- State Numbered Routes
- Local Roads

0 0.225 0.45 0.9 1.35 1.8 Miles

CMRPC Central Massachusetts Regional Planning Commission

Source: Data provided by the US Census Bureau, Central Massachsuetts Regional Planning Commission (CMRPC), massDOT Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information MassGIS), Commonwealth of Massachusetts, Information Technology Division.

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3.4 Percentage of Heavy Vehicles Utilizing Route 62 Focus Intersections

According to the Highway Capacity Manual (HCM), heavy vehicles are vehicles that have more than four tires touching the pavement. Trucks, buses, and recreational vehicles (RVs) are the three primary groups of heavy vehicles. Heavy vehicles often adversely affect traffic flows in two ways: 1) they are larger than passenger cars and occupy more roadway space and 2) they have inferior operating capabilities when compared to passenger cars, particularly with respect to acceleration, deceleration, and the ability to maintain speed on upgrades.

Table 5 lists the percentage of heavy vehicles that were observed at each of the focus study intersections. The Route 62 focus intersections in Berlin average 5.4% in the morning peak hour and 2.3% during the evening peak hour. In the AM, the highest heavy vehicle percentage observed was at the Interstate 495 Northbound Ramps with 6.9% and the lowest was at Linden Street with 4.4%. In the PM, the highest percentage was at Pleasant Street intersection with 3.3% and the lowest was at Gates Pond Road with 1.5%. Observers in the field noted that school buses accounted for some of the heavy vehicle traffic as well.

It should be noted that the heavy vehicle percentages shown in the table were observed on one random weekday. The percentages are, by nature, subject to variation due to sample size and temporary or permanent local conditions as well as other factors, such as prevailing weather. As such, the figures in the table should be used as a general indicator of trends and conditions only, as opposed to absolute statements of prevailing circumstance.

Table 5

Percentage of Heavy Vehicles Utilizing Route 62 Focus Intersections

Study Intersection	Date of Count	Morning Peak Hour %	Evening Peak Hour %
Route 62/West St/Barnes Rd/Derby Rd	June 2022	5.1%	2.5%
Route 62/Linden St	June 2022	4.4%	1.6%
Route 62/Pleasant St	May 2022	4.5%	3.3%
Route 62/I-495 SB Ramps	June 2022	5.9%	2.8%
Route 62/I-495 NB Ramps	May 2022	6.9%	2.3%
Route 62/Gates Pond Rd	May 2022	5.4%	1.5%
Peak Hour Averages:		**5.4%**	**2.3%**

3.5 Route 62 Intersections Peak Hour Level of Service (LOS) Analyses

Using the existing observed traffic volumes Route 62, a Level of Service (LOS) grade was calculated for each focus intersection. The LOS is calculated by using the *Highway Capacity Software* (HCS). The software calculates the amount of delay (in seconds) for each approach and the intersection as a whole. Using the estimated length of delay in seconds, a LOS grade between "A" and "F" is assigned. LOS "A" is indicative of free flow conditions while LOS "F" indicates highly congested conditions. **Table 6** lists the existing LOS for the Route 62 focus intersections. (The complete LOS worksheets are provided in the document's Technical Appendix). Based on the calculated results, the following notable trends were observed:

- There are six (6) study intersections in the Route 62 Corridor Profile. Two (2) are signalized while the other four (4) are under "Stop" sign control.
- The Interstate 495 intersections are the two signalized locations. The northbound ramps intersection has a LOS "B" for both the AM and PM. The southbound ramps intersection has a LOS "C" for the AM and a LOS "B" for the PM.
- All four of the "Stop" sign-controlled intersections have a LOS between "C" and "F" in the AM while all have a LOS "F" in the PM.
- The five-way intersection of at West Street, Barnes Road, and Derby Road has the worst calculated delay in the AM peak period with just under 200 seconds. This intersection was analyzed as a four-way, with Barnes Road and Derby Road combined into a single approach as the software necessitates.
- The Pleasant Street intersection has the worst calculated delay in the PM peak period with 150 seconds.

Table 6
Route 62 Focus Intersections LOS Summary Table

Community	Route 62 Intersection	Intersection Level of Service Analysis Results					
		AM			PM		
		V/C*	Delay**	LOS	V/C*	Delay**	LOS
Signalized							
Berlin	Route 62 / I-495 SB Ramps	1.01	23.2	C	0.76	18.6	B
	Route 62 / I-495 NB Ramps	0.86	13.5	B	0.84	15.0	B
Unsignalized* **							
Berlin	Route 62 / West St / Barnes Rd / Derby Rd	1.34	195.6	F	0.83	59.5	F
	Route 62 / Linden St	0.50	30.5	D	0.93	93.6	F
	Route 62 / Pleasant St	0.33	23.3	C	1.18	150.4	F
	Route 62 / Gates Pond Rd	0.29	23.3	C	0.87	85.0	F

*V(volume)/C(capacity) is for worst lane group; C is maximum flow under prevailing conditions

**Delay in seconds

***Stop Sign delay and LOS are for minor street approaches

3.6 Route 62 Intersections Projected Peak Hour Traffic Growth Rate

As this Corridor Profile is a planning document, meant to be used to suggest and help design improvements that may not be built or implemented for several years, it is typical to estimate, or "project", future traffic conditions in the study area. Transportation changes and solutions are rarely made instantly, and pertinent area circumstances can change. As such, the findings of the Regional Travel Demand Model were used to determine what future traffic growth might occur along the Route 62 Corridor.

The Regional Travel Demand Model is an advanced computer simulation of the region's network of major highways and other modal networks, such as fixed route transit, that is maintained by the CMRPC transportation staff. It considers the greater region's population, housing stock, and employment. For this Corridor Profile effort, anticipated overall growth in traffic volumes was estimated by the Model. Based on projection data between 2018 and 2030, the annual growth rate for Route 62 ranged between 0.6% and 1.4%, with an average at 1.0%. This growth rate can be used by the community when assessing potential future year improvement options for Route 62.

3.7 Performance Management

The Performance Measures related to the Congestion Management Process (CMP) is the federal rule of System Performance & Air Quality (PM3) and the regionally-customized measure of Economic Vitality which deals with freight reliability. The goal of the System Performance & Air Quality (PM3) measure is to achieve a significant reduction in congestion on the National Highway System (NHS). This rule has five measures that are linked to reliability, congestion and emissions. The CMMPO has in fact long supported the five statewide targets in regards to Level of Travel Time Reliability (LOTTR), Level of Truck Travel Time Reliability (TTTR), Percentage of Non-Single Occupancy Vehicle (SOV) Travel, Peak Hour Excessive Delay (PHED), and Total Reduction of On-Road Mobile Source Emissions. As for the CMMPO's Economic Vitality measure, it deals with accessibility to jobs in the region and the reliability of freight movement.

1. **System Performance & Air Quality (PM3)**: As for the measure of LOTTR, Route 62 is considered part of the NHS so any improvements to travel time reliability would affect this performance measure. Currently, Route 62 along its entire length through the town of Berlin is considered "reliable".

   The TTTR target only pertains to the Interstate System so improvements on Route 62 will not affect this measure, but could improve truck travel times. A significant number of heavy vehicles have been observed to use the Route 62 study corridor as an east/west route to Interstate 495. Based on 24-hour traffic volumes, between 13% and 17% heavy vehicles are using the study corridor on a daily basis.

For the non-SOV travel measure, creating other travel options (e.g. carpool, public transit, walking, bicycling, or telecommuting) through MassDOT's Complete Streets program or public outreach and awareness could perhaps help contribute towards reaching the target. There is also a MassDOT-maintained Park and Ride lot on Route 62, adjacent to Interstate 495. This lot contains 45 spaces and is well utilized.

For the PHED measure, any improvements to Route 62 made in regards to the above measures that would help reduce delays would also contribute positively towards this statewide target.

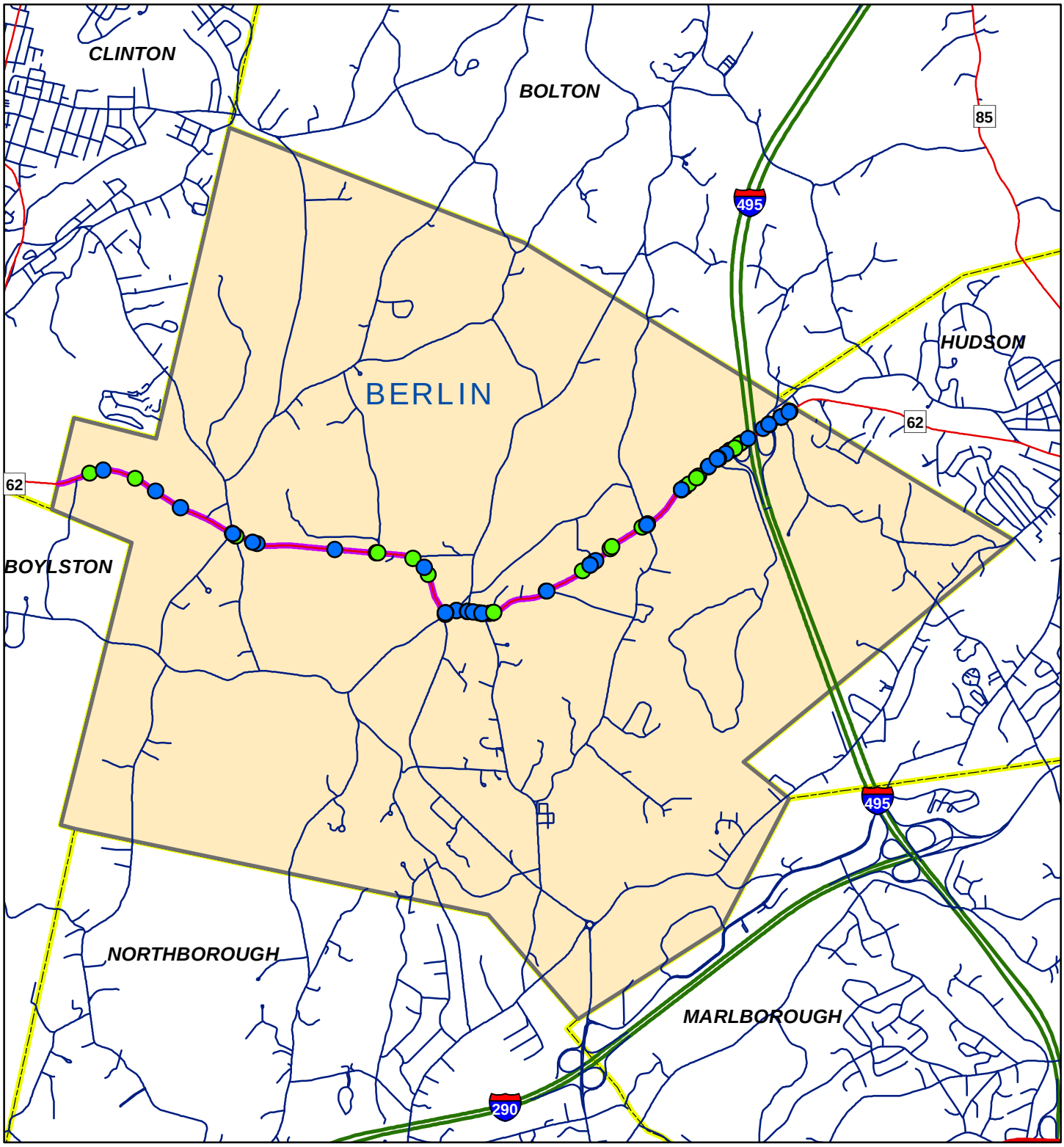
The Reduction of Emissions measure is related to Congestion Mitigation & Air Quality (CMAQ) projects where such TIP projects are intended to reduce emissions. Examples of these types of projects include intersection improvements, bicycle & pedestrian improvements, and new transit services or buses. This calculation is required for all projects using CMAQ funding. Currently, there are no CMAQ funded projects programmed on the TIP in the community of Berlin.

2. **Economic Vitality**: This measure is used to improve accessibility to jobs in the region. The reliability of freight movement is also important. Since Route 62 appears to accommodate a significant number of daily trucks, roadway improvements would likely help freight movement as well as improve travel conditions for passenger vehicles and the bicycling & walking modes.

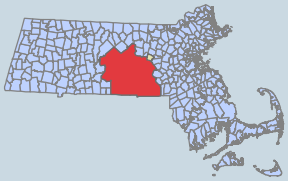
4.0 Safety Management System (SMS)

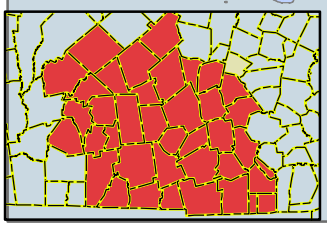
For the purpose of this Corridor Profile, CMRPC staff obtained crash data from the Massachusetts Department of Transportation (MassDOT). The crash information used for this Corridor Profile is from the three-year period from 2018 to 2020. This chapter will discuss the results of this data analysis for the community of Berlin.

Figure 13 shows the location of the crashes that occurred on the Route 62 corridor in Berlin between 2018 and 2020. The colored dots on the map indicate whether an incident was a fatal injury, non-fatal injury, or property damage-only type crash. The total number of each crash type is shown in the legend. In addition, the locations of Highway Safety Improvement Program (HSIP) eligible "crash clusters" are shown on the map, if any. To be HSIP eligible, the clusters need to be within the top 5% worst documented locations statewide. These clusters are defined based on the number of crashes adjacent to one another within a defined radius that has a high incidence of crash severity. MassDOT has developed an automated procedure for processing, standardizing, matching and aggregating the crash data collected by the Registry of Motor Vehicles (RMV) branch by geographical location. Geographic Information System (GIS) tools and procedures are used that result in determining the locations of vehicle crash clusters, bicycle clusters and pedestrian clusters. As the map shows, there are currently no crash clusters along the study corridor.



ROUTE 62 CORRIDOR PROFILE





Berlin Crash Data
Figure 13

Legend

- Route 62 Corridor Profile
- Non-Fatal Injury (35)
- Property Damage (94)
- Unknown (1)

0 0.225 0.45 0.9 1.35 1.8 Miles

CMRPC Central Massachusetts Regional Planning Commission

Source: Data provided by the US Census Bureau, Central Massachsuetts Regional Planning Commission (CMRPC), massDOT Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information MassGIS), Commonwealth of Massachusetts, Information Technology Division.

Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

4.1 Route 62 Crash Analysis

For the town of Berlin, vehicle crash records were analyzed for the three-year period 2018 - 2020. All crashes along Route 62 from the Clinton town line to the Hudson town line were tabulated. Also, incidents on minor streets that were close to or at Route 62 were also included. All important information from the crash reports was summarized and included in the various tables that follow.

There was a total of 130 reported study area crashes in the town of Berlin within the three-year period. **Table 7** shows a summary of the crashes in which the details are shown in a variety of ways. Property damage-only crashes accounted for 72% of the total, while non-fatal injuries accounted for 27%. Rear-end and single vehicle crashes were the most prevalent with a total of 37, with angle crashes the next highest with a total of 34. The intersection with the most crashes was West Street/Barnes Road/Derby Road. Often the case, most crashes occurred on dry road conditions, in daylight, and in clear weather. The highest number of crashes occurred between 12 PM and 4 PM and the most crashes occurred during the month of November.

Table 7
Summary of Reported Crashes
On Route 62 Corridor in the Town of Berlin
January 1, 2018 - December 31, 2020

Crash Severity

	Number	Percent
Property Damage Only	94	72.3%
Non-Fatal Injury	35	26.9%
Fatal Injury	0	0.0%
Unknown	1	0.8%
Total	**130**	**100.0%**

Manner of Collision

	Number	Percent
Angle	34	26.2%
Rear-end	37	28.5%
Head On	4	3.1%
Sideswipe, opposity direction	5	3.8%
Sideswipe, same direction	12	9.2%
Single vehicle crash	37	28.5%
Unknown	1	0.8%
Total	**130**	**100.0%**

Type of Collision

	Number	Percent
Collision with a motor vehicle in traffic	92	70.8%
Collision with deer	5	3.8%
Collision with ditch, embankment or guardrail	12	9.2%
Collision with fixed object	13	10.0%
Other	8	6.2%
Total	**130**	**100.0%**

Locations with the highest number of crashes

	Number
Route 62 / West St / Barnes Rd / Derby Rd	14
Route 62 / Sawyer Hill Rd	11
Route 62 / Gates Pond Rd	11
Route 62 / I-495 NB Ramps	9

Road Surface Condition

	Number	Percent
Dry	95	73.1%
Wet	24	18.5%
Ice/Slush	6	4.6%
Snow	5	3.8%
Total	**130**	**100.0%**

Time of Day

	Number	Percent
Before 7 AM	12	9.2%
7 AM - 10 AM	17	13.1%
10 AM - 12 PM	5	3.8%
12 PM - 4 PM	38	29.2%
4 PM - 6 PM	34	26.2%
6 PM - 9 PM	19	14.6%
After 9 PM	5	3.8%
Total	**130**	**100.0%**

Light Conditions

	Number	Percent
Daylight	89	68.5%
Dark	32	24.6%
Dawn	4	3.1%
Dusk	5	3.8%
Total	**130**	**100.0%**

Weather Conditions

	Number	Percent
Clear	81	62.3%
Rain	17	13.1%
Cloudy	20	15.4%
Snow/Sleet	10	7.7%
Unknown	2	1.5%
Total	**130**	**100.0%**

Month of the Year

	Number	Percent
January	14	10.8%
February	6	4.6%
March	5	3.8%
April	11	8.5%
May	15	11.5%
June	9	6.9%
July	11	8.5%
August	5	3.8%
September	5	3.8%
October	17	13.1%
November	21	16.2%
December	11	8.5%
Total	**130**	**100.0%**

Table 8 shows the collision type by study area location in the town of Berlin. The table lists the total number of crashes at each intersection and at other Route 62 locations (non-intersection crashes) and what type of crash occurred. There were 57 non-intersection crashes and 73 intersection crashes. There were 34 angle crashes along the study corridor with the majority of these crashes occurring at intersection locations. One potential reason for the number of angle crashes along Route 62 is the high volume of left turning vehicles, whether turning in/out of a business or turning in/out of a minor street or driveway. Drivers often underestimate the speed and distance of oncoming vehicles (or become impatient when insufficient safe gaps occur) and turn in front of the oncoming vehicles, leaving them very little time to stop. Rear-end and single vehicle crashes were the most prevalent type of crash with a total of 37 each. Single vehicle crashes typically happen when a vehicle hits a fixed object along the roadway such as a guardrail, tree or utility pole. Rear ends often occur during congested roadway conditions and from driver inattention. Roadway surface conditions can also be a factor. Additionally, there were also 17 sideswipes, four head-on crashes and one unknown crash type.

Table 8
Collision Type by Location in Berlin, 2018-2020

Location	Total	Type					
		Angle	Rear-End	Sideswipe	Head-On	Single Vehicle Crash	Unknown
Route 62 / West St / Barnes Rd / Derby Rd	**14**	8	1	2	1	2	-
Route 62 / Coburn Rd	**1**	-	-	-	1	-	-
Route 62 / Linden St	**4**	1	-	-	-	3	-
Route 62 / Woodward Ave	**2**	-	-	1	-	1	-
Route 62 / Carter St	**4**	1	2	-	-	1	-
Route 62 / Pleasant St	**5**	4	-	1	-	-	-
Route 62 / Oak St	**3**	-	-	-	1	2	-
Route 62 / Sawyer Hill Rd	**11**	3	4	1	-	3	-
Route 62 / Taylor Rd	**4**	1	3	-	-	-	-
Route 62 / I-495 SB Ramps	**5**	2	2	1	-	-	-
Route 62 / I-495 NB Ramps	**9**	1	4	2	-	2	-
Route 62 / Gates Pond Rd	**11**	9	-	1	-	1	-
Other Route 62 Locations	**57**	4	21	8	1	22	1
Total	**130**	**34**	**37**	**17**	**4**	**37**	**1**

Table 9 below shows the types of collisions that occurred and the severity. The majority of crashes caused property damage only. Rear-end crashes caused the most property damage with a total of 29 and angle crashes were second with a total of 25. Of the 35 crashes that caused a non-fatal injury, most of them were single vehicle crashes.

Table 9

Berlin Crashes by Severity and Type of Collision, 2018-2020

Type of Collision	Severity			
	Fatal Injury	Non-Fatal Injury	Property Damage Only	Unknown
Angle	-	9	25	-
Rear-end	-	8	29	-
Sideswipe	-	-	16	1
Head-on	-	3	1	-
Single vehicle crash	-	15	22	-
Unknown	-	-	1	-
Total Number of Crashes	**0**	**35**	**94**	**1**

4.2 Performance Management

There are two Performance Measures related to this chapter. The first is Safety, the goal of which is to reduce the number and rate of fatal and serious injury crashes in the region for all types of vehicles. Non-motorized fatalities and serious injuries are also included. The second measure is Security, where the goal is to enhance the transportation security coordination and preparedness regionwide.

1. **Safety**: Earlier this year, the CMMPO chose to adopt the statewide Safety Performance Measure targets set by MassDOT for calendar year 2022. The objectives of the safety performance measures are to reduce the total number of fatalities, rate of fatalities per 100 million vehicle miles traveled (VMT), total number of serious injuries, rate of serious injuries per 100 million VMT, and the total number of combined serious injuries and fatalities for non-motorized modes. Currently, all five safety measures are showing a decrease in statewide trends.

   In all safety categories, MassDOT has established a long-term target towards "Zero Deaths" and will establish safety targets for the CMMPO to consider for future adoption each calendar year. In regards to the Route 62 study corridor, any suggested safety improvements to reduce crashes would potentially help in reaching the safety targets set forth by MassDOT.

2. **Security**: The objective of this measure is to enhance transportation security coordination and preparedness regionwide. One way to measure this is to identify the primary highway evacuation routes in the region. Accordingly, in a previous joint effort between the CMRPC and the Montachusett Regional Planning Commission (MRPC), a Central Region Homeland Security Evacuation Plan was completed in 2013. In this evacuation plan, numerous roadways within the central region were designated as either "primary" or "secondary" evacuation routes. Route 62 was designated as a primary evacuation route so, accordingly, it is critical for this roadway to continue to be both safe and secure.

   Another Security goal is for all communities in the CMRPC planning region to have a Hazard Mitigation Plan and/or Municipal Vulnerability Plan (MVP). These plans identify vulnerable or hazardous locations within the community. Staff previously worked with the town of Berlin to develop their respective plans. Berlin's MVP was approved in 2020 and it noted frequent flooding and other drainage issues (ie. poor culverts) along Route 62.

5.0 Pavement Management System (PMS)

Pavement management is an asset management system designed to assist decision makers in determining the most cost-effective strategies to address poor or failing roadway conditions. In general, a successful Pavement Management System (PMS) defines a roadway network, identifies the condition of each segment of the network, develops a list of needed improvements, and balances those needs with the available resources of the party responsible for maintaining the defined roadway network. *Cartegraph*, a software package developed and supported by Cartegraph Systems Incorporated, is used by CMRPC in its pavement management program to assess overall pavement condition and to assist in developing cost-effective strategies for addressing observed pavement distress.

For this Corridor Profile effort, pavement distress information was collected for Route 62 in the town of Berlin. The pavement data was collected by conducting "windshield surveys." A team of two CMRPC representatives inspected Route 62 taking note of both the severity and extent of the following pavement distresses:

- Potholes
- Distortions
- Alligator Cracking
- Transverse and Longitudinal Cracking
- Block Cracking
- Rutting
- Bleeding/Polished Aggregate
- Surface Wear and Raveling
- Corrugations, Shoving, and Slippage

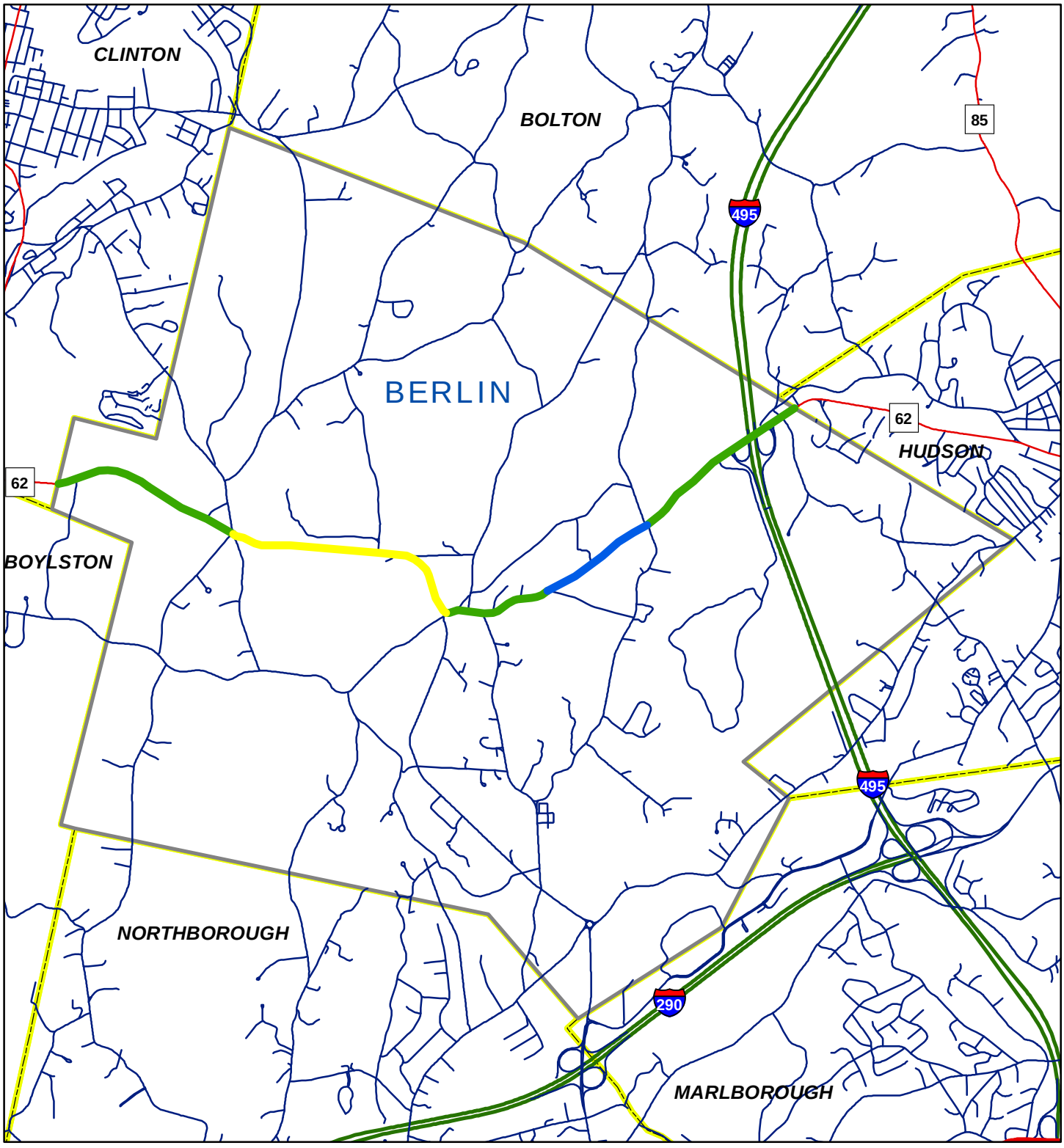
Based on the field-observed distresses, an Overall Condition Index (OCI) was calculated for each surveyed roadway segment. The OCI is used to rate each segment on a scale of 0 to 100. An OCI of 100 indicates optimal pavement conditions, usually a newly paved roadway segment. Conversely, a score of 0 indicates a roadway that has failed entirely and is likely impassable for an average passenger vehicle. Starting at a top index rating of 100, the OCI is calculated by subtracting a series of deduct values, each associated with the severity and extent of the various pavement distresses described above. *Cartegraph's* deduct values are determined through a series of deduct curves, which were developed by pavement engineers using years of research on pavement performance. The resulting OCI is a quantified rating of pavement condition.

Cartegraph's Recommended Action category definitions are as follows:

- Do Nothing (OCI 100 – 88) – used when a road is in relatively perfect condition and prescribes no maintenance.
- Routine Maintenance (OCI 88 – 68) – used on roads in reasonably good condition to prevent deterioration from the normal effects of traffic and pavement age. This treatment category would include either crack sealing or local repair (pothole, depression, poorly constructed utility patching, etc.), or minor localized leveling.
- Preventative Maintenance (OCI 68 – 48) – slightly greater response to more pronounced signs of age and wear. This includes crack sealing, full-depth patching, and minor leveling, as well as surface treatments such as chip seals, micro-surfacing, and thin overlays.
- Structural Improvement (OCI 48 – 24) – when the pavement deteriorates beyond the need for surface maintenance applications, but the road base appears to be sound. These include structural overlays, shim and overlay, cold planing and overlay, and hot in-place recycling.
- Base Rehabilitation (OCI 24 – 0) – represents roads that exhibit weakened pavement foundation base layers. Complete reconstruction and full depth reclamation are indicated.

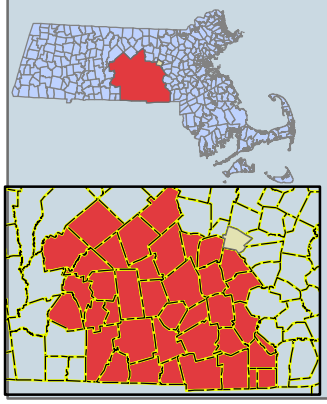
Each Recommended Action category has an associated cost, which includes the design, materials, and labor to complete such action. *Cartegraph* produced OCI Recommended Action categories suggest the type of remedial improvements necessary to bring a road segment to "Excellent" condition. As a roadway's OCI drops, the associated Recommended Action becomes more demanding, and the cost of repair increases. Therefore, the cost of "Routine Maintenance," which categorically falls under "Do Nothing," is only a fraction of the cost of "Base Rehabilitation," the most financially demanding Recommended Action category. For a practical example, the cost of applying crack seal to minor alligator cracking over a half mile segment of road is significantly less than the cost to fully reconstruct a half mile of impassable roadway. Therefore, it is prudent to conduct "Routine Maintenance" on a roadway in order to prevent the deterioration of the pavement.

Figure 14 displays the current pavement condition for Route 62 represented by Overall Condition Index (OCI) Recommended Action. Again, *Cartegraph* produced OCI Recommended Action categories suggest the type of action necessary to bring a given roadway segment to "excellent" condition.



ROUTE 62 CORRIDOR PROFILE

Berlin Pavement Condition
Figure 14



Legend

- Excellent
- Good
- Fair
- Poor
- Very Poor

0 0.25 0.5 1 1.5 2 Miles

C M R P C
Central Massachusetts Regional Planning Commission

Source: Data provided by the US Census Bureau, Central Massachsuetts Regional Planning Commission (CMRPC), massDOT Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information MassGIS), Commonwealth of Massachusetts, Information Technology Division.

Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

5.1 Route 62 Overall Condition Index (OCI)

The most recent pavement data for Route 62 in Berlin was collected in 2022. **Figure 14** shows that Route 62 has a mix of excellent, good, and fair condition ratings for the study corridor. **Table 10** shows each assessed roadway segment, segment length, as well as the suggested plan activity for the segment to reach "excellent" condition. Starting at the Clinton town line, the first two segments have a "good" rating. Distresses include low severity of distortions and bleeding, while also moderate severity of alligator cracking, longitudinal transverse cracking, and raveling. The next two segments were determined to be in "fair" condition. The distresses were low to medium severity of surface wear, rutting, alligator cracking, distortions, and longitudinal transverse cracking. The next section between South Street and Brewer Road is also in "good" condition. The observed severity of the distresses was mostly low, with one distress categorized as high. The segment between Brewer Road and Sawyer Hill Road is in "excellent" condition and has only low severity of longitudinal transverse cracking. The last two segments are also considered in "good" condition. Distresses assessed in the field included low to medium severity of potholes, surface wear, alligator cracking, longitudinal transverse cracking, distortions, and rutting. The extent of all of the distresses observed were either localized or low for the entire Route 62 corridor.

Table 10
Route 62 Pavement Analysis Recommendations

Street	From	To	Length	Plan Activity	OCI
Route 62	Clinton TL	#92 Boylston Rd	0.50 mi	Routine Maintenance	74.4
Route 62	#92 Boylston Rd	Derby Rd	0.52 mi	Routine Maintenance	74.4
Route 62	Derby Rd	Coburn Rd	0.77 mi	Preventative Maintenance	62.5
Route 62	Coburn Rd	South St	0.54 mi	Preventative Maintenance	63.1
Route 62	South St	Brewer Rd	0.56 mi	Routine Maintenance	74.8
Route 62	Brewer Rd	Sawyer Hill Rd	0.62 mi	Do Nothing	98.4
Route 62*	Sawyer Hill Rd	I-495 Overpass	0.71 mi	Routine Maintenance	70.3
Route 62	I-495 Overpass	Hudson TL	0.28 mi	Routine Maintenance	86.5

*A section of Route 62 was recently repaved around the I-495 Ramps in the Summer of 2022.

5.2 Performance Management

In regards to pavement, the Performance Measure is from the FHWA State of Good Repair (PM2) rule which is to increase the percentage of non-Interstate NHS roadways in good condition greater than 30% and decrease the percentage of roadways in poor condition to less than 30%. PM2 also pertains to Interstate highways, but for this Corridor Profile the non-Interstate performance targets are simply considered since Route 62 is a non-Interstate highway.

Currently, there are no segments of Route 62 that have been determined to be in “poor” or “very poor” condition. By repaving the sections ranked as “fair”, it would help to reach the national pavement goal of having greater than 30% of non-Interstate highways in “good” condition. Further, by repaving even the “good” segments within the Route 62 study corridor, it will likely result in preventing the roadway from continually degrading at different severities over time, resulting in ongoing “poor” condition ratings.

6.0 Bridges

6.1 Statewide Bridge Management System

MassDOT has a Bridge Inspection Management System (BIMS) that inventories the location and available inspection data for bridges in accordance with the National Bridge Inventory (NBI). The NBI is a national database maintained by the Federal Highway Administration (FHWA) that contains the type, condition, and inspection data for any bridge over 20 feet in length. As part of this program, these bridges are inspected on a biannual basis. The condition of bridges is evaluated in four major categories (deck, superstructure, substructure, and culvert) and ranked on a scale of 0-9. If any of these categories receive a ranking of 4 or less, they are considered "Structurally Deficient" (SD), meaning there is a need for further monitoring and/or repair. To date, complete inspections are only available for all NBI bridges in Massachusetts. At this time, inspection and inventory efforts are currently underway for all short span bridges and culverts in Massachusetts. The results of this effort are anticipated to be available in the near future.

6.2 MassDOT Municipal Small Bridge Program

The MassDOT Municipal Small Bridge Program provides financial support to cities and towns for small bridge replacement, preservation and rehabilitation projects. Originally, it began as a five-year program (2017-2021) to assist cities and towns to replace or preserve bridges with spans between 10 feet and 20 feet. Each participating municipality could qualify for up to $500,000 per year. These small bridges are not eligible for federal-aid under existing programs. The communities must complete an application with a preliminary cost estimate that includes design costs and an amount for contingencies (suggested 15%). Additional items that are needed include photographs, a description of the structure which includes date of construction/reconstruction and structure type, repair history, summary of known problems, and a discussion of proposed work. The most recent deadline to submit applications for fiscal year 2023 was April 1, 2022. However, additional information about the program and future deadlines can be found on the MassDOT website at the following link https://www.mass.gov/municipal-small-bridge-program.

6.3 Route 62 Corridor Profile Bridges

Within the Corridor Profile study area there are two bridges owned by MassDOT. Both of these bridges have spans greater than 20 feet and are located above Route 62. Since these bridges are categorized as National Bridge Inventory (NBI) structures, inspections are completed by MassDOT on a biannual basis and both of these bridges were last inspected in 2021. **Table 11** provides some details about these two bridges.

Table 11
Route 62 Bridges

Host Community	MassDOT Bridge #	Facility Name (Over)	Facility Name (Under)	Year Built/ or Rebuilt	Structurally Deficient
Berlin	B-09-017	I-495 SB	Route 62	1963	No
Berlin	B-09-017	I-495 NB	Route 62	1963	No

6.4 Performance Management

The Performance Measure related to this chapter is from the FHWA State of Good Repair (PM2) rule which is to maintain at least 16% of NHS bridges by deck area in good condition and have less than 12% of NHS bridges by deck area in poor condition. Since both of the above listed bridges are still in adequate condition and not considered Structurally Deficient, they would be included in the data set for this federal performance measure.

7.0 Public Transit

7.1 Regional and Profile Study Area Services

Worcester Regional Transit Authority

The Worcester Regional Transit Authority (WRTA) provides transit service for the City of Worcester and 36 additional communities within the Central Massachusetts area. Fixed-route bus service is provided within thirteen (13) communities, and flexible Community Shuttle service is available in six (6) communities.

Paratransit service is available to eligible individuals, including Americans with Disabilities Act (ADA) complementary paratransit service. ADA paratransit services operate within a 3/4 mile "buffer" surrounding the fixed-route service and is available during the corresponding fixed-route schedule. Non-ADA paratransit service is available for elders and people with disabilities, with service hours varying by community or eligibility. These services are generally provided by local Councils on Aging, or other contractors, and are subsidized by the WRTA.

7.2 Town of Berlin

Existing WRTA Services

Currently, there is no WRTA fixed-route bus service or flexible Community Shuttle service within the town of Berlin. Since there is no fixed-route bus service, there is also no ADA complementary paratransit service available. However, non-ADA paratransit services are offered to all Berlin elders (age 60 and over) and people with disabilities on weekdays between 8:30 AM and 2:30 PM. Non-ADA paratransit services are operated by the Berlin Council on Aging (COA) through a contract with the WRTA. The WRTA provides a handicapped-accessible van and reimburses the Berlin COA for operating expenses. In Fiscal Year 2021, there were 63 trips to Berlin residents. In addition, Berlin has a town-owned van which also provides transit service to their seniors. The WRTA does not have any financial or operational control over this van.

Future Outlook

The WRTA underwent a Comprehensive Service Analysis (CSA)/Regional Transit Plan of its entire fixed-route system by consultant URS Corporation/AECOM in 2015. Currently, an update to this Plan was initiated as the result of the WRTA's Memorandum of Understanding with MassDOT. This update was also prepared by AECOM and was initiated in January 2021 and released in March 2021. This most recent update analyzes the WRTA's current system, identifies gaps in service and unmet needs, and helps to develop a strategic vision for the next five years. Specific needs identified include fare payment, website redesign, vehicle acquisition

and cost efficiencies. Due to the timing of COVID-19 pandemic, much attention was focused on restoring ridership and recovery. None of the service recommendations in the updated Plan include the town of Berlin.

7.3 Performance Management

There are two Performance Measures related to this chapter, Multimodality and Equity. The Multimodality objective is to increase ridership totals for their entire system and the Equity objective is to increase Environmental Justice (EJ) and vulnerable populations that intersect WRTA fixed-route bus service.

1. **Multimodality**: Currently, there is no fixed-route service, but the Berlin COA does provide service to the elderly and disabled. In the future, should the WRTA decide to expand their service area to include Route 62 in Berlin, it would help meet the CMMPO's regionally-customized multimodality performance goal. Improving ridership totals for the Berlin COA would also help to meet this performance goal.
2. **Equity**: This measure seeks to ensure that all populations benefit from roadway improvements, WRTA service, and any other public transportation services. Currently, there are no EJ or vulnerable populations identified within the town of Berlin. As there are no EJ neighborhoods in Berlin, improvements or new WRTA services will not help meet the CMMPO's regionally-customized transit equity goal.

8.0 Other Modes

Traffic congestion, or traffic "jams", occur when demand for the highway infrastructure exceeds capacity. Because of this recurring congestion, various state initiatives, design criteria revisions, funding opportunities and compacts have evolved the design of the planning region's transportation and physical infrastructure so that alternatives to driving alone are both available and highly encouraged. These other modes include bicycling, public transit (detailed in a separate chapter), and walking. This chapter includes examples of the aforementioned statewide initiatives and their applicability to the Route 62 Corridor Profile.

8.1 MassDOT Healthy Transportation Compact

The Transportation Reform Law (2009) established the Healthy Transportation Compact (HTC) which promotes improved public health through active transportation. Active transportation refers to bicycling, transit, and walking. The HTC is an interagency initiative co-chaired by the Commonwealth's Secretary of Transportation and Secretary of Health & Human Services, including the Secretary of Energy & Environmental Affairs, MassDOT Highway Administrator, MassDOT Transit Administrator, the Commissioner of Public Health and the Secretary of Housing & Economic Development. The HTC goals are to facilitate transportation decisions that balance the needs of all users, expand mobility, improve public health, support a cleaner environment and, in turn, create stronger communities. Overall, the intent is to adopt best practices to increase efficiency in achieving positive health outcomes through the coordination of land use, transportation and public health policy.

Some of the programs and/or initiatives promoted by MassDOT and its partners that are currently in place, making the connection between health and transportation, are:

- Mass in Motion
- Safe Routes to School
- Healthy Transportation Policy Directive
- Healthy Transportation Engineering Directive
- Complete Streets

8.2 Healthy Transportation Policy Directive

MassDOT's Healthy Transportation Policy Directive requires all state transportation projects to increase bicycling, transit, and walking options. This Directive is intended to promote multimodal access for all transportation customers. MassDOT has indicated that everyone in Massachusetts must be provided the opportunity to bike, take transit, or walk instead of driving alone in a motor vehicle.

All MassDOT facilities will consider adjacent land uses and, as applicable, be designed to include sidewalks of sufficient width, landscaping, street crossing opportunities and other features to enhance healthy transportation options. Safety audits will be conducted at vehicle crash cluster sites where incidents have occurred with healthy-mode transportation users. MassDOT has also developed a Shared Use Path Planning and Design Guide to assist communities proposing shared use paths on or along former railroad right-of-way in order to accelerate the path design process. To view the guide, click on the following link Shared Use Path Planning and Design Guide. The resources compiled in this guide help communities understand the process of planning, designing, funding, and constructing shared use paths.

8.3 Complete Streets

What is widely known as the "Complete Streets" approach was first included in MassDOT's 2006 *Project Development and Design Guide*. Multimodal design guidelines are part of MassDOT's current policy for Context Sensitive Design. In a Complete Streets approach, roadway projects accommodate all users, not only vehicular traffic. All highway projects shall, from the earliest design stages, provide safe access and connectivity for pedestrians and bicyclists. The Healthy Transportation Policy Directive expands on how, when and where these accommodations should be provided, including ADA design compliance. The *Complete Streets Initiative*, which requires roadway designs that accommodate all users, calls for bicycle & pedestrian accommodation as part of most highway projects, a major exception being limited access highways.

The state's 2014 Transportation Bond Bill authorized funding for the creation of the Complete Streets Funding Program. It offers Massachusetts municipalities incentives to adopt complete streets policies and practices. To aid in the program MassDOT launched an interactive web portal to assist municipalities through the policy development, prioritization planning, and project approval steps of the application process. To view the website, click on the following link Complete Streets Program

For a community to be eligible for funding from this program it must meet three primary requirements as follows:

1. Attendance of a municipal employee at a Complete Streets training and the development of a locally-customized Complete Streets Policy that scores 80 or above out of a possible 100 points.
2. Development of a Complete Streets Prioritization Plan.
3. Submit application for available funding to construct projects in those communities with an approved Prioritization Plan.

Once these primary requirements are met, the host communities are eligible for up to $38,000 in technical assistance and up to $400,000 in construction funding. The Transportation Bond Bill stated at that time that 33% of the funds will go to municipalities that are at or below the median household income. MassDOT has also implemented a new funding eligibility criterion, effective Fiscal Year 2022. Municipalities are now only eligible to receive up to $400,000 in any rolling four-fiscal-year period. Accordingly, a municipality may only receive one full $400,000 grant, or several smaller grants, during any four-fiscal-year timeframe.

Between 2016 and 2020, over 150 Tier 3 construction project grants have been awarded across the Commonwealth totaling $62 million. Future funding is based on the availability of funds, continued community interest as well as the success of the program. Further, through MassDOT's Capital Investment Plan (CIP) additional funding could potentially be directed towards the program.

In 2017, the town of Berlin contracted with CMRPC to assist with both the community's Complete Streets policy and Prioritization Plan. Currently, the town has not been awarded any grants, but there are numerous proposed projects in Berlin's plan for various sections of Route 62. The prioritization plan was approved by MassDOT on 1/22/19. The next step for Berlin would be to apply for the funding necessary to implement the projects listed in the town's prioritization plan.

8.4 Bicycling in the Corridor

Paved shoulders reduce passing conflicts between motor vehicles, bicyclists and pedestrians while also making the crossing pedestrian more visible. They also provide for storm water discharge from outside the travel lanes, reducing hydroplaning, along with splash and spray to following vehicles, bicyclists and pedestrians. In rural areas, roadway shoulders often provide space for bicyclists to ride at their own pace.

There are no dedicated bicycle lanes along Route 62 in Berlin within the study area. In addition, the shoulder widths in the study area are not sufficiently wide to be considered safe to ride a bicycle along the roadway. The current shoulder widths are between zero and eight feet along both sides of the roadway. The segment of Route 62 that has an eight-foot shoulder is in the vicinity of the Interstate 495 ramps. Shoulder widths should be at least five feet in width to safely ride a bicycle.

In 2018, CMRPC staff completed a Regional Bicycle Plan. The main purpose of the plan was to identify opportunities for both encouraging and enhancing bicycle travel within the CMRPC region. The recommendations contained in the plan are intended to be used as a guide for local jurisdictions in taking advantage of these opportunities. The implementation of the recommendations will eventually provide for a comprehensive bicycle transportation network

in the region that is focused on accessibility, mobility, and safety. For more information, follow this link to the Regional Bicycle Plan on the CMRPC website 2018 Regional Bicycle Plan.

Through the public input process, related meetings and stakeholder outreach, a number of intersections, bridges, interchanges, and other barriers to bicycle travel were identified in the Bicycle Plan. Per the plan, Route 62 is considered a regional priority and the essentially parallel Mass Central Rail Trail is considered a regional multi-use corridor priority.

As a supplement to the Regional Bicycle Plan, a Bicycle Compatibility Index (BCI) was created to serve as a guide to evaluate the capability of urban and rural roadways to accommodate bicyclists. The BCI spotlights individual road segments as they pertain to the larger bicycle network. This includes identifying what infrastructure currently exists as well as an understanding of the viability of implementing bicycle facilities on a given roadway segment. The BCI provides insight to guide decision making with stakeholders and local officials regarding projects along federal-aid eligible highways within the community. For the BCI, a rating or grading system is used to help stakeholders make the most informed decisions. Various criteria are used to determine the scoring of the roadway segments. The resulting scores allow for project prioritization, in turn targeting funding towards those projects that can best meet the goals of the community and/or region. According to the BCI rating, Route 62 is considered a "Class E". This type of road would be likely be used by a highly confident rider as these types of roadways present limited to no protection between vehicles and bicyclists.

8.5 Pedestrian Facilities and Activity in the Corridor

As observed in the field, there are sidewalks on the north side of Route 62 between the Interstate 495 Southbound Ramps and Gates Pond Road. These sidewalks are in excellent condition and have ADA-compliant ramps. Another section of Route 62 with sidewalks is in the vicinity of Linden Street and Carter Street, which is in the town center. These sidewalks were observed to be in fair to good condition. As for the related ADA ramps, there is a mix of conditions ranging from compliant to non-compliant ramps. Additionally, the only marked crosswalks along Route 62 are at the Woodward Avenue and Carter Street intersections.

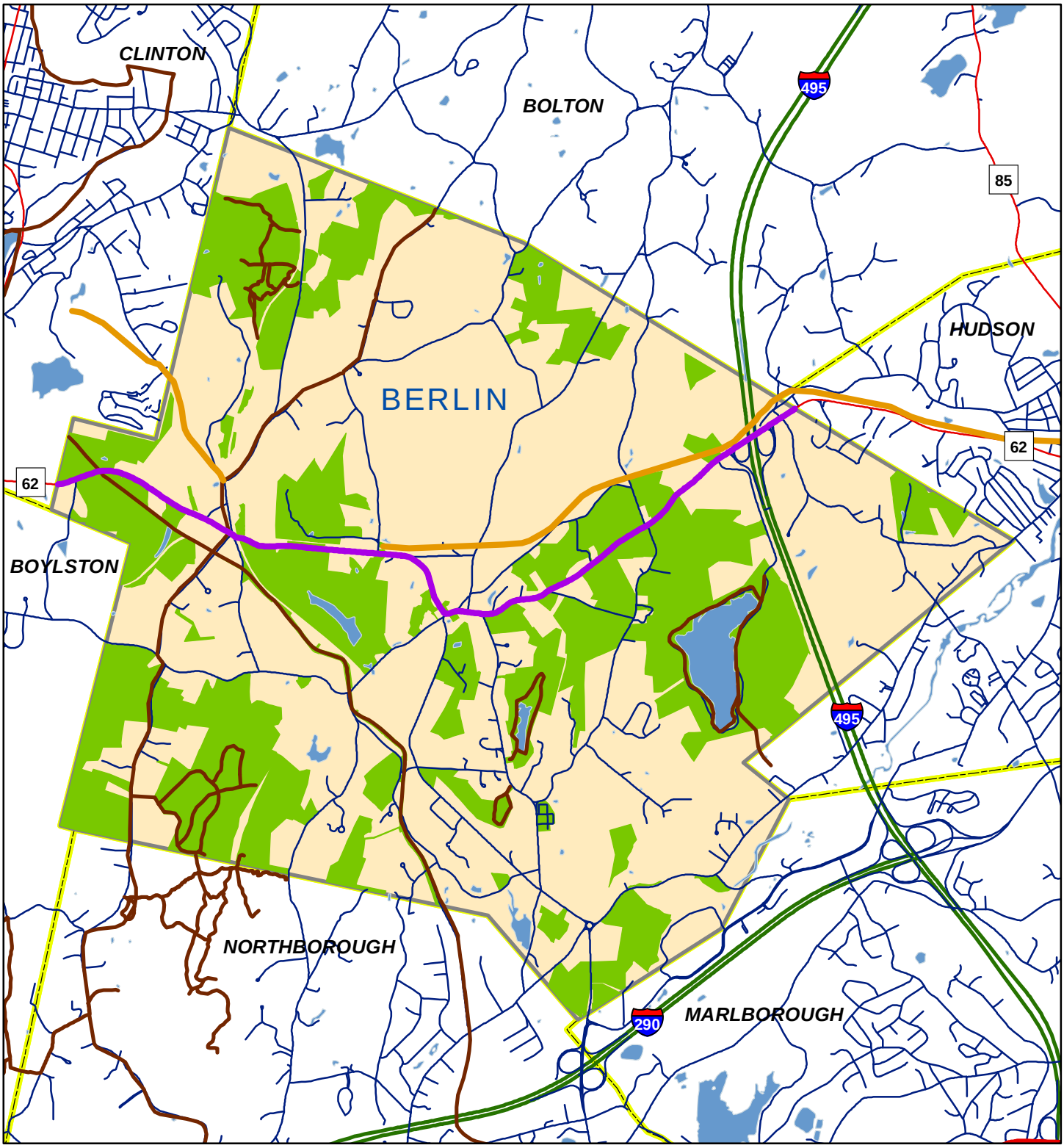
In 2018, CMRPC staff completed the Regional Pedestrian Plan. This plan was intended to facilitate the expansion and upgrade of the pedestrian network in the region in order to encourage more walking trips and safely link important destinations to where people live. Further, the plan also documented the extensive pedestrian-related planning and project development work being conducted in the CMRPC communities. The recommendations within the plan are intended to be used as a guide for local jurisdictions in taking advantage of available opportunities. For more information, the plan can be found on the CMRPC website at 2018 Regional Pedestrian Plan.

Through the public input process, related meetings and stakeholder outreach, some overall recommendations of the plan included connecting emerging residential development with traditional village centers while also improving crosstown connectivity, such as joining segments of already existing pathways and trails. Some priority recommendations for the host community of Berlin included continuing Complete Streets development, partnering eligible K-8 grade schools with the MassDOT Safe Routes to School (SRTS) Program to increase safe biking and walking among students. In addition, the town was encouraged to work with MassDOT and the state's Department of Conservation & Recreation (DCR) to ensure that regional multi-use trails and pathways are advanced to meet the needs of subregional and regional travel via other non-motorized modes.

8.6 Regional Trails in the Corridor

In addition to on-road facilities like sidewalks and marked bicycle lanes, regional trails are also used by hikers and bicyclists. During the winter, trails can also be used by cross-country skiers. These trails are often built on old former railroad right-of-way as well as through forests, recreational areas, and parks. **Figure 15** features the Mass Central Rail Trail, other regional trails, and open space areas in the town of Berlin in proximity to the study corridor. The open space layer is essentially public and private-owned recreational and conservation lands. These lands include, but are not limited to, town parks, commons, playing fields, school fields, golf courses, bike paths, scout camps, cemeteries, and fish & game clubs.

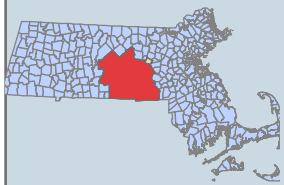
The developing Mass Central Rail Trail, which traverses the town of Berlin, is 104 miles in length overall and connects 26 communities between Boston and Northampton. The section through the host community of Berlin is considered an "unofficial path" (walkable and bikeable) and is not yet a completed trail. The trail follows an east/west direction and is situated just north of the Route 62 study corridor. Additionally, there are numerous other established local trails in the town of Berlin as shown on the map.

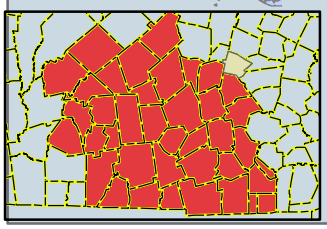


ROUTE 62 CORRIDOR PROFILE

Regional Trails & Open Space

Figure 15





Legend

- Route 62 Corridor Profile
- Interstate
- U.S. Route
- State Route
- Mass Central Rail Trail
- Other Regional Trails
- Open Space

Miles

0 0.25 0.5 1 1.5 2

CMRPC
Central Massachusetts Regional Planning Commission

Source: Data provided by the US Census Bureau, Central Massachsuetts Regional Planning Commission (CMRPC), massDOT Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information MassGIS), Commonwealth of Massachusetts, Information Technology Division.

Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

8.7 Performance Management

The Performance Measure emphasis areas related to this chapter are 1) Multimodal, 2) Economic Vitality, and 3) Travel & Tourism. All three are regionally-customized measures approved by the CMMPO. The goal of the Multimodal measure is to improve and/or expand transportation accessibility for all modes (bicycle, pedestrian, transit) in the region. The goal of the Economic Vitality measure is to make employment opportunities accessible and available, thus allowing for job expansion by improving bicycle, pedestrian, and transit networks near major employment centers. Next, the Travel & Tourism goal is to enhance the access, safety and effectiveness of the region's transportation network that serves places of touristic value.

1. **Multimodal**: The first measure under Multimodal is to increase the miles of sidewalks in good condition on a yearly basis. Sidewalk conditions are rated on a scale of poor, fair, good and excellent. Any sidewalks within the Good or Excellent categories are included in this measure. The limited sidewalks along the study corridor were observed to be a mix of fair, good and excellent condition. If new sidewalks were to be constructed elsewhere along the study corridor, they would be added to this measure since they would be in Excellent condition.

   The second measure is to increase the number of ADA ramps in good condition on a yearly basis. ADA ramp conditions are rated on a scale of good, poor, and no ramp. Any ramp that is not in good or excellent condition will help towards the goal of this measure if they were to be improved. Also, any new ramps that are constructed will help this measure.

   The third measure is to increase the bicycle lane miles available in the region. Bicycle data includes dedicated bicycle lanes available on the roadway and roadways that have shoulders on either side that measure a minimum of five feet. Roadways that have sufficiently wide shoulders are considered viable to safely ride a bicycle. Since essentially the entire Route 62 study corridor has minimal existing shoulder widths, if any, the entirety of the roadway would need to be widened to be considered for safe bicycle use.

2. **Economic Vitality**: The first measure is to improve truck travel time reliability. As the study corridor is somewhat narrow, widening the roadway by adding shoulders would help better accommodate truck traffic.

   The second measure is to improve the accessibility to jobs using all modes in the region. By improving accessibility on the roadway for all modes, people are able to drive, walk, and ride a bicycle for a greater distance with reduced congestion. As more travel options become increasingly available, there exists the potential for fewer vehicles on the roadway network.

3. **Travel & Tourism**: The goal of this emphasis area is to enhance the access and safety of the transportation network that serves tourist areas. Enhancing and improving the Route 62 study corridor will allow for better and safer connections to local attractions, the adjacent major Mass Central Rail Trail as well as other nearby tourist locations.

9.0 Overall Corridor Profile Findings

This Corridor Profile effort considers the results of all Management System and environmental analyses and, in conjunction with local public processes, selects those improvement options viewed as feasible to the host community. Based on all the analysis completed and discussed previously, this section of the study summarizes the Corridor Profile findings for both intersections and roadway segments as well applicable Performance Measures related to the Route 62 corridor.

9.1 Route 62 Intersections

Table 12 summarizes the findings for intersections. It includes study intersection locations, environmental considerations adjacent to Route 62, calculated intersection Level of Service (LOS), the percentage of heavy vehicles during the morning and evening peak hour travel periods, number of documented vehicle crashes, the availability of public transit and other considerations. These could include obstructed lines of sight or the need for bicycle and pedestrian accommodations.

The following observations for Route 62 are based on the table:

- All focus intersections in Berlin are located in the Concord River Watershed. Regarding impaired waters, there is a nearby river attaining some uses just east of the West Street, Barnes Road, and Derby Road intersection. Most of the study intersections have nearby wetlands and the Interstate 495 southbound ramps intersection also have potential vernal pools in the vicinity. The West Street, Barnes Road, Derby Road and Interstate 495 southbound intersections also have nearby flood zones.
- The worst operating intersections, in terms of Level of Service (LOS), are the four Stop-sign controlled intersections. The AM peak periods range between a LOS of “C” and “F”. The PM peak period exhibits a LOS “F” for all four intersections. Both signalized intersections at the Interstate 495 ramps have a LOS of either “B” or “C”.
- Normally, heavy vehicles travel at slower speeds than passenger cars. As such, the heavier the vehicles using the roadway, the more likely travel times are slower. The percentage of heavy vehicles using the Route 62 intersections, as is typically the case in the region, was higher during the morning peak hour than during the evening peak hour. Often trucking activities follow a 7:00 AM to 3:00 PM shift, leading to a decrease in activity during the evening peak. Morning percentages were as high as 6.9% (Interstate 495 NB) and evening percentages were as high as 3.3% (Pleasant Street).
- MassDOT crash data from 2018-2020 was used for this Corridor Profile. There was a total of 48 crashes at the six study intersections in the town of Berlin over the three-

year period. The intersection that had the highest number of reported crashes was West Street, Barnes Road, and Derby Road, with a total of 14. The next highest crash location was Gates Pond Road with 11. There are currently no Highway Safety Improvement Program (HSIP) identified crash clusters along the Route 62 study corridor.

- Currently, the WRTA does not provide fixed route public transit service along the Route 62 study corridor in the town of Berlin. However, the local Council on Aging does provide on-demand service to the elderly and disabled population in Berlin.
- Geometrically substandard 5-way intersection at Route 62, West Street, Barnes Road, and Derby Road. Linden Street intersection located on fairly sharp curve with flashing beacon and concrete dividers on Route 62. Pleasant Street travels southerly and connects to South Street, which continues into Northborough. Fairly recent improvements to intersection geometry and signalized control at both Interstate 495 ramp intersections with Route 62. Gates Pond Roads travels into Hudson. Also, a major shopping plaza, the Shoppes at Highland Commons, is located just to the east on Route 62.

Table 12

Berlin
Route 62 Focus Intersections:
Overall Corridor Profile Findings

Study Intersection Location	Environmental Consultation Analysis	Level-of-Service (LOS)	Freight Movement Heavy Vehicle %	Safety Analysis*	Public Transit	Other Considerations
Route 62 / West Street / Barnes Road / Derby Road	Nearby river attaining some uses. Located in Concord River Watershed. Nearby wetlands & flood zone.	AM = F PM = F	AM = 5.1% PM = 2.5%	14	No fixed-route service, but the Berlin Council on Aging provides service to the elderly and disabled.	Substandard 5-way intersection. Only westbound approach not controlled by stop sign. Adjacent CSX railroad crossing.
Route 62 / Linden Street	Located in Concord River Watershed. Nearby wetlands.	AM = D PM = F	AM = 4.4% PM = 1.6%	4	No fixed-route service, but the Berlin Council on Aging provides service to the elderly and disabled.	Intersection located on sharp curve. Includes flashing beacon and concrete dividers on Route 62.
Route 62 / Pleasant Street	Located in Concord River Watershed. Nearby wetlands.	AM = C PM = F	AM = 4.5% PM = 3.3%	5	No fixed-route service, but the Berlin Council on Aging provides service to the elderly and disabled.	Pleasant Street travels southerly and connects to South Street, which travels into Northborough.
Route 62 / I-495 SB Ramps	Located in Concord River Watershed. Nearby wetlands, potential vernal pools, and flood zones.	AM = C PM = B	AM = 5.9% PM = 2.8%	5	No fixed-route service, but the Berlin Council on Aging provides service to the elderly and disabled.	Fairly recent improvements to intersection geometry and signalized control.
Route 62 / I-495 NB Ramps	Located in Concord River Watershed.	AM = B PM = B	AM = 6.9% PM = 2.3%	9	No fixed-route service, but the Berlin Council on Aging provides service to the elderly and disabled.	Fairly recent improvements to intersection geometry and signalized control.
Route 62 / Gates Pond Road	Located in Concord River Watershed.	AM = C PM = F	AM = 5.4% PM = 1.5%	11	No fixed-route service, but the Berlin Council on Aging provides service to the elderly and disabled.	Gates Pond Road travels south westerly into Hudson. Shoppes at Highland Commons located just to the east on Route 62.

*Total number of crashes (2018-2020)

9.2 Route 62 Roadway Segments

The Corridor Profile findings for Route 62 roadway segments are summarized in **Table 13**. Similar to the previous intersection table, the roadway segment table lists each Route 62 study segment, environmental considerations adjacent to Route 62 and beyond, the daily percentage of heavy vehicles, number of documented vehicle crashes, the field-observed condition of the paved roadway surface, any bridges or culverts, the availability of public transit and other considerations, including the need to accommodate both bicycles and pedestrians.

Based on the information summarized in the table, the following observations are provided:

- All roadway segments for Route 62 are located in the Concord River Watershed. For the segment between West Street and Linden Street, there is a nearby river attaining some uses. Most study segments have nearby wetlands, potential vernal pools, and flood zones.
- Using data obtained through the ongoing traffic count program maintained by CMRPC, staff was able to determine the heavy vehicle percentages along Route 62 for a 24-hour period. The data listed in the table is the daily percentage of heavy vehicles traveling along the focus roadway segments. The entire study corridor averages between 13.4% and 16.6% heavy vehicles on a daily basis.
- From 2018 to 2020 there were 82 reported roadway segment crashes on Route 62 within the study area. The majority of the crashes (51) occurred between Pleasant Street and Interstate 495 southbound ramps. The next highest number of crashes (11) happened between West Street and Linden Street. The other remaining segments of the Route 62 study corridor had a total of 20 crashes.
- Roadway pavement condition along Route 62 in Berlin is based on a calculated "Overall Condition Index" (OCI) which is derived from the pavement distresses (cracking, distortions, etc.) observed in the field. The OCI scale ranges from 100, indicative of a new roadway, down to zero, where total failure of the paved surface is evident. As can be seen in the table, some of the study segments have two pavement condition scores as, which is typically the case, the established pavement segments are not the same as the CP study roadway segments.
- Route 62 has two bridges within the study area. The two bridges (B-09-017) are Interstate 495, both for the southbound and northbound directions, and are located above Route 62. Regularly inspected by MassDOT, both of these structures are not considered Structurally Deficient and are in good condition. As for culverts, there are a total of nine (9) along the study corridor. Based on field observations and subsequent analysis, most of the identified culverts are considered a "moderate" or "severe"

barrier. Further, there is one “insignificant” barrier culvert and one culvert that was unable to be assessed.

- Similar to that indicated in the intersection findings, there is no fixed-route public transit service along the entire length of the Route 62 study corridor. However, the Council on Aging does provide on-demand transit service for the elderly and disabled in Berlin.
- The majority of the length of Route 62 has essentially no shoulder to safely accommodate bicycles and minimal sidewalks for pedestrians. There are sidewalks on both sides of Route 62 at the Linden Street intersection. Route 62 is a four-lane roadway between the Interstate 495 ramps and the Hudson town line. A MassDOT Park and Ride lot is located on the north side of Route 62 between the Interstate 495 ramp intersections. Additional sidewalks are located on the north side of Route 62 in the vicinity of Interstate 495 ramps.

Table 13

Berlin
Route 62 Roadway Segments:
Overall Corridor Profile Findings

Route 62 Roadway Segments	Environmental Consultation Analysis*	Freight Movement Daily % of Heavy Vehicles	Safety Analysis*	Pavement Condition**	Bridges / Culverts	Public Transit	Other Considerations
Clinton Town Line to West Street	Located in Concord River Watershed. Nearby wetlands, potential vernal pools, and flood zones.	13.4%	5	OCI = 74.4 (Good) Routine Maintenance	Culverts #1, #2 & #3	No Fixed Route Service, but the Berlin Council on Aging provides service to the elderly and disabled.	No shoulder to safely accommodate bicycles and no sidewalks for pedestrians.
West Street to Linden Street	Nearby river attaining some uses. Located in Concord River Watershed. Nearby wetlands, potential vernal pools, and flood zones.	13.6%	11	OCI = 62.5 - 63.1 (Fair) Preventative Maintenance	Culverts #4, #5 & #6	No Fixed Route Service, but the Berlin Council on Aging provides service to the elderly and disabled.	No accommodations for bicycles. Sidewalks on both sides of Linden Street intersection.
Linden Street to Pleasant Street	Located in Concord River Watershed. Nearby wetlands.	13.6%	8	OCI = 74.8 (Good) Routine Maintenance	None	No Fixed Route Service, but the Berlin Council on Aging provides service to the elderly and disabled.	Some sidewalks on both sides of Route 62. Varied shoulder widths for bicycles.
Pleasant Street to I-495 SB Ramps	Located in Concord River Watershed. Nearby wetlands, potential vernal pools, and flood zones.	16.6%	51	OCI = 74.8 (Good) Routine Maintenance OCI = 98.4 (Excellent) Do Nothing	Culverts #7, #8 & #9	No Fixed Route Service, but the Berlin Council on Aging provides service to the elderly and disabled.	No shoulder to safely accommodate bicycles and no sidewalks for pedestrians.
I-495 SB Ramps to I-495 NB Ramps	Located in Concord River Watershed. Nearby wetlands, potential vernal pools, and flood zones.	16.6%	3	OCI = 70.3 (Good) Routine Maintenance OCI = 86.5 (Good) Routine Maintenance	B-09-017	No Fixed Route Service, but the Berlin Council on Aging provides service to the elderly and disabled.	Four-lane roadway between I-495 ramps. Sidewalk on north side of road. Park and Ride lot located on north side of road.
I-495 NB Ramps to Gates Pond Road	Located in Concord River Watershed.	16.6%	0	OCI = 86.5 (Good) Routine Maintenance	None	No Fixed Route Service, but the Berlin Council on Aging provides service to the elderly and disabled.	Four-lane roadway. Sidewalk on north side of road.
Gates Pond Road to Hudson Town Line	Located in Concord River Watershed.	Unknown	4	OCI = 86.5 (Good) Routine Maintenance	None	No Fixed Route Service, but the Berlin Council on Aging provides service to the elderly and disabled.	Four-lane roadway. No sidewalks and limited bicycle accommodations.

*Total number of crashes (2018-2020)
**OCI = Overal Condition Index, Ranging From 0 - 100

9.3 Performance Management

Table 14 shows the integration of the Route 62 Corridor Profile findings as they relate to performance management. This table lists numerous federal transportation planning emphasis areas and the associated report chapter in which they are discussed. The performance objectives for each of the emphasis areas are also listed in the table. As can be realized, there are multiple performance areas that are included in more than one chapter. The "corridor context" column describes how the Route 62 corridor relates to each of the performance areas and associated objective. Further, the last two columns initially list the observed deficiencies on Route 62 followed by what type of suggested improvements to the corridor could likely help obtain the planning region's overall performance objectives.

Table 14 - Integrating Corridor Profi Findings with Performance Management

Associated Chapter	Performance Area	Performance Objective	Corridor Context	Observed Deficiencies	Suggested Improvement and Regional Impact
Chapter 4	**SAFETY**	Reduce the number and rate of fatal & serious injury crashes in the region for all types of vehicles. Also includes non-motorized fatalities and serious injuries. (PM1)	Route 62 is a major connector road between Route 70 and Interstate 495. Safety improvements could reduce vehicle crashes that involve injuries and fatalities along the roadway.	A total of 130 crashes occurred in the host community of Berlin along the Route 62 study segments between 2018 and 2020. Of those crashes, 35 caused a non-fatal injury and there were zero fatalities.	Improve intersections with a high number of crashes. Improve roadway geometry, pavement markings, and signage, if needed to reduce the number of crashes. Also, cut back overgrown vegetation where needed.
Chapter 4	**SECURITY**	Enhance the transportation security coordination and preparedness regionwide.	Route 62 is considered a primary evacuation route and it is important for the roadway to be safe and secure. Municipal Vulnerability Plans (MVP) are developed to identify vulnerable or hazardous locations within a community.	The Berlin MVP Plan identified a frequent flooding area and other drainage issues along Route 62.	See the suggested improvement options for the other performance areas.
Chapters 5 & 6	**STATE OF GOOD REPAIR**	Maintain the highway infrastructure asset system in a state of good repair (PM2): **5)** Increase % of pavement in good condition and reduce % of pavement in poor condition. **6)** Increase % of bridges by deck area in good condition and reduce % of bridge by deck area in poor condition.	**5)** There is a mix of pavement conditions found along the study corridor, but no segments in poor condition. **6)** There are two MassDOT-owned bridges along the study corridor located over Route 62 on Interstate 495, for both the northbound and southbound directions.	**5)** Most segments are in good or excellent condition and two segments are in fair condition. **6)** Both MassDOT bridges are in good condition and not considered structurally deficient.	**5)** Improve segments of pavement in fair condition and monitor segments in good condition. At the very least Preventative Maintenance such as crack sealing, patching and surface treatments should be scheduled along the entire study corridor so other sections of the roadway will not degrade to a poor condition. **6)** Continue to inspect the two interstate bridges along the study corridor on a regular basis.
Chapter 3	**CONGESTION**	To achieve a significant reduction in congestion on the National Highway System (NHS). Travel time reliability, non-SOV travel, peak hour excessive delay, and emissions reduction are the focus of this Performance Measure (PM3).	Route 62 is a major route between Route 70 and Interstate 495 and into the town of Hudson. Route 62 is used by both passenger vechicles and heavy trucks.	The signalized intersections have a LOS of "B" or "C", but the four unsignalized intersections has a LOS between "C" and "F". Average travel speeds are over 30 mph. Minimal congestion along the entire corridor; higher volumes are on the easterm part of the corridor, near Interstate 495.	Periodically check/adjust timing and phasing of both Interstate 495 ramp intersections to ensure they are operating efficiently. Seek to encourage other travel options through the Complete Streets program.
Chapters 7 & 8	**MULTIMODALITY**	Improve and/or expand transportation accessibility for all modes (bicycle, pedestrian, transit) in the region.	**7)** Currently, there is no fixed-route transit service along Route 62, but there is service to the elderly provided by the Berlin COA. **8)** Limited bicycle and pedestrian accommodations along the corridor.	**7)** Fixed-route transit does not exist on Route 62. **8)** Limited sidewalks located in the center of town and at Interstate 495 interchange. No safe bicycle accommodations as there are shoulders that are either of limited width or nonexistent..	**7)** If there is interest, study the feasiblity of transit options within the study corridor. **8)** Where needed, construct new sidewalks where none currently exist. Widen the study corridor to increase shoulder widths for bicyclists. Potentially use the Complete Streets program to fund these types of improvements.
None	**SUSTAINABILITY**	Encourage compact and mixed-use development. Ensure a good ratio exists between available housing and jobs.	As there are many forms of sustainability, promoting sustainability through transportation planning can be approached by detailed TIP screening for projects that serve to mitigate environmental impacts and are near identified Priority Development Areas (PDAs). Currently, there are no PDA's in Berlin	Limited PDA opportunities along the study corridor.	See the suggested improvement options for the other performance areas.
Chapter 7	**EQUITY**	Achieve geographic and population equity across the region. Also, increase EJ & vulnerable populations that intersect WRTA fixed-route bus service and also ensure all subregions benefit from TIP projects.	The town of Berlin has no EJ or vulnerable populations within the study area. There is also no fixed-route transit service along the study corridor. Route 62 is eligible for federal-aid monies through the TIP.	See observed deficiencies identified within the other performance areas.	Proposed projects should consider the benefits and burdens of all populations in the project area.
Chapter 3 & 8	**ECONOMIC VITALITY**	To improve the accessibility to jobs in the CMMPO region through **3)** reliable freight movement and to **8)** improve the accessibility to jobs for all modes in the region.	**3)** Route 62 is frequently used by heavy trucks traveling to/from Interstate 495 and elsewhere. 8) Numerous businesses along the study corridor with limited bicycle and pedestrian accommodations and no transit.	**3)** There are between 13% & 17% trucks using the study corridor. **8)** Minimal or no bicycle and pedestrian accommodations along the corridor. In addtion, no fixed-route transit services.	**3)** Periodically check/adjust timing and phasing of both Interstate 495 intersectiontos to ensure they are working efficiently. Consider widening roadway to allow for more space for trucks. **8)** Consider using the Complete Streets program to improve the roadway for all users.
Chapter 2	**STORMWATER MGMT & RESILIENCY**	Create a transportation network that is resilient to the impacts of strormwater.	There are 9 culverts within the study corridor.	Three of the culverts are considered severe barriers and four culverts are moderate barriers.	Improve/update all culverts based on current standards.
Chapter 8	**TRAVEL & TOURISM**	To enhance the access, safety and effectiveness of the region's transportation network that serves places of touristic value.	Although incomplete, the Mass Central Rail Trail runs parallel to Route 62 in the town of Berlin. Additionally, other local trails are also nearby.	See observed deficiencies identified within the other performance areas.	Install or improve standardized wayfinding signs to recreation areas and popular tourist attractions. Improve roadways near and around local tourist attractions.

10.0 Suggested Improvement Options

CMRPC summarizes a broad range of suggested improvement options within each completed Corridor Profile effort. Depending on host community needs, some suggestions can be specific to a certain corridor location or can be applied to the entire length of the study area. Staff will typically meet with each community included in the Corridor Profile scope to discuss and incorporate their ideas for suggested improvements into the study report. Some improvements can be implemented on a short-term basis while others are aimed at the future, perhaps 5 to 10 years from the present.

As a reference, below are some of the short-term improvement options that were suggested in previous Corridor Profiles which can be used at specific intersections or along an entire corridor. These suggestions include:

- Check the traffic signal timing & phasing of signalized intersections.
- Maintain all traffic signals, signs, and pavement markings.
- Trim any overgrown vegetation that is obstructing sight lines of vehicles, signs, or traffic signals.
- Maintain good pavement surfaces.
- Maintain bridges, culverts, and other roadside drainage facilities and features.
- Install new or improve current guide signs for sites of touristic value.
- Consider access management techniques, such as curb cut consolidation.
- Incorporate additional signage for safety purposes, such as yellow diamond warning signs.
- Consider enhancing pedestrian and bicyclist safety corridor-wide, with a focus at high-use locations.
- Reconfigure the travel lanes at an intersection where appropriate and feasible.
- Use streetscaping for beautification purposes.

Additionally, the following suggested improvements incorporated into prior Corridor Profile efforts were more for the mid-term/long-term time frames. These types of improvements will likely cost more and will take longer to implement or construct. They have been mostly suggested on a community-by-community basis, but can generally be used for more than one location. They include:

- Realignment of intersection approaches.
- Strongly consider the installation of a modern roundabout instead of a traffic signal where appropriate and feasible.
- Widen roadways where additional shoulder width, travel or turning lanes are needed.

- Incorporate Intelligent Transportation Systems (ITS) components into the roadway network, such as dynamic messaging signs.
- Install overhead highway lighting where necessary.
- Utilize a "Complete Streets" approach, designing for all roadway users.
- Coordinate traffic signals where appropriate and feasible.
- Install new traffic signals where warranted or modernize/update existing signal equipment.
- Utilize traffic calming measures along densely settled sections of a roadway, as appropriate and feasible.

Reaffirmed by the recent Bipartisan Infrastructure Law (BIL), the CMMPO is continuing the development of performance-driven, multimodal TIP projects. Performance Based Planning & Programming (PBP&P) is intended to improve public transparency, fiscal accountability, and investment decisions affecting the condition and performance of the transportation system.

The CMMPO's Performance Management program includes numerous goals and objectives across many federal transportation planning emphasis areas. Each goal and objective have corresponding performance metrics that are monitored and progress towards the established goals is reported annually. A Performance Measures Scoresheet was created to assess current and future year TIP projects and to what extent they address regional goals. TIP projects that rank high are often projects that can provide substantive measurable outcomes for each goal, thus having increased regional impact.

This Corridor Profile report includes a range of suggested improvement options for both MassDOT and host community consideration. Mostly maintained by the host community, Route 62 is federal-aid eligible, therefore many of the suggested improvement options could be included in future candidate TIP projects that have the potential to produce higher Performance Management scores. Higher scores increase the likelihood of CMMPO programming. In addition to the TIP, the MassWorks Infrastructure Program could also be a potential funding option for some of the suggested improvements on Route 62. For more information on the MassWorks program, click here MassWorks Program.

10.1 Route 62 Suggested Improvement Options

The following suggested improvement options, meant to address general overall deficiencies observed along the Route 62 study corridor, have been compiled for MassDOT and host community consideration. These improvement options are also shown in **Figure 16**.

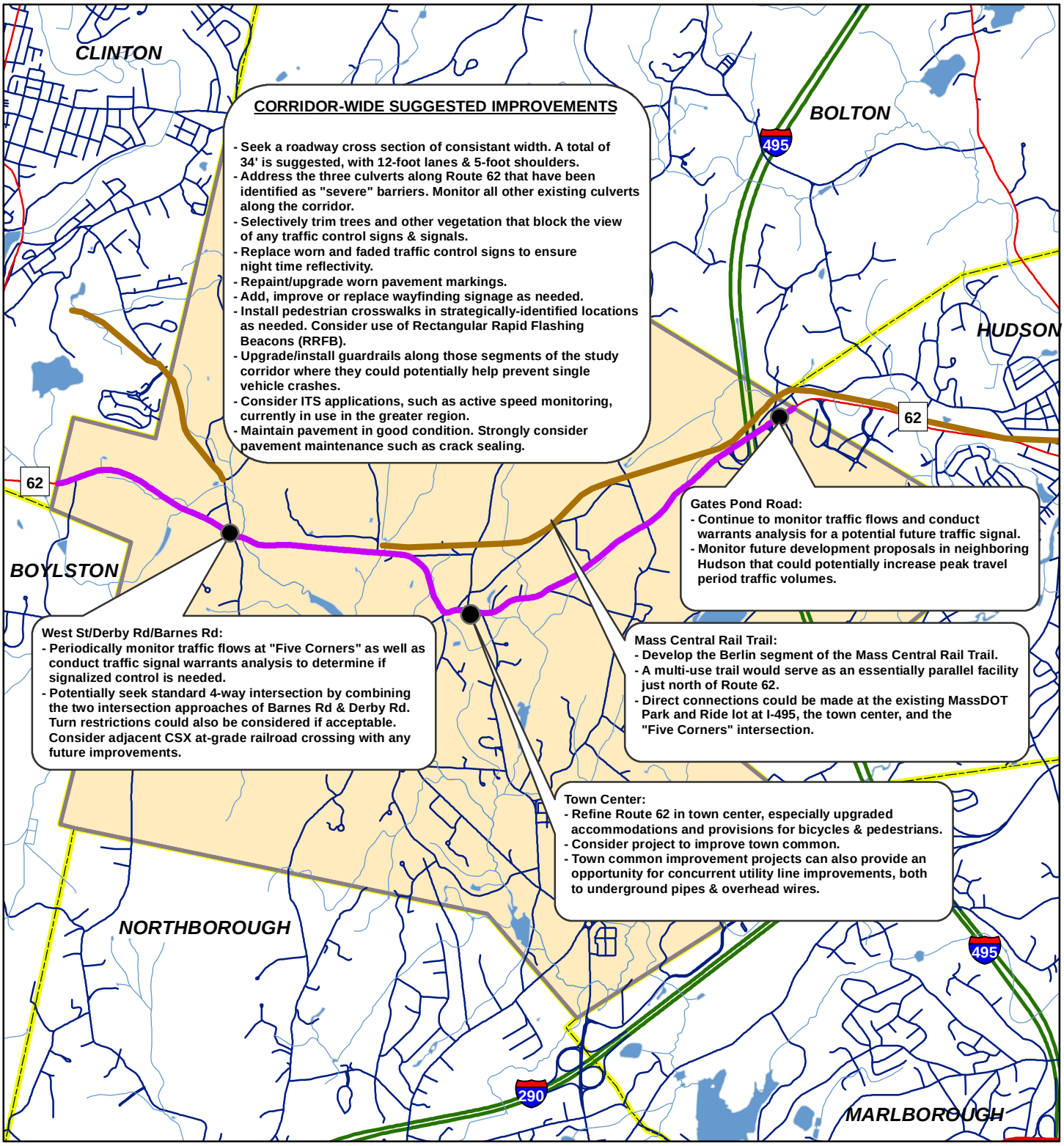
- Seek a roadway cross section of consistent width. A total width of 34' is suggested, with 12-foot lanes and 5-foot shoulders. Any potential improvements to roadway width need to be sensitive to the overall rural nature of the corridor; be mindful of stonewalls

and healthy aged trees for example. (*Could consider 11-foot lanes for traffic calming purposes, especially in the town center, with MassDOT consensus.*)

- Beyond potential roadway widening to provide a more accommodating cross section for all users, the town should take immediate action to develop the Berlin segment of the Mass Central Rail Trail, envisioned to connect the Boston area with Northampton in western Massachusetts when complete, a distance of over 100 miles. The existing railroad right-of-way is owned by the MBTA within the town of Berlin. As has been successfully implemented and maintained elsewhere, a multi-use rail trail would serve as an essentially parallel facility just north of Route 62. Direct future connections to the trail could potentially be made at the existing MassDOT Park and Ride lot at I-495, in vicinity of Berlin's town center as well as the western section of the community where provision would need to be made for bicycles and pedestrians at Route 62's "Five Corners" intersection. Many communities that have worked to revive former rail lines have enjoyed local economic expansion due to the touristic value associated with multi-use rail trails.
- The existing design of Route 62 in the town center area could be refined for all users, especially upgraded accommodations and provisions for bicycles and pedestrians. In prior years, other communities in the CMRPC planning region have used federal funding to improve their town common areas. Barre, Princeton and Shrewsbury are all examples. Often, town common improvement plans seek a return to lost historic aspects and the undoing of uncoordinated changes and incremental improvements implemented over the decades. Town common improvement projects may also provide an opportunity for concurrent utility line improvements (funded beyond the federal program), both to underground pipes and overhead wires. Notably, locally-funded period lighting fixtures have been used to replace more modern style lighting in some communities as part of prior town common improvement efforts.
- Suggest periodic monitoring of traffic flows at the "Five Corners" as well as traffic signal warrants analysis to determine if the required criteria is met for signalized control. Further, it appears that consideration should be given to possibly combining the two intersection approaches of Barnes Road and Derby Road in some manner, seeking standard four-way intersection geometry. Turn restrictions could also be considered if acceptable to MassDOT and the host community of Berlin. As observed in the field, the geometry of the adjacent CSX at-grade railroad crossing over Route 62 will help in determining any roadway grading improvements that could further be implemented at this study location.
- Addressing the three (3) culverts along Route 62 in Berlin that have been identified as "severe" barriers to natural stream flow should be considered a potential "early success" project that would provide some of the necessary preparatory work for further

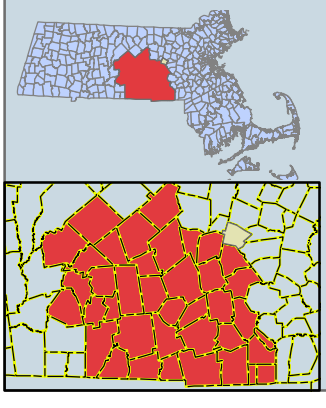
improvements along the Route 62 corridor, particularly any widening to a achieve a consistent roadway cross section. Also, continue to monitor all existing culverts along the corridor to help assure adequate drainage and resiliency for future storm events.

- Continue to monitor traffic flows at the Gates Pond Road intersection and conduct warrants analysis for a potential future traffic signal. Monitor future development proposals in neighboring Hudson that could potentially increase peak travel period traffic volumes on the minor approaches of this study intersection.
- Selectively trim trees and other vegetation that block the view of any traffic control signs and signals.
- Replace worn and faded traffic control signs to ensure night time reflectivity and periodically conduct any needed sign maintenance.
- Repaint/upgrade worn pavement markings to enhance travel lane and crosswalk delineation through increased reflectivity.
- Assess condition of existing signage for tourist attractions near the study corridor. Add, improve or replace wayfinding signage as needed.
- Install pedestrian crosswalks in strategically-identified locations along the study corridor as needed. Install appropriate, accompanying warning signs. Consider use of Rectangular Rapid-Flashing Beacons (RRFB).
- Upgrade/install guard rails along those segments of the study corridor where they could potentially help prevent single vehicle crashes that include hit fixed-object crashes or vehicles driving off the roadway.
- Consider ITS applications along the study corridor, such as active speed monitoring, currently in use in the greater region.
- Maintain pavement in good condition throughout the study corridor. Also, strongly consider periodic pavement maintenance such as crack sealing.



ROUTE 62 CORRIDOR PROFILE

Suggested Improvements
Figure 16



Legend

- Route 62 Corridor Profile
- Interstate
- U.S. Route
- State Route
- Water
- Mass Central Rail Trail

0 0.25 0.5 1 1.5 2 Miles

CMRPC Central Massachusetts Regional Planning Commission

Source: Data provided by the US Census Bureau, Central Massachsuetts Regional Planning Commission (CMRPC), massDOT Office Of Transportation Planning Geospatial Resources Section and the Office of Geographic Information MassGIS), Commonwealth of Massachusetts, Information Technology Division.

Information depicted on this map is for planning purposes only. This information is not adequate for legal boundary definition, regulatory interpretation, or parcel-level analysis. Use caution intrepreting positional accuracy.

Appendix A: Route 62 Culvert Assessment Forms

Appendix A includes the assessment forms that CMRPC staff used to collect culvert data along Route 62 in the town of Berlin. An assessment form is available for the nine (9) culverts that were surveyed.

AQUATIC CONNECTIVITY

Stream Crossing Survey

DATA FORM

DATABASE ENTRY BY _____ ENTRY DATE _____

DATA ENTRY REVIEWED BY _____ REVIEW DATE _____

CROSSING DATA

Crossing Code •xy4239214071673587 Local ID (Optional) 28-051-01

Date Observed (00/00/0000) 8/31/2021 Lead Observer EH

Town/County BERLIN Stream _____

Road Boylston Road Type ☐ MULTILANE ☒ PAVED ☐ UNPAVED ☐ DRIVEWAY ☐ TRAIL ☐ RAILROAD

GPS Coordinates (Decimal degrees) 42.39209 °N Latitude — 71.67264 °W Longitude

Location Description NEAR TELEPHONE POLE #19. NEAR HOUSE #113

Crossing Type ☐ BRIDGE ☒ CULVERT ☐ MULTIPLE CULVERT ☐ FORD ☐ NO CROSSING ☐ REMOVED CROSSING ☐ BURIED STREAM ☐ INACCESSIBLE ☐ PARTIALLY INACCESSIBLE ☐ NO UPSTREAM CHANNEL ☐ BRIDGE ADEQUATE

Number of Culverts/ Bridge Cells 1

Photo IDs INLET _____ OUTLET _____ UPSTREAM _____ DOWNSTREAM _____ OTHER _____

Flow Condition ☐ NO FLOW ☒ TYPICAL-LOW ☐ MODERATE ☐ HIGH

Crossing Condition ☒ OK ☐ POOR ☐ NEW ☐ UNKNOWN

Tidal Site ☐ YES ☒ NO ☐ UNKNOWN

Alignment ☒ FLOW-ALIGNED ☐ SKEWED (>45°)

Road Fill Height (Top of culvert to road surface; bridge = 0) 4.5

Bankfull Width (Optional) 3 Confidence ☐ HIGH ☒ LOW/ESTIMATED

Constriction ☐ SEVERE ☒ MODERATE ☐ SPANS ONLY BANKFULL/ ACTIVE CHANNEL ☐ SPANS FULL CHANNEL & BANKS

Tailwater Scour Pool ☐ NONE ☒ SMALL ☐ LARGE

Crossing Comments OUTLET IN POOR CONDITION

STRUCTURE 1

Structure Material ☒ METAL ☐ CONCRETE ☐ PLASTIC ☐ WOOD ☐ ROCK/STONE ☐ FIBERGLASS ☐ COMBINATION

OUTLET

Outlet Shape ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Outlet Armoring ☒ NONE ☐ NOT EXTENSIVE ☐ EXTENSIVE

Outlet Grade (Pick one) ☐ AT STREAM GRADE ☒ FREE FALL ☐ CASCADE ☐ FREE FALL ONTO CASCADE ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Outlet Dimensions A. Width 1.2 B. Height 1. C. Substrate/Water Width 0.17 D. Water Depth 0.011

Outlet Drop to Water Surface 1.5 Outlet Drop to Stream Bottom 1.6 E. Abutment Height (Type 7 bridges only) _____

L. Structure Length (Overall length from inlet to outlet) 42.0

INLET

Inlet Shape ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Inlet Type ☐ PROJECTING ☒ HEADWALL ☐ WINGWALLS ☐ HEADWALL & WINGWALLS ☐ MITERED TO SLOPE ☐ OTHER ☐ NONE

Inlet Grade (Pick one) ☒ AT STREAM GRADE ☐ INLET DROP ☐ PERCHED ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Inlet Dimensions A. Width 1.2 B. Height 1.2 C. Substrate/Water Width 0.083 D. Water Depth 0.021

ADDITIONAL CONDITIONS

Slope % (Optional) _____ Slope Confidence ☐ HIGH ☐ LOW

Internal Structures ☐ NONE ☒ BAFFLES/WEIRS ☐ SUPPORTS ☐ OTHER _____

Structure Substrate Matches Stream ☒ NONE ☐ COMPARABLE ☐ CONTRASTING ☐ NOT APPROPRIATE ☐ UNKNOWN

Structure Substrate Type (Pick one) ☒ NONE ☐ SILT ☐ SAND ☐ GRAVEL ☐ COBBLE ☐ BOULDER ☐ BEDROCK ☐ UNKNOWN

Structure Substrate Coverage ☒ NONE ☐ 25% ☐ 50% ☐ 75% ☐ 100% ☐ UNKNOWN

Physical Barriers (Pick all that apply) ☒ NONE ☐ DEBRIS/SEDIMENT/ROCK ☐ DEFORMATION ☐ FREE FALL ☐ FENCING ☐ DRY ☐ OTHER

Severity (Choose carefully based on barrier type(s) above) ☒ NONE ☐ MINOR ☐ MODERATE ☐ SEVERE

Water Depth Matches Stream ☐ YES ☒ NO-SHALLOWER ☐ NO-DEEPER ☐ UNKNOWN ☐ DRY

Water Velocity Matches Stream ☒ YES ☐ NO-FASTER ☐ NO-SLOWER ☐ UNKNOWN ☐ DRY

Dry Passage through Structure? ☐ YES ☒ NO ☐ UNKNOWN Height above Dry Passage _____

Comments

5/26/16

Culvert Assessment Form

CROSSING DATA

For multiple culvert crossings use one sheet per culvert. Go from left to right, standing at inlet looking downstream.

Crossing Code:_____ **Local ID:** (Optional)_____ **Date Observed:** (00/00/0000) 8 / 3 / 202 Lead **Observer:** EH

Number of Culverts: ____ **Culvert** ____ **of** ____ **Stream:**_____ **Road:** BOYLSTON ROAD

Location: (St.#, Pole#, Etc.)_____ **Town:** BERLIN **County:** WORCESTER **State:** MA

GPS Coordinates: 42 39209 °N Latitude 71 67264 °W Longitude Time:_____ Weather:_____

Crossing Type: ☐Bridge ☒Culvert ☐Multiple Culvert ☐Ford ☐No Crossing ☐Removed Crossing ☐Buried Stream ☐Inaccessible ☐Partially Inaccessible ☐No Upstream Channel

Culvert Material: ☒Metal ☐Concrete ☐Plastic ☐Wood ☐Rock/Stone ☐Fiberglass ☐Combination **Length of Culvert:** _____

INLET

Appurtenance: ☒Headwall ☐Wingwalls ☐Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Inlet Shape: ☒1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 **Inlet Dimensions: A. Width:**____ **B. Height:**____ **C. Substrate/Water Width:**____ **D. Water Depth:**____ **E. Abutment Height:**____

Inlet Grade: ☒At Stream Grade ☐Inlet Drop ☐Perched ☐Clogged/Collapsed/Submerged ☐Unknown

OUTLET

Appurtenance: ☒Headwall ☐Wingwalls ☐Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Outlet Shape: ☒1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 **Outlet Dimensions: A. Width:**____ **B. Height:**____ **C. Substrate/Water Width:**____ **D. Water Depth:**____ **E. Abutment Height:**____

Outlet Grade: ☐At Stream Grade ☒Free Fall ☐Cascade ☐Free Fall Onto Cascade ☐Clogged/Collapsed/Submerged ☐Unknown

	INLET *Please check only one level for each item*					**OUTLET** *Please check only one level for each item*				
	Adequate	Poor	Critical	Unknown	N/A	Adequate	Poor	Critical	Unknown	N/A
Structural (Longitudinal) Alignment	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Channel Alignment	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Level of Blockage	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Flared End Section	☐	☐	☐	☐	☒	☐	☐	☐	☐	☒
Invert Deterioration	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐
Buoyancy or Crushing	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐
Cross-Section Deformation	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Structural Integrity of Barrel	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Joints and Seams	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐
Footings	☐	☐	☐	☐	☒	☐	☐	☐	☐	☒
Headwall/Wingwalls	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Armoring	☐	☐	☐	☐	☒	☐	☐	☐	☐	☒
Apron	☐	☐	☐	☐	☒	☐	☐	☐	☐	☒
Embankment Piping	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐

To provide additional feedback on performance problems use the optional second sheet

Performance Problems Requiring Action

- Debris/Veg Blockage >1/3 of rise ☐
- Sediment Blockage >1/2 the opening ☐
- Buoyancy or Crushing-Related Inlet Failure ☐
- Poor Channel Alignment ☐
- Local Outlet Scour ☐
- Previous and/or Frequent Overtopping ☐
- Embankment Piping ☐
- Channel Degradation/Headcut ☐
- Embankment Slope Instability ☐
- No Access/Ends Totally Buried/Submerged ☐
- Aggressive Abrasion/Corrosion/Chemical ☐
- Exposed Footing (Open-Bottom Culvert Only) ☐

Notes:_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

AQUATIC CONNECTIVITY

Stream Crossing Survey

DATA FORM

DATABASE ENTRY BY _____ ENTRY DATE _____

DATA ENTRY REVIEWED BY _____ REVIEW DATE _____

CROSSING DATA

Crossing Code •xy4239011871667287 Local ID (Optional) _____

Date Observed (00/00/0000) 8/31/2021 Lead Observer EH

Town/County BERLIN Stream _____

Road Boylston Road Type ☐ MULTILANE ☒ PAVED ☐ UNPAVED ☐ DRIVEWAY ☐ TRAIL ☐ RAILROAD

GPS Coordinates (Decimal degrees) 42.39048 °N Latitude — 71.66789 °W Longitude

Location Description NEAR 85 BOYLSTON ROAD

Crossing Type ☐ BRIDGE ☒ CULVERT ☐ MULTIPLE CULVERT ☐ FORD ☐ NO CROSSING ☐ REMOVED CROSSING ☐ BURIED STREAM ☐ INACCESSIBLE ☐ PARTIALLY INACCESSIBLE ☐ NO UPSTREAM CHANNEL ☐ BRIDGE ADEQUATE

Number of Culverts/ Bridge Cells 1

Photo IDs INLET _____ OUTLET _____ UPSTREAM _____ DOWNSTREAM _____ OTHER _____

Flow Condition ☐ NO FLOW ☒ TYPICAL-LOW ☐ MODERATE ☐ HIGH

Crossing Condition ☐ OK ☒ POOR ☐ NEW ☐ UNKNOWN

Tidal Site ☐ YES ☒ NO ☐ UNKNOWN

Alignment ☐ FLOW-ALIGNED ☒ SKEWED (>45°)

Road Fill Height (Top of culvert to road surface; bridge = 0) 2 FT

Bankfull Width (Optional) _____ Confidence ☐ HIGH ☐ LOW/ESTIMATED

Constriction ☐ SEVERE ☒ MODERATE ☐ SPANS ONLY BANKFULL/ ACTIVE CHANNEL ☐ SPANS FULL CHANNEL & BANKS

Tailwater Scour Pool ☐ NONE ☒ SMALL ☐ LARGE

Crossing Comments OUTLET SIDE IN POOR CONDITION

STRUCTURE 1

Structure Material ☒ METAL ☐ CONCRETE ☐ PLASTIC ☐ WOOD ☐ ROCK/STONE ☐ FIBERGLASS ☐ COMBINATION

OUTLET

Outlet Shape ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Outlet Armoring ☒ NONE ☐ NOT EXTENSIVE ☐ EXTENSIVE

Outlet Grade (Pick one) ☐ AT STREAM GRADE ☒ FREE FALL ☐ CASCADE ☐ FREE FALL ONTO CASCADE ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Outlet Dimensions A. Width 2.0 B. Height 2.0 C. Substrate/Water Width 0.5 D. Water Depth 0.021

Outlet Drop to Water Surface 0.042 Outlet Drop to Stream Bottom 0.042 E. Abutment Height (Type 7 bridges only) _____

L. Structure Length (Overall length from inlet to outlet) 58.0

INLET

Inlet Shape ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Inlet Type ☐ PROJECTING ☐ HEADWALL ☐ WINGWALLS ☒ HEADWALL & WINGWALLS ☐ MITERED TO SLOPE ☐ OTHER ☐ NONE

Inlet Grade (Pick one) ☒ AT STREAM GRADE ☐ INLET DROP ☐ PERCHED ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Inlet Dimensions A. Width 2.0 B. Height 2.0 C. Substrate/Water Width 0.5 D. Water Depth 0.042

ADDITIONAL CONDITIONS

Slope % (Optional) _____ Slope Confidence ☐ HIGH ☐ LOW

Internal Structures ☒ NONE ☐ BAFFLES/WEIRS ☐ SUPPORTS ☐ OTHER _____

Structure Substrate Matches Stream ☒ NONE ☐ COMPARABLE ☐ CONTRASTING ☐ NOT APPROPRIATE ☐ UNKNOWN

Structure Substrate Type (Pick one) ☒ NONE ☐ SILT ☐ SAND ☐ GRAVEL ☐ COBBLE ☐ BOULDER ☐ BEDROCK ☐ UNKNOWN

Structure Substrate Coverage ☒ NONE ☐ 25% ☐ 50% ☐ 75% ☐ 100% ☐ UNKNOWN

Physical Barriers (Pick all that apply) ☒ NONE ☐ DEBRIS/SEDIMENT/ROCK ☐ DEFORMATION ☐ FREE FALL ☐ FENCING ☐ DRY ☐ OTHER

Severity (Choose carefully based on barrier type(s) above) ☒ NONE ☐ MINOR ☐ MODERATE ☐ SEVERE

Water Depth Matches Stream ☒ YES ☐ NO-SHALLOWER ☐ NO-DEEPER ☐ UNKNOWN ☐ DRY

Water Velocity Matches Stream ☒ YES ☐ NO-FASTER ☐ NO-SLOWER ☐ UNKNOWN ☐ DRY

Dry Passage through Structure? ☐ YES ☒ NO ☐ UNKNOWN Height above Dry Passage _____

Comments

5/26/16

Culvert Assessment Form

CROSSING DATA

For multiple culvert crossings use one sheet per culvert. Go from left to right, standing at inlet looking downstream.

Crossing Code:_____ **Local ID:** (Optional)_____ **Date Observed:** (00/00/0000) 8 / 31 / 2021 Lead **Observer:** EH

Number of Culverts: ____ **Culvert** ____ **of** ____ **Stream:**_____ **Road:** BOYLSTON ROAD

Location: (St.#, Pole#, Etc.)_____ **Town:** BERLIN **County:** WORCESTER **State:** MA

GPS Coordinates: __ 42 __ 39048 __ °N Latitude __ 71 __ 66789 __ °W Longitude Time:_____ Weather:_____

Crossing Type: ☐Bridge ☒Culvert ☐Multiple Culvert ☐Ford ☐No Crossing ☐Removed Crossing ☐Buried Stream ☐Inaccessible ☐Partially Inaccessible ☐No Upstream Channel

Culvert Material: ☒Metal ☐Concrete ☐Plastic ☐Wood ☐Rock/Stone ☐Fiberglass ☐Combination **Length of Culvert:** _____

INLET

Appurtenance: ☐Headwall ☐Wingwalls ☒Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Inlet Shape: ☒1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 **Inlet Dimensions: A. Width:**____ **B. Height:**____ **C. Substrate/Water Width:**____ **D. Water Depth:**____ **E. Abutment Height:**____

Inlet Grade: ☒At Stream Grade ☐Inlet Drop ☐Perched ☐Clogged/Collapsed/Submerged ☐Unknown

OUTLET

Appurtenance: ☐Headwall ☐Wingwalls ☒Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Outlet Shape: ☒1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 **Outlet Dimensions: A. Width:**____ **B. Height:**____ **C. Substrate/Water Width:**____ **D. Water Depth:**____ **E. Abutment Height:**____

Outlet Grade: ☐At Stream Grade ☒Free Fall ☐Cascade ☐Free Fall Onto Cascade ☐Clogged/Collapsed/Submerged ☐Unknown

	INLET *Please check only one level for each item*					OUTLET *Please check only one level for each item*				
	Adequate	Poor	Critical	Unknown	N/A	Adequate	Poor	Critical	Unknown	N/A
Structural (Longitudinal) Alignment	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Channel Alignment	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐
Level of Blockage	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Flared End Section	☐	☐	☐	☐	☒	☐	☐	☐	☐	☒
Invert Deterioration	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐
Buoyancy or Crushing	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐
Cross-Section Deformation	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Structural Integrity of Barrel	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐
Joints and Seams	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐
Footings	☐	☐	☐	☐	☒	☐	☐	☐	☐	☒
Headwall/Wingwalls	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Armoring	☐	☐	☐	☐	☒	☐	☐	☐	☐	☒
Apron	☐	☐	☐	☐	☒	☐	☐	☐	☐	☒
Embankment Piping	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐

To provide additional feedback on performance problems use the optional second sheet

Performance Problems Requiring Action

Debris/Veg Blockage >1/3 of rise	☐	Local Outlet Scour	☐	Embankment Slope Instability	☐
Sediment Blockage >1/2 the opening	☐	Previous and/or Frequent Overtopping	☐	No Access/Ends Totally Buried/Submerged	☐
Buoyancy or Crushing-Related Inlet Failure	☐	Embankment Piping	☐	Aggressive Abrasion/Corrosion/Chemical	☐
Poor Channel Alignment	☐	Channel Degradation/Headcut	☐	Exposed Footing (Open-Bottom Culvert Only)	☐

Notes:_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

AQUATIC CONNECTIVITY

Stream Crossing Survey

DATA FORM

DATABASE ENTRY BY _____ ENTRY DATE _____

DATA ENTRY REVIEWED BY _____ REVIEW DATE _____

CROSSING DATA

Crossing Code •xy4238920371665241 Local ID (Optional) 28-050-01

Date Observed (00/00/0000) 8/31/21 Lead Observer EH

Town/County BERLIN Stream _____

Road Boylston Road Type ☐ MULTILANE ☒ PAVED ☐ UNPAVED ☐ DRIVEWAY ☐ TRAIL ☐ RAILROAD

GPS Coordinates (Decimal degrees) 42.389585 °N Latitude — 71.666088 °W Longitude

Location Description 57 - 83 BOYLSTON STREET

Crossing Type ☐ BRIDGE ☒ CULVERT ☐ MULTIPLE CULVERT ☐ FORD ☐ NO CROSSING ☐ REMOVED CROSSING ☐ BURIED STREAM ☐ INACCESSIBLE ☐ PARTIALLY INACCESSIBLE ☐ NO UPSTREAM CHANNEL ☐ BRIDGE ADEQUATE

Number of Culverts/ Bridge Cells 1

Photo IDs INLET _____ OUTLET _____ UPSTREAM _____ DOWNSTREAM _____ OTHER _____

Flow Condition ☐ NO FLOW ☐ TYPICAL-LOW ☒ MODERATE ☐ HIGH

Crossing Condition ☐ OK ☒ POOR ☐ NEW ☐ UNKNOWN

Tidal Site ☐ YES ☒ NO ☐ UNKNOWN

Alignment ☒ FLOW-ALIGNED ☐ SKEWED (>45°)

Road Fill Height (Top of culvert to road surface; bridge = 0) 3

Bankfull Width (Optional) 6

Confidence ☐ HIGH ☒ LOW/ESTIMATED

Constriction ☐ SEVERE ☒ MODERATE ☐ SPANS ONLY BANKFULL/ ACTIVE CHANNEL ☐ SPANS FULL CHANNEL & BANKS

Tailwater Scour Pool ☐ NONE ☐ SMALL ☒ LARGE

Crossing Comments OUTLET SIDE IN POOR CONDITION. THE STRUCTURE IS RUSTING AWAY

STRUCTURE 1

Structure Material ☒ METAL ☐ CONCRETE ☐ PLASTIC ☐ WOOD ☐ ROCK/STONE ☐ FIBERGLASS ☐ COMBINATION

OUTLET

Outlet Shape ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Outlet Armoring ☒ NONE ☐ NOT EXTENSIVE ☐ EXTENSIVE

Outlet Grade (Pick one) ☒ AT STREAM GRADE ☐ FREE FALL ☐ CASCADE ☐ FREE FALL ONTO CASCADE ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Outlet Dimensions A. Width 6 B. Height 4.8 C. Substrate/Water Width 4 D. Water Depth 0

Outlet Drop to Water Surface 0 Outlet Drop to Stream Bottom 0 E. Abutment Height (Type 7 bridges only) _____

L. Structure Length (Overall length from inlet to outlet) 45

INLET

Inlet Shape ☐ 1 ☐ 2 ☒ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Inlet Type ☒ PROJECTING ☐ HEADWALL ☐ WINGWALLS ☐ HEADWALL & WINGWALLS ☐ MITERED TO SLOPE ☐ OTHER ☐ NONE

Inlet Grade (Pick one) ☒ AT STREAM GRADE ☐ INLET DROP ☐ PERCHED ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Inlet Dimensions A. Width 5 B. Height 4 C. Substrate/Water Width 4.6 D. Water Depth 0

ADDITIONAL CONDITIONS

Slope % (Optional) _____ Slope Confidence ☐ HIGH ☐ LOW

Internal Structures ☐ NONE ☐ BAFFLES/WEIRS ☐ SUPPORTS ☐ OTHER _____

Structure Substrate Matches Stream ☒ NONE ☐ COMPARABLE ☐ CONTRASTING ☐ NOT APPROPRIATE ☐ UNKNOWN

Structure Substrate Type (Pick one) ☒ NONE ☐ SILT ☐ SAND ☐ GRAVEL ☐ COBBLE ☐ BOULDER ☐ BEDROCK ☐ UNKNOWN

Structure Substrate Coverage ☒ NONE ☐ 25% ☐ 50% ☐ 75% ☐ 100% ☐ UNKNOWN

Physical Barriers (Pick all that apply) ☒ NONE ☐ DEBRIS/SEDIMENT/ROCK ☐ DEFORMATION ☐ FREE FALL ☐ FENCING ☐ DRY ☐ OTHER

Severity (Choose carefully based on barrier type(s) above) ☒ NONE ☐ MINOR ☐ MODERATE ☐ SEVERE

Water Depth Matches Stream ☐ YES ☒ NO-SHALLOWER ☐ NO-DEEPER ☐ UNKNOWN ☐ DRY

Water Velocity Matches Stream ☒ YES ☐ NO-FASTER ☐ NO-SLOWER ☐ UNKNOWN ☐ DRY

Dry Passage through Structure? ☐ YES ☒ NO ☐ UNKNOWN Height above Dry Passage _____

Comments

5/26/16

Culvert Assessment Form

CROSSING DATA

For multiple culvert crossings use one sheet per culvert. Go from left to right, standing at inlet looking downstream.

Crossing Code:_____ **Local ID:** (Optional)_____ **Date Observed:** (00/00/0000) 8 / 3 / 202 Lead **Observer:** EH

Number of Culverts: 1 **Culvert** ____ **of** ____ **Stream:**_____ **Road:** BOYLSTON ROAD

Location: (St.#, Pole#, Etc.)_____ **Town:** BERLIN **County:** WORCESTER **State:** MA

GPS Coordinates: 42. 38958 °N Latitude 71. _____ °W Longitude Time:_____ Weather:_____

Crossing Type: ☐Bridge ☒Culvert ☐Multiple Culvert ☐Ford ☐No Crossing ☐Removed Crossing ☐Buried Stream ☐Inaccessible ☐Partially Inaccessible ☐No Upstream Channel

Culvert Material: ☒Metal ☐Concrete ☐Plastic ☐Wood ☐Rock/Stone ☐Fiberglass ☐Combination **Length of Culvert:** _____

INLET

Appurtenance: ☐Headwall ☐Wingwalls ☐Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Inlet Shape: ☐1 ☐2 ☒3 ☐4 ☐5 ☐6 ☐7 **Inlet Dimensions: A. Width:**____ **B. Height:**____ **C. Substrate/Water Width:**____ **D. Water Depth:**____ **E. Abutment Height:**____

Inlet Grade: ☒At Stream Grade ☐Inlet Drop ☐Perched ☐Clogged/Collapsed/Submerged ☐Unknown

OUTLET

Appurtenance: ☐Headwall ☐Wingwalls ☐Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Outlet Shape: ☐1 ☐2 ☒3 ☐4 ☐5 ☐6 ☐7 **Outlet Dimensions: A. Width:**____ **B. Height:**____ **C. Substrate/Water Width:**____ **D. Water Depth:**____ **E. Abutment Height:**____

Outlet Grade: ☑At Stream Grade ☐Free Fall ☐Cascade ☐Free Fall Onto Cascade ☐Clogged/Collapsed/Submerged ☐Unknown

	INLET *Please check only one level for each item*					OUTLET *Please check only one level for each item*				
	Adequate	Poor	Critical	Unknown	N/A	Adequate	Poor	Critical	Unknown	N/A
Structural (Longitudinal) Alignment	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Channel Alignment	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Level of Blockage	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Flared End Section	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐
Invert Deterioration	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐
Buoyancy or Crushing	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐
Cross-Section Deformation	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Structural Integrity of Barrel	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐
Joints and Seams	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐
Footings	☐	☐	☐	☐	☒	☐	☐	☐	☐	☒
Headwall/Wingwalls	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Armoring	☐	☐	☐	☐	☒	☐	☐	☐	☐	☒
Apron	☐	☐	☐	☐	☒	☐	☐	☐	☐	☒
Embankment Piping	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐

To provide additional feedback on performance problems use the optional second sheet

Performance Problems Requiring Action

Debris/Veg Blockage >1/3 of rise	☐	Local Outlet Scour	☐	Embankment Slope Instability	☐
Sediment Blockage >1/2 the opening	☐	Previous and/or Frequent Overtopping	☐	No Access/Ends Totally Buried/Submerged	☐
Buoyancy or Crushing-Related Inlet Failure	☐	Embankment Piping	☐	Aggressive Abrasion/Corrosion/Chemical	☐
Poor Channel Alignment	☐	Channel Degradation/Headcut	☐	Exposed Footing (Open-Bottom Culvert Only)	☐

Notes:_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

AQUATIC CONNECTIVITY

Stream Crossing Survey

DATA FORM

DATABASE ENTRY BY | ENTRY DATE

DATA ENTRY REVIEWED BY | REVIEW DATE

CROSSING DATA

Crossing Code: 4238703871659228 | Local ID (Optional): 28-053-01

Date Observed (00/00/0000): 10/15/21 | Lead Observer: EH

Town/County: BERLIN

Road: WEST ST | Type: MULTILANE PAVED UNPAVED DRIVEWAY TRAIL RAILROAD

GPS Coordinates (Decimal degrees): 42.38692 °N Latitude | -71.65863 °W Longitude

Location: NEAR INTERSECTION OF DERBY RD AND WEST ST

Crossing Type: BRIDGE X ULVERT MULTIPLE CULVERT FORD NO CROSSING REMOVED CROSSING
BURIED STREAM INACCESSIBLE PARTIALLY INACCESSIBLE NO UPSTREAM CHANNEL BRIDGE ADEQUATE

Number of Culverts/ Bridge Cells: 3

Photo IDs: INLET OUTLET UPSTREAM DOWNSTREAM OTHER

Flow Condition: NO FLOW TYPICAL-LOW X ODERATE HIGH

Crossing Condition: X K POOR NEW UNKNOWN

Tidal Site: YES X O UNKNOWN

Alignment: X OW-ALIGNED SKEWED (>45°)

Road Fill Height (Top of culvert to road surface; bridge = 0): 15

Bankfull Width (Optional): 15 | Confidence: HIGH X OW/ESTIMATED

Constriction: SEVERE MODERATE X PANS ONLY BANKFULL/ ACTIVE CHANNEL
PANS FULL CHANNEL & BANKS

Tailwater Scour Pool: X ONE SMALL LARGE

Crossing Comme: BRIDGE WITH 3 BOX STRUCTURES FOR FLOW

STRUCTURE 1

Structure Material: METAL X ONCRETE PLASTIC WOOD ROCK/STONE FIBERGLASS COMBINATION

OUTLET

Outlet Shape: 1 2 3 X 5 6 7 FORD UNKNOWN REMOVED

Outlet Armoring: X ONE NOT EXTENSIVE EXTENSIVE

Outlet Grade (Pick one): AT STREAM GRADE FREE FALL CASCADE X EE FALL ONTO CASCADE CLOGGED/COLLAPSED/SUBMERGED UNKNOWN

Outlet Dimensions: A. Width 5 | B. Height 10 | C. Substrate/Water Wi 3.75 | D. Water D 1.25

Outlet Drop to Water Surface: 3 | Outlet Drop to Stream Bott 4.3 | E. Abutment Height (Type 7 bridges only)

L. Structure Length (Overall length from inlet to outlet): 40

INLET

Inlet Shape: 1 2 3 X 5 6 7 FORD UNKNOWN REMOVED

Inlet Type: PROJECTING X EADWALL WINGWALLS HEADWALL & WINGWALLS MITERED TO SLOPE OTHER NONE

Inlet Grade (Pick one): AT STREAM GRADE X ILET DROP PERCHED CLOGGED/COLLAPSED/SUBMERGED UNKNOWN

Inlet Dimensions: A. Width 5 | B. Height 10 | C. Substrate/Water Widt 3.75 | D. Water Dep 1.25

ADDITIONAL CONDITIONS

Slope % (Optional): | Slope Confidence: HIGH LOW

Internal Structures: NONE X AFFLES/WEIRS SUPPORTS OTHER

Structure Substrate Matches Stream: X ONE COMPARABLE CONTRASTING NOT APPROPRIATE UNKNOWN

Structure Substrate Type (Pick one): X ONE SILT SAND GRAVEL COBBLE BOULDER BEDROCK UNKNOWN

Structure Substrate Coverage: X ONE 25% 50% 75% 100% UNKNOWN

Physical Barriers (Pick all that apply): X ONE DEBRIS/SEDIMENT/ROCK DEFORMATION FREE FALL FENCING DRY OTHER

Severity (Choose carefully based on barrier type(s) above): X ONE MINOR MODERATE SEVERE

Water Depth Matches Stream: X ES NO-SHALLOWER NO-DEEPER UNKNOWN DRY

Water Velocity Matches Stream: X ES NO-FASTER NO-SLOWER UNKNOWN DRY

Dry Passage through Structure? YES X O UNKNOWN | Height above Dry Passage:

MIDDLE BRIDGE PILLAR HAS LARGE CRACK IN HEADWALL

5/26/16

STRUCTURE 2

Structure Material ☐ METAL ☒ CONCRETE ☐ PLASTIC ☐ WOOD ☐ ROCK/STONE ☐ FIBERGLASS ☐ COMBINATION

OUTLET

Outlet Shape ☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED **Outlet Armoring** ☐ NONE ☐ NOT EXTENSIVE ☐ EXTENSIVE

Outlet Grade (Pick one) ☒ AT STREAM GRADE ☐ FREE FALL ☐ CASCADE ☐ FREE FALL ONTO CASCADE ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Outlet Dimensions **A. Width** 5 **B. Height** 10 **C. Substrate/Water** 3.75 **D. Water Dep** 1.25

Outlet Drop to Water Surface 0 **Outlet Drop to Stream Bottom** 0 **E. Abutment Height** (Type 7 bridges only)

L. Structure Length (Overall length from inlet to outlet) 40

INLET

Inlet Shape ☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Inlet Type ☐ PROJECTING ☒ HEADWALL ☐ WINGWALLS ☐ HEADWALL & WINGWALLS ☐ MITERED TO SLOPE ☐ OTHER ☐ NONE

Inlet Grade (Pick one) ☐ AT STREAM GRADE ☒ OUTLET DROP ☐ PERCHED ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Inlet Dimensions **A. Width** 5 **B. Height** 10 **C. Substrate/Water W** 3.75 **D. Water Depth** 1.25

ADDITIONAL CONDITIONS

Slope % (Optional) **Slope Confidence** ☐ HIGH ☐ LOW **Internal Structures** ☐ NONE ☒ BAFFLES/WEIRS ☐ SUPPORTS ☐ OTHER

Structure Substrate Matches Stream ☒ ONE ☐ COMPARABLE ☐ CONTRASTING ☐ NOT APPROPRIATE ☐ UNKNOWN

Structure Substrate Type (Pick one) ☒ NONE ☐ SILT ☐ SAND ☐ GRAVEL ☐ COBBLE ☐ BOULDER ☐ BEDROCK ☐ UNKNOWN

Structure Substrate Coverage ☒ ONE ☐ 25% ☐ 50% ☐ 75% ☐ 100% ☐ UNKNOWN

Physical Barriers (Pick all that apply) ☒ NONE ☐ DEBRIS/SEDIMENT/ROCK ☐ DEFORMATION ☐ FREE FALL ☐ FENCING ☐ DRY ☐ OTHER

Severity (Choose carefully based on barrier type(s) above) ☒ NONE ☐ MINOR ☐ MODERATE ☐ SEVERE

Water Depth Matches Stream ☒ YES ☐ NO-SHALLOWER ☐ NO-DEEPER ☐ UNKNOWN ☐ DRY

Water Velocity Matches Stream ☒ YES ☐ NO-FASTER ☐ NO-SLOWER ☐ UNKNOWN ☐ DRY

Dry Passage through Structure? ☐ YES ☒ NO ☐ UNKNOWN **Height above Dry Passage**

Comments

STRUCTURE 3

Structure Material ☐ METAL ☒ CONCRETE ☐ PLASTIC ☐ WOOD ☐ ROCK/STONE ☐ FIBERGLASS ☐ COMBINATION

OUTLET

Outlet Shape ☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED **Outlet Armoring** ☒ NONE ☐ NOT EXTENSIVE ☐ EXTENSIVE

Outlet Grade (Pick one) ☒ AT STREAM GRADE ☐ FREE FALL ☐ CASCADE ☐ FREE FALL ONTO CASCADE ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Outlet Dimensions **A. Width** 5 **B. Height** 10 **C. Substrate/Water** 3.75 **D. Water** 1.25

Outlet Drop to Water Surface 0 **Outlet Drop to Stream Bottom** 0 **E. Abutment Height** (Type 7 bridges only)

L. Structure Length (Overall length from inlet to outlet) 40

INLET

Inlet Shape ☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Inlet Type ☐ PROJECTING ☒ HEADWALL ☐ WINGWALLS ☐ HEADWALL & WINGWALLS ☐ MITERED TO SLOPE ☐ OTHER ☐ NONE

Inlet Grade (Pick one) ☐ AT STREAM GRADE ☒ OUTLET DROP ☐ PERCHED ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Inlet Dimensions **A. Width** 5 **B. Height** 10 **C. Substrate** 3.75 **D. Wate** 1.25

ADDITIONAL CONDITIONS

Slope % (Optional) **Slope Confidence** ☐ HIGH ☐ LOW **Internal Structures** ☐ NONE ☒ BAFFLES/WEIRS ☐ SUPPORTS ☐ OTHER

Structure Substrate Matches Stream ☒ ONE ☐ COMPARABLE ☐ CONTRASTING ☐ NOT APPROPRIATE ☐ UNKNOWN

Structure Substrate Type (Pick one) ☒ NONE ☐ SILT ☐ SAND ☐ GRAVEL ☐ COBBLE ☐ BOULDER ☐ BEDROCK ☐ UNKNOWN

Structure Substrate Coverage ☒ ONE ☐ 25% ☐ 50% ☐ 75% ☐ 100% ☐ UNKNOWN

Physical Barriers (Pick all that apply) ☒ NONE ☐ DEBRIS/SEDIMENT/ROCK ☐ DEFORMATION ☐ FREE FALL ☐ FENCING ☐ DRY ☐ OTHER

Severity (Choose carefully based on barrier type(s) above) ☒ NONE ☐ MINOR ☐ MODERATE ☐ SEVERE

Water Depth Matches Stream ☒ YES ☐ NO-SHALLOWER ☐ NO-DEEPER ☐ UNKNOWN ☐ DRY

Water Velocity Matches Stream ☒ YES ☐ NO-FASTER ☐ NO-SLOWER ☐ UNKNOWN ☐ DRY

Dry Passage through Structure? ☐ YES ☒ NO ☐ UNKNOWN **Height above Dry Passage**

Comments

Culvert Assessment Form

CROSSING DATA

For multiple culvert crossings use one sheet per culvert. Go from left to right, standing at inlet looking downstream.

Crossing Code: 28-053-01 **Local ID:** (Optional) **Date Observed:** 10/15/21 **Lead Observer:**

Number of Culverts: ____ **Culvert** ____ **of** ____ **Stream:** **Road:** WEST ST

Location: (St.#, Pole#, Etc.) **Town:** **County:** **State:**

GPS Coordinates: __ __ . __ __ __ __ °N Latitude __ __ . __ __ __ __ °W Longitude **Time:** **Weather:**

Crossing Type: ☐Bridge ☐Culvert ☐Multiple Culvert ☐Ford ☐No Crossing ☐Removed Crossing ☐Buried Stream ☐Inaccessible ☐Partially Inaccessible ☐No Upstream Channel

Culvert Material: ☐Metal ☐Concrete ☐Plastic ☐Wood ☐Rock/Stone ☐Fiberglass ☐Combination **Length of Culvert:**

INLET

Appurtenance: ☐Headwall ☐Wingwalls ☐Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Inlet Shape: ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 **Inlet Dimensions: A. Width:** **B. Height:** **C. Substrate/Water Width:** **D. Water Depth:** **E. Abutment Height:**

Inlet Grade: ☐At Stream Grade ☐Inlet Drop ☐Perched ☐Clogged/Collapsed/Submerged ☐Unknown

OUTLET

Appurtenance: ☐Headwall ☐Wingwalls ☐Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Outlet Shape: ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 **Outlet Dimensions: A. Width:** **B. Height:** **C. Substrate/Water Width:** **D. Water Depth:** **E. Abutment Height:**

Outlet Grade: ☐At Stream Grade ☐Free Fall ☐Cascade ☐Free Fall Onto Cascade ☐Clogged/Collapsed/Submerged ☐Unknown

	INLET *Please check only one level for each item*					OUTLET *Please check only one level for each item*				
	Adequate	Poor	Critical	Unknown	N/A	Adequate	Poor	Critical	Unknown	N/A
Structural (Longitudinal) Alignment	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Channel Alignment	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Level of Blockage	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Flared End Section	☐	☐	☐	☐	X	☐	☐	☐	☐	X
Invert Deterioration	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Buoyancy or Crushing	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Cross-Section Deformation	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Structural Integrity of Barrel	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Joints and Seams	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Footings	☐	X	☐	☐	☐	☐	X	☐	☐	☐
Headwall/Wingwalls	☐	X	☐	☐	☐	X	☐	☐	☐	☐
Armoring	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Apron	☐	☐	☐	☐	X	☐	☐	☐	☐	X
Embankment Piping	X	☐	☐	☐	☐	X	☐	☐	☐	☐

To provide additional feedback on performance problems use the optional second sheet

Performance Problems Requiring Action

Debris/Veg Blockage >1/3 of rise	☐	Local Outlet Scour	☐	Embankment Slope Instability	☐
Sediment Blockage >1/2 the opening	☐	Previous and/or Frequent Overtopping	☐	No Access/Ends Totally Buried/Submerged	☐
Buoyancy or Crushing-Related Inlet Failure	☐	Embankment Piping	☐	Aggressive Abrasion/Corrosion/Chemical	☐
Poor Channel Alignment	☐	Channel Degradation/Headcut	☐	Exposed Footing (Open-Bottom Culvert Only)	☐

Notes:

Photo #: **Description:** **Photo #:** **Description:**

Photo #: **Description:** **Photo #:** **Description:**

Photo #: **Description:** **Photo #:** **Description:**

Photo #: **Description:** **Photo #:** **Description:**

2019

AQUATIC CONNECTIVITY

Stream Crossing Survey

DATA FORM

DATABASE ENTRY BY _____ ENTRY DATE _____

DATA ENTRY REVIEWED BY _____ REVIEW DATE _____

CROSSING DATA

Crossing Code •xy4238586271644709 Local ID (Optional) 28-52-01

Date Observed (00/00/0000) 8/31/21 Lead Observer EH

Town/County BERLIN Stream _____

Road West Street Type ☐ MULTILANE ☒ PAVED ☐ UNPAVED ☐ DRIVEWAY ☐ TRAIL ☐ RAILROAD

GPS Coordinates (Decimal degrees) 42.38596 °N Latitude — 71.64470 °W Longitude

Location Description NEAR 68 WEST STREET

Crossing Type ☐ BRIDGE ☒ CULVERT ☐ MULTIPLE CULVERT ☐ FORD ☐ NO CROSSING ☐ REMOVED CROSSING ☐ BURIED STREAM ☐ INACCESSIBLE ☐ PARTIALLY INACCESSIBLE ☐ NO UPSTREAM CHANNEL ☐ BRIDGE ADEQUATE

Number of Culverts/ Bridge Cells 2

Photo IDs INLET _____ OUTLET _____ UPSTREAM _____ DOWNSTREAM _____ OTHER _____

Flow Condition ☐ NO FLOW ☒ TYPICAL-LOW ☐ MODERATE ☐ HIGH

Crossing Condition ☒ OK ☐ POOR ☐ NEW ☐ UNKNOWN

Tidal Site ☐ YES ☒ NO ☐ UNKNOWN

Alignment ☒ FLOW-ALIGNED ☐ SKEWED (>45°)

Road Fill Height (Top of culvert to road surface; bridge = 0) 5

Bankfull Width (Optional) 12 Confidence ☐ HIGH ☒ LOW/ESTIMATED

Constriction ☐ SEVERE ☐ MODERATE ☒ SPANS ONLY BANKFULL/ ACTIVE CHANNEL ☐ SPANS FULL CHANNEL & BANKS

Tailwater Scour Pool ☒ NONE ☐ SMALL ☐ LARGE

Crossing Comments 2 STRUCTURES. 2ND STRUCTURE IS IN POOR CONDITION. IT IS LONGER AND PROJECTS OUTWARDS.

STRUCTURE 1

Structure Material ☐ METAL ☒ CONCRETE ☐ PLASTIC ☐ WOOD ☐ ROCK/STONE ☐ FIBERGLASS ☐ COMBINATION

OUTLET

Outlet Shape ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Outlet Armoring ☐ NONE ☒ NOT EXTENSIVE ☐ EXTENSIVE

Outlet Grade (Pick one) ☐ AT STREAM GRADE ☒ FREE FALL ☐ CASCADE ☐ FREE FALL ONTO CASCADE ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Outlet Dimensions A. Width 2.5 B. Height 2.5 C. Substrate/Water Width 1.2 D. Water Depth 0.0833

Outlet Drop to Water Surface 1.0 Outlet Drop to Stream Bottom 1.2 E. Abutment Height (Type 7 bridges only) _____

L. Structure Length (Overall length from inlet to outlet) 36.0

INLET

Inlet Shape ☒ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Inlet Type ☐ PROJECTING ☐ HEADWALL ☐ WINGWALLS ☒ HEADWALL & WINGWALLS ☐ MITERED TO SLOPE ☐ OTHER ☐ NONE

Inlet Grade (Pick one) ☒ AT STREAM GRADE ☐ INLET DROP ☐ PERCHED ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Inlet Dimensions A. Width 2 B. Height 2 C. Substrate/Water Width 1 D. Water Depth 1

ADDITIONAL CONDITIONS

Slope % (Optional) _____ Slope Confidence ☐ HIGH ☐ LOW

Internal Structures ☒ NONE ☐ BAFFLES/WEIRS ☐ SUPPORTS ☐ OTHER _____

Structure Substrate Matches Stream ☒ NONE ☐ COMPARABLE ☐ CONTRASTING ☐ NOT APPROPRIATE ☐ UNKNOWN

Structure Substrate Type (Pick one) ☒ NONE ☐ SILT ☐ SAND ☐ GRAVEL ☐ COBBLE ☐ BOULDER ☐ BEDROCK ☐ UNKNOWN

Structure Substrate Coverage ☒ NONE ☐ 25% ☐ 50% ☐ 75% ☐ 100% ☐ UNKNOWN

Physical Barriers (Pick all that apply) ☒ NONE ☐ DEBRIS/SEDIMENT/ROCK ☐ DEFORMATION ☐ FREE FALL ☐ FENCING ☐ DRY ☐ OTHER

Severity (Choose carefully based on barrier type(s) above) ☒ NONE ☐ MINOR ☐ MODERATE ☐ SEVERE

Water Depth Matches Stream ☐ YES ☒ NO-SHALLOWER ☐ NO-DEEPER ☐ UNKNOWN ☐ DRY

Water Velocity Matches Stream ☒ YES ☐ NO-FASTER ☐ NO-SLOWER ☐ UNKNOWN ☐ DRY

Dry Passage through Structure? ☐ YES ☒ NO ☐ UNKNOWN Height above Dry Passage _____

Comments MEASUREMENTS FOR 2ND STRUCTURE ARE THE SAME AS THE FIRST

5/26/16

Culvert Assessment Form

CROSSING DATA

For multiple culvert crossings use one sheet per culvert. Go from left to right, standing at inlet looking downstream.

Crossing Code:_____ **Local ID:** (Optional)_____ **Date Observed:** (00/00/0000) 8 / 31 / 2021 Lead **Observer:** EH

Number of Culverts: 2 **Culvert** ____ **of** ____ **Stream:**_____ **Road:** WEST STREET

Location: (St.#, Pole#, Etc.)_____ **Town:** BERLIN **County:**_____ **State:** MA

GPS Coordinates: __ __ . __ __ __ __ __ °N Latitude __ __ . __ __ __ __ __ °W Longitude **Time:**_____ **Weather:**_____

Crossing Type: ☐Bridge ☒Culvert ☐Multiple Culvert ☐Ford ☐No Crossing ☐Removed Crossing ☐Buried Stream ☐Inaccessible ☐Partially Inaccessible ☐No Upstream Channel

Culvert Material: ☐Metal ☒Concrete ☐Plastic ☐Wood ☐Rock/Stone ☐Fiberglass ☐Combination **Length of Culvert:** _____

INLET

Appurtenance: ☐Headwall ☐Wingwalls ☒Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Inlet Shape: ☒1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 **Inlet Dimensions: A. Width:**____ **B. Height:**____ **C. Substrate/Water Width:**____ **D. Water Depth:**____ **E. Abutment Height:**____

Inlet Grade: ☒At Stream Grade ☐Inlet Drop ☐Perched ☐Clogged/Collapsed/Submerged ☐Unknown

OUTLET

Appurtenance: ☐Headwall ☐Wingwalls ☒Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Outlet Shape: ☒1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 **Outlet Dimensions: A. Width:**____ **B. Height:**____ **C. Substrate/Water Width:**____ **D. Water Depth:**____ **E. Abutment Height:**____

Outlet Grade: ☐At Stream Grade ☒Free Fall ☐Cascade ☐Free Fall Onto Cascade ☐Clogged/Collapsed/Submerged ☐Unknown

	INLET *Please check only one level for each item*					OUTLET *Please check only one level for each item*				
	Adequate	Poor	Critical	Unknown	N/A	Adequate	Poor	Critical	Unknown	N/A
Structural (Longitudinal) Alignment	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Channel Alignment	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Level of Blockage	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Flared End Section	☐	☐	☐	☐	☒	☐	☐	☐	☐	☒
Invert Deterioration	☐	☒	☐	☐	☐	☐	☒	☐	☐	☐
Buoyancy or Crushing	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Cross-Section Deformation	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Structural Integrity of Barrel	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐
Joints and Seams	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐
Footings	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Headwall/Wingwalls	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Armoring	☐	☐	☐	☐	☒	☒	☐	☐	☐	☐
Apron	☐	☐	☐	☐	☒	☐	☐	☐	☐	☒
Embankment Piping	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐

To provide additional feedback on performance problems use the optional second sheet

Performance Problems Requiring Action

Debris/Veg Blockage >1/3 of rise	☐	Local Outlet Scour	☐	Embankment Slope Instability	☐
Sediment Blockage >1/2 the opening	☐	Previous and/or Frequent Overtopping	☐	No Access/Ends Totally Buried/Submerged	☐
Buoyancy or Crushing-Related Inlet Failure	☐	Embankment Piping	☐	Aggressive Abrasion/Corrosion/Chemical	☐
Poor Channel Alignment	☐	Channel Degradation/Headcut	☐	Exposed Footing (Open-Bottom Culvert Only)	☐

Notes:_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

AQUATIC CONNECTIVITY

Stream Crossing Survey

DATA FORM

DATABASE ENTRY BY _____ ENTRY DATE _____

DATA ENTRY REVIEWED BY _____ REVIEW DATE _____

CROSSING DATA

Crossing Code •xy4238331671639763 Local ID (Optional) 28-052-0

Date Observed (00/00/0000) 8/31/21 Lead Observer EH

Town/County BERLIN Stream _____

Road West Street Type ☐ MULTILANE ☒ PAVED ☐ UNPAVED ☐ DRIVEWAY ☐ TRAIL ☐ RAILROAD

GPS Coordinates (Decimal degrees) 42.38343 °N Latitude — 71.63985 °W Longitude

Location Description RIGHT NEXT TO 28 WEST STREET

Crossing Type ☐ BRIDGE ☒ CULVERT ☐ MULTIPLE CULVERT ☐ FORD ☐ NO CROSSING ☐ REMOVED CROSSING ☐ BURIED STREAM ☐ INACCESSIBLE ☐ PARTIALLY INACCESSIBLE ☐ NO UPSTREAM CHANNEL ☐ BRIDGE ADEQUATE

Number of Culverts/ Bridge Cells 1

Photo IDs INLET _____ OUTLET _____ UPSTREAM _____ DOWNSTREAM _____ OTHER _____

Flow Condition ☐ NO FLOW ☒ TYPICAL-LOW ☐ MODERATE ☐ HIGH

Crossing Condition ☒ OK ☐ POOR ☐ NEW ☐ UNKNOWN

Tidal Site ☐ YES ☒ NO ☐ UNKNOWN

Alignment ☐ FLOW-ALIGNED ☒ SKEWED (>45°)

Road Fill Height (Top of culvert to road surface; bridge = 0) 2

Bankfull Width (Optional) _____ Confidence ☐ HIGH ☐ LOW/ESTIMATED

Constriction ☐ SEVERE ☐ MODERATE ☒ SPANS ONLY BANKFULL/ ACTIVE CHANNEL ☐ SPANS FULL CHANNEL & BANKS

Tailwater Scour Pool ☒ NONE ☐ SMALL ☐ LARGE

Crossing Comments

STRUCTURE 1

Structure Material ☐ METAL ☒ CONCRETE ☐ PLASTIC ☐ WOOD ☐ ROCK/STONE ☐ FIBERGLASS ☐ COMBINATION

OUTLET

Outlet Shape ☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Outlet Armoring ☐ NONE ☐ NOT EXTENSIVE ☐ EXTENSIVE

Outlet Grade (Pick one) ☒ AT STREAM GRADE ☐ FREE FALL ☐ CASCADE ☐ FREE FALL ONTO CASCADE ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Outlet Dimensions A. Width 4.0 B. Height 2.5 C. Substrate/Water Width 3.0 D. Water Depth 0.125

Outlet Drop to Water Surface 0. Outlet Drop to Stream Bottom 0. E. Abutment Height (Type 7 bridges only) _____.

L. Structure Length (Overall length from inlet to outlet) 49.0

INLET

Inlet Shape ☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Inlet Type ☐ PROJECTING ☒ HEADWALL ☐ WINGWALLS ☐ HEADWALL & WINGWALLS ☐ MITERED TO SLOPE ☐ OTHER ☐ NONE

Inlet Grade (Pick one) ☒ AT STREAM GRADE ☐ INLET DROP ☐ PERCHED ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Inlet Dimensions A. Width 4.0 B. Height 2.5 C. Substrate/Water Width 3.0 D. Water Depth 0.0833

ADDITIONAL CONDITIONS

Slope % (Optional) _____ Slope Confidence ☐ HIGH ☐ LOW

Internal Structures ☒ NONE ☐ BAFFLES/WEIRS ☐ SUPPORTS ☐ OTHER _____

Structure Substrate Matches Stream ☐ NONE ☒ COMPARABLE ☐ CONTRASTING ☐ NOT APPROPRIATE ☐ UNKNOWN

Structure Substrate Type (Pick one) ☐ NONE ☐ SILT ☐ SAND ☒ GRAVEL ☐ COBBLE ☐ BOULDER ☐ BEDROCK ☐ UNKNOWN

Structure Substrate Coverage ☐ NONE ☐ 25% ☒ 50% ☐ 75% ☐ 100% ☐ UNKNOWN

Physical Barriers (Pick all that apply) ☒ NONE ☐ DEBRIS/SEDIMENT/ROCK ☐ DEFORMATION ☐ FREE FALL ☐ FENCING ☐ DRY ☐ OTHER

Severity (Choose carefully based on barrier type(s) above) ☒ NONE ☐ MINOR ☐ MODERATE ☐ SEVERE

Water Depth Matches Stream ☒ YES ☐ NO-SHALLOWER ☐ NO-DEEPER ☐ UNKNOWN ☐ DRY

Water Velocity Matches Stream ☒ YES ☐ NO-FASTER ☐ NO-SLOWER ☐ UNKNOWN ☐ DRY

Dry Passage through Structure? ☐ YES ☒ NO ☐ UNKNOWN Height above Dry Passage _____

Comments

5/26/16

Culvert Assessment Form

CROSSING DATA

For multiple culvert crossings use one sheet per culvert. Go from left to right, standing at inlet looking downstream.

Crossing Code:_____ **Local ID:** (Optional)_____ **Date Observed:** (00/00/0000) __8_/__3_/__2021 Lead **Observer:** EH

Number of Culverts: __1__ **Culvert** ____ **of** ____ **Stream:**_____ **Road:** WEST STREET

Location: (St.#, Pole#, Etc.)_____ **Town:** BERLIN **County:** WORCESTER **State:** MA

GPS Coordinates: __ __ . __ __ __ __ °N Latitude __ __ . __ __ __ __ °W Longitude Time:_____ Weather:_____

Crossing Type: ☐Bridge ☑Culvert ☐Multiple Culvert ☐Ford ☐No Crossing ☐Removed Crossing ☐Buried Stream ☐Inaccessible ☐Partially Inaccessible ☐No Upstream Channel

Culvert Material: ☐Metal ☑Concrete ☐Plastic ☐Wood ☐Rock/Stone ☐Fiberglass ☐Combination **Length of Culvert:** _____

INLET

Appurtenance: ☑Headwall ☐Wingwalls ☐Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Inlet Shape: ☐1 ☐2 ☐3 ☑4 ☐5 ☐6 ☐7 **Inlet Dimensions: A. Width:**____ **B. Height:**____ **C. Substrate/Water Width:**____ **D. Water Depth:**____ **E. Abutment Height:**____

Inlet Grade: ☑At Stream Grade ☐Inlet Drop ☐Perched ☐Clogged/Collapsed/Submerged ☐Unknown

OUTLET

Appurtenance: ☑Headwall ☐Wingwalls ☐Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Outlet Shape: ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 **Outlet Dimensions: A. Width:**____ **B. Height:**____ **C. Substrate/Water Width:**____ **D. Water Depth:**____ **E. Abutment Height:**____

Outlet Grade: ☑At Stream Grade ☐Free Fall ☐Cascade ☐Free Fall Onto Cascade ☐Clogged/Collapsed/Submerged ☐Unknown

	INLET *Please check only one level for each item*					OUTLET *Please check only one level for each item*				
	Adequate	Poor	Critical	Unknown	N/A	Adequate	Poor	Critical	Unknown	N/A
Structural (Longitudinal) Alignment	☑	☐	☐	☐	☐	☒	☐	☐	☐	☐
Channel Alignment	☑	☐	☐	☐	☐	☑	☐	☐	☐	☐
Level of Blockage	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Flared End Section	☐	☐	☐	☐	☒	☐	☐	☐	☐	☒
Invert Deterioration	☑	☐	☐	☐	☐	☑	☐	☐	☐	☐
Buoyancy or Crushing	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Cross-Section Deformation	☑	☐	☐	☐	☐	☑	☐	☐	☐	☐
Structural Integrity of Barrel	☒	☐	☐	☐	☐	☒	☐	☐	☐	☐
Joints and Seams	☑	☐	☐	☐	☐	☒	☐	☐	☐	☐
Footings	☑	☐	☐	☐	☐	☑	☐	☐	☐	☐
Headwall/Wingwalls	☑	☐	☐	☐	☐	☑	☐	☐	☐	☐
Armoring	☐	☐	☐	☐	☒	☐	☐	☐	☐	☑
Apron	☐	☐	☐	☐	☑	☐	☐	☐	☐	☒
Embankment Piping	☑	☐	☐	☐	☐	☒	☐	☐	☐	☐

To provide additional feedback on performance problems use the optional second sheet

Performance Problems Requiring Action

Debris/Veg Blockage >1/3 of rise	☐	Local Outlet Scour	☐	Embankment Slope Instability	☐
Sediment Blockage >1/2 the opening	☐	Previous and/or Frequent Overtopping	☐	No Access/Ends Totally Buried/Submerged	☐
Buoyancy or Crushing-Related Inlet Failure	☐	Embankment Piping	☐	Aggressive Abrasion/Corrosion/Chemical	☐
Poor Channel Alignment	☐	Channel Degradation/Headcut	☐	Exposed Footing (Open-Bottom Culvert Only)	☐

Notes:_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

AQUATIC CONNECTIVITY

Stream Crossing Survey

DATA FORM

DATABASE ENTRY BY | ENTRY DATE

DATA ENTRY REVIEWED BY | REVIEW DATE

CROSSING DATA

XY4238243071630238 | 28-024-02

Date Observ 10/15/21 | Lead Observer EH

Town/County BERLIN | Stream

Road CENTRAL ST | Type ☐ MULTILANE ☐ PAVED ☐ UNPAVED ☐ DRIVEWAY ☐ TRAIL ☐ RAILROAD

GPS Coordinates (Decimal degrees) 42.38243 Latitude | -71.63027 W Longitude

Location Description WEST OF BREWER ROAD

Crossing Type ☐ BRIDGE [X] CULVERT ☐ MULTIPLE CULVERT ☐ FORD ☐ NO CROSSING ☐ REMOVED CROSSING ☐ BURIED STREAM ☐ INACCESSIBLE ☐ PARTIALLY INACCESSIBLE ☐ NO UPSTREAM CHANNEL ☐ BRIDGE ADEQUATE

Number of Culverts/ Bridge Cells 1

Photo IDs INLET ____ OUTLET ____ UPSTREAM ____ DOWNSTREAM ____ OTHER ____

Flow Condition ☐ NO FLOW [X] TYPICAL-LOW ☐ MODERATE ☐ HIGH

Crossing Condition [X] OK ☐ POOR ☐ NEW ☐ UNKNOWN

Tidal Site ☐ YES ☐ NO ☐ UNKNOWN

Alignment [X] FLOW-ALIGNED ☐ SKEWED (>45°)

Road Fill Height (Top of culvert to road surface; bridge = 0) 3

Bankfull W 4.5

Confidence ☐ HIGH [X] LOW/ESTIMATED

Constriction ☐ SEVERE ☐ MODERATE [X] BANKS ONLY BANKFULL/ ACTIVE CHANNEL ☐ SPANS FULL CHANNEL & BANKS

Tailwater Scour Pool [X] NONE ☐ SMALL ☐ LARGE

Crossing Co FENCING ACROSS STREAM ON OUTLET SIDE

STRUCTURE 1

Structure Material [X] METAL ☐ CONCRETE ☐ PLASTIC ☐ WOOD ☐ ROCK/STONE ☐ FIBERGLASS ☐ COMBINATION

OUTLET

Outlet Shape [X] ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Outlet Armoring [X] NONE ☐ NOT EXTENSIVE ☐ EXTENSIVE

Outlet Grade (Pick one) [X] AT STREAM GRADE ☐ FREE FALL ☐ CASCADE ☐ FREE FALL ONTO CASCADE ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Outlet Dimensions A. Width 4 | B. Height 4 | C. Substrate/Water Width 1.3 | Depth 0.17

Outlet Drop to Water Surface 0 | Outlet Drop to Stream Bottom 0 | E. Abutment Height (Type 7 bridges only)

L. Structure Length (Overall length from inlet to outlet) 50

INLET

Inlet Shape [X] ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Inlet Type ☐ PROJECTING [X] HEADWALL ☐ WINGWALLS ☐ HEADWALL & WINGWALLS ☐ MITERED TO SLOPE ☐ OTHER ☐ NONE

Inlet Grade (Pick one) [X] AT STREAM GRADE ☐ INLET DROP ☐ PERCHED ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Inlet Dimensions A. Width 4 | B. Height 4 | C. Substrate/Wa 2.75 | D. Water Dep 0.46

ADDITIONAL CONDITIONS

Slope % (Optional) | Slope Confidence ☐ HIGH ☐ LOW

Internal Structures ☐ NONE ☐ BAFFLES/WEIRS ☐ SUPPORTS ☐ OTHER

Structure Substrate Matches Stream [X] ONE ☐ COMPARABLE ☐ CONTRASTING ☐ NOT APPROPRIATE ☐ UNKNOWN

Structure Substrate Type (Pick one) [X] NONE ☐ SILT ☐ SAND ☐ GRAVEL ☐ COBBLE ☐ BOULDER ☐ BEDROCK ☐ UNKNOWN

Structure Substrate Coverage [X] NONE ☐ 25% ☐ 50% ☐ 75% ☐ 100% ☐ UNKNOWN

Physical Barriers (Pick all that apply) ☐ NONE ☐ DEBRIS/SEDIMENT/ROCK ☐ DEFORMATION ☐ FREE FALL [X] PONDING ☐ DRY ☐ OTHER

Severity (Choose carefully based on barrier type(s) above) ☐ NONE [X] MINOR ☐ MODERATE ☐ SEVERE

Water Depth Matches Stream ☐ YES [X] TOO-SHALLOWER ☐ NO-DEEPER ☐ UNKNOWN ☐ DRY

Water Velocity Matches Stream ☐ YES [X] TOO-FASTER ☐ NO-SLOWER ☐ UNKNOWN ☐ DRY

Dry Passage through Structure? ☐ YES [X] NO ☐ UNKNOWN | Height above Dry Passage

Comments

5/26/16

Culvert Assessment Form

CROSSING DATA

For multiple culvert crossings use one sheet per culvert. Go from left to right, standing at inlet looking downstream.

Crossing Code: 28-024-02 _____ **Date Observed (00/00/0000):** 10/15/21 **Lead Observer:** _____

Number of Culverts: ____ **Culvert** ____ **of** ____ **Stream:** _____ **Road:** CENTRAL ST

Location: (St.#, Pole#, Etc.) _____ **Town:** _____ **County:** _____ **State:** _____

GPS Coordinates: __ __ . __ __ __ __ __ °N Latitude __ __ . __ __ __ __ __ °W Longitude **Time:** _____ **Weather:** _____

Crossing Type: ☐Bridge ☐Culvert ☐Multiple Culvert ☐Ford ☐No Crossing ☐Removed Crossing ☐Buried Stream ☐Inaccessible ☐Partially Inaccessible ☐No Upstream Channel

Culvert Material: ☐Metal ☐Concrete ☐Plastic ☐Wood ☐Rock/Stone ☐Fiberglass ☐Combination **Length of Culvert:** _____

INLET

Appurtenance: ☐Headwall ☐Wingwalls ☐Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Inlet Shape: ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 **Inlet Dimensions: A. Width:**____**B. Height:**____**C. Substrate/Water Width:**____**D. Water Depth:**____**E. Abutment Height:**____

Inlet Grade: ☐At Stream Grade ☐Inlet Drop ☐Perched ☐Clogged/Collapsed/Submerged ☐Unknown

OUTLET

Appurtenance: ☐Headwall ☐Wingwalls ☐Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Outlet Shape: ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 **Outlet Dimensions: A. Width:**____**B. Height:**____**C. Substrate/Water Width:**____**D. Water Depth:**____**E. Abutment Height:**____

Outlet Grade: ☐At Stream Grade ☐Free Fall ☐Cascade ☐Free Fall Onto Cascade ☐Clogged/Collapsed/Submerged ☐Unknown

	INLET *Please check only one level for each item*					OUTLET *Please check only one level for each item*				
	Adequate	Poor	Critical	Unknown	N/A	Adequate	Poor	Critical	Unknown	N/A
Structural (Longitudinal) Alignment	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Channel Alignment	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Level of Blockage	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Flared End Section	☐	☐	☐	☐	X	☐	☐	☐	☐	X
Invert Deterioration	☐	X	☐	☐	☐	☐	X	☐	☐	☐
Buoyancy or Crushing	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Cross-Section Deformation	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Structural Integrity of Barrel	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Joints and Seams	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Footings	☐	☐	☐	☐	X	☐	☐	☐	☐	X
Headwall/Wingwalls	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Armoring	☐	☐	☐	☐	X	☐	☐	☐	☐	X
Apron	☐	☐	☐	☐	X	☐	☐	☐	☐	X
Embankment Piping	☐	X	☐	☐	☐	☐	X	☐	☐	☐

To provide additional feedback on performance problems use the optional second sheet

Performance Problems Requiring Action

Debris/Veg Blockage >1/3 of rise	☐	Local Outlet Scour	☐	Embankment Slope Instability	☐
Sediment Blockage >1/2 the opening	☐	Previous and/or Frequent Overtopping	☐	No Access/Ends Totally Buried/Submerged	☐
Buoyancy or Crushing-Related Inlet Failure	☐	Embankment Piping	☐	Aggressive Abrasion/Corrosion/Chemical	☐
Poor Channel Alignment	☐	Channel Degradation/Headcut	☐	Exposed Footing (Open-Bottom Culvert Only)	☐

Notes: _____

Photo #:____ **Description:** _____ **Photo #:**____ **Description:** _____

Photo #:____ **Description:** _____ **Photo #:**____ **Description:** _____

Photo #:____ **Description:** _____ **Photo #:**____ **Description:** _____

Photo #:____ **Description:** _____ **Photo #:**____ **Description:** _____

2019

AQUATIC CONNECTIVITY

Stream Crossing Survey

DATA FORM

DATABASE ENTRY BY | ENTRY DATE

DATA ENTRY REVIEWED BY | REVIEW DATE

CROSSING DATA

Crossing Code 4238133571633700 Local ID (Optional) 28-024-01

Date Ob: 10/15/21 Lead Observer EH

Town/County BERLIN

Ro CENTRAL ST Type ☐ MULTILANE ☐ PAVED ☐ UNPAVED ☐ DRIVEWAY ☐ TRAIL ☐ RAILROAD

GPS Coordinates (Decimal 42.381335 N Latitude — -71.633700

Location Description RIGHT NEXT TO OAK ST AND 44 CENTRAL ST

Crossing Type ☐ BRIDGE ☒ CULVERT ☐ MULTIPLE CULVERT ☐ FORD ☐ NO CROSSING ☐ REMOVED CROSSING ☐ BURIED STREAM ☐ INACCESSIBLE ☐ PARTIALLY INACCESSIBLE ☐ NO UPSTREAM CHANNEL ☐ BRIDGE ADEQUATE

Number of Culverts/ Bridge Cells 1

Photo IDs INLET OUTLET UPSTREAM DOWNSTREAM OTHER

Flow Condition ☐ NO FLOW ☒ TYPICAL-LOW ☐ MODERATE ☐ HIGH

Crossing Condition ☒ OK ☐ POOR ☐ NEW ☐ UNKNOWN

Tidal Site ☐ YES ☒ NO ☐ UNKNOWN

Alignment ☒ LOW-ALIGNED ☐ SKEWED (>45°)

Road Fill Height (Top of culvert to road surface; bridge = 0)

Bankfull Width (Optional) Confidence ☐ HIGH ☐ LOW/ESTIMATED

Constriction ☐ SEVERE ☐ MODERATE ☒ SPANS ONLY BANKFULL/ ACTIVE CHANNEL ☐ SPANS FULL CHANNEL & BANKS

Tailwater Scour Pool ☐ NONE ☒ SMALL ☐ LARGE

Crossing Comments

STRUCTURE 1

Structure Material ☐ METAL ☒ CONCRETE ☐ PLASTIC ☐ WOOD ☐ ROCK/STONE ☐ FIBERGLASS ☐ COMBINATION

OUTLET

Outlet Shape ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Outlet Armoring ☒ NONE ☐ NOT EXTENSIVE ☐ EXTENSIVE

Outlet Grade (Pick one) ☒ STREAM GRADE ☐ FREE FALL ☐ CASCADE ☐ FREE FALL ONTO CASCADE ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Outlet Dimensions A. Width 1.5 B. Height 1.5 C. Substrate/Water Width 0.42 D. Water Depth 0.042

Outlet Drop to Water Surface 0 Outlet Drop to Stream Bottom 0 E. Abutment Height (Type 7 bridges only)

L. Structure Length (Overall length from inlet to outlet) 60

INLET

Inlet Shape ☒ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Inlet Type ☐ PROJECTING ☒ HEADWALL ☐ WINGWALLS ☐ HEADWALL & WINGWALLS ☐ MITERED TO SLOPE ☐ OTHER ☐ NONE

Inlet Grade (Pick one) ☒ STREAM GRADE ☐ INLET DROP ☐ PERCHED ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Inlet Dimensions A. Width 1.5 B. Height 1.5 C. Substrate/Water Width 0.25 D. Water Depth 0.021

ADDITIONAL CONDITIONS

Slope % (Optional) Slope Confidence ☐ HIGH ☐ LOW

Internal Structures ☒ NONE ☐ BAFFLES/WEIRS ☐ SUPPORTS ☐ OTHER

Structure Substrate Matches Stream ☒ NONE ☐ COMPARABLE ☐ CONTRASTING ☐ NOT APPROPRIATE ☐ UNKNOWN

Structure Substrate Type (Pick one) ☒ NONE ☐ SILT ☐ SAND ☐ GRAVEL ☐ COBBLE ☐ BOULDER ☐ BEDROCK ☐ UNKNOWN

Structure Substrate Coverage ☒ NONE ☐ 25% ☐ 50% ☐ 75% ☐ 100% ☐ UNKNOWN

Physical Barriers (Pick all that apply) ☒ NONE ☐ DEBRIS/SEDIMENT/ROCK ☐ DEFORMATION ☐ FREE FALL ☐ FENCING ☐ DRY ☐ OTHER

Severity (Choose carefully based on barrier type(s) above) ☒ NONE ☐ MINOR ☐ MODERATE ☐ SEVERE

Water Depth Matches Stream ☐ YES ☒ NO-SHALLOWER ☐ NO-DEEPER ☐ UNKNOWN ☐ DRY

Water Velocity Matches Stream ☒ YES ☐ NO-FASTER ☐ NO-SLOWER ☐ UNKNOWN ☐ DRY

Dry Passage through Structure? ☐ YES ☒ NO ☐ UNKNOWN Height above Dry Passage

Comments

5/26/16

Culvert Assessment Form

CROSSING DATA

For multiple culvert crossings use one sheet per culvert. Go from left to right, standing at inlet looking downstream.

Crossing Code:_____ **Local ID:** (optional) 28-024-01 _____ **Date Observed:** (00/00/0000) 10-15-21 **Observer:**_____

Number of Culverts: ____ **Culvert** ____ **of** ____ **Stream:**_____ **Road:** CENTRAL ST

Location: (St.#, Pole#, Etc.)_____ **Town:**_____ **County:**_____ **State:**_____

GPS Coordinates: __ __ . __ __ __ __ °N Latitude __ __ . __ __ __ __ °W Longitude **Time:**_____ **Weather:**_____

Crossing Type: ☐Bridge ☐Culvert ☐Multiple Culvert ☐Ford ☐No Crossing ☐Removed Crossing ☐Buried Stream ☐Inaccessible ☐Partially Inaccessible ☐No Upstream Channel

Culvert Material: ☐Metal ☐Concrete ☐Plastic ☐Wood ☐Rock/Stone ☐Fiberglass ☐Combination **Length of Culvert:** _____

INLET

Appurtenance: ☐Headwall ☐Wingwalls ☐Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Inlet Shape: ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 **Inlet Dimensions: A. Width:**____ **B. Height:**____ **C. Substrate/Water Width:**____ **D. Water Depth:**____ **E. Abutment Height:**____

Inlet Grade: ☐At Stream Grade ☐Inlet Drop ☐Perched ☐Clogged/Collapsed/Submerged ☐Unknown

OUTLET

Appurtenance: ☐Headwall ☐Wingwalls ☐Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Outlet Shape: ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 **Outlet Dimensions: A. Width:**____ **B. Height:**____ **C. Substrate/Water Width:**____ **D. Water Depth:**____ **E. Abutment Height:**____

Outlet Grade: ☐At Stream Grade ☐Free Fall ☐Cascade ☐Free Fall Onto Cascade ☐Clogged/Collapsed/Submerged ☐Unknown

	INLET *Please check only one level for each item*					OUTLET *Please check only one level for each item*				
	Adequate	Poor	Critical	Unknown	N/A	Adequate	Poor	Critical	Unknown	N/A
Structural (Longitudinal) Alignment	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Channel Alignment	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Level of Blockage	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Flared End Section	☐	☐	☐	☐	X	☐	☐	☐	☐	X
Invert Deterioration	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Buoyancy or Crushing	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Cross-Section Deformation	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Structural Integrity of Barrel	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Joints and Seams	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Footings	☐	☐	☐	☐	X	☐	☐	☐	☐	X
Headwall/Wingwalls	X	☐	☐	☐	☐	X	☐	☐	☐	☐
Armoring	☐	☐	☐	☐	X	☐	☐	☐	☐	X
Apron	☐	☐	☐	☐	X	☐	☐	☐	☐	X
Embankment Piping	X	☐	☐	☐	☐	X	☐	☐	☐	☐

To provide additional feedback on performance problems use the optional second sheet

Performance Problems Requiring Action

Debris/Veg Blockage >1/3 of rise	☐	Local Outlet Scour	☐	Embankment Slope Instability	☐
Sediment Blockage >1/2 the opening	☐	Previous and/or Frequent Overtopping	☐	No Access/Ends Totally Buried/Submerged	☐
Buoyancy or Crushing-Related Inlet Failure	☐	Embankment Piping	☐	Aggressive Abrasion/Corrosion/Chemical	☐
Poor Channel Alignment	☐	Channel Degradation/Headcut	☐	Exposed Footing (Open-Bottom Culvert Only)	☐

Notes:_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

AQUATIC CONNECTIVITY

Stream Crossing Survey

DATA FORM

DATABASE ENTRY BY _____ ENTRY DATE _____

DATA ENTRY REVIEWED BY _____ REVIEW DATE _____

CROSSING DATA

Crossing Code xy4239107771613466 Local ID (Optional) 28-026-01

Date Observed (00/00/0000) 8/31/21 Lead Observer EH

Town/County Berlin Stream _____

Road Central Street Type ☐ MULTILANE ☒ PAVED ☐ UNPAVED ☐ DRIVEWAY ☐ TRAIL ☐ RAILROAD

GPS Coordinates (Decimal degrees) 42.391077 °N Latitude — 71.613466 °W Longitude

Location Description Directly across the road in front of indulge pet

Crossing Type ☐ BRIDGE ☐ CULVERT ☐ MULTIPLE CULVERT ☐ FORD ☐ NO CROSSING ☐ REMOVED CROSSING ☐ BURIED STREAM ☐ INACCESSIBLE ☒ PARTIALLY INACCESSIBLE ☐ NO UPSTREAM CHANNEL ☐ BRIDGE ADEQUATE

Number of Culverts/ Bridge Cells 1

Photo IDs INLET _____ OUTLET _____ UPSTREAM _____ DOWNSTREAM _____ OTHER _____

Flow Condition ☐ NO FLOW ☒ TYPICAL-LOW ☐ MODERATE ☐ HIGH

Crossing Condition ☐ OK ☒ POOR ☐ NEW ☐ UNKNOWN

Tidal Site ☐ YES ☒ NO ☐ UNKNOWN

Alignment ☒ FLOW-ALIGNED ☐ SKEWED (>45°)

Road Fill Height (Top of culvert to road surface; bridge = 0) 3.5 ft

Bankfull Width (Optional) _____ Confidence ☐ HIGH ☐ LOW/ESTIMATED

Tailwater Scour Pool ☐ NONE ☐ SMALL ☐ LARGE

Constriction ☐ SEVERE ☒ MODERATE ☐ SPANS ONLY BANKFULL/ ACTIVE CHANNEL ☐ SPANS FULL CHANNEL & BANKS

Crossing Comments LARGE SCOUR POOL ON INLET SIDE. CANNOT FIND OUTLET SIDE, GOES UNDER PARKING LOT.

STRUCTURE 1

Structure Material ☐ METAL ☐ CONCRETE ☐ PLASTIC ☐ WOOD ☒ ROCK/STONE ☐ FIBERGLASS ☐ COMBINATION

OUTLET

Outlet Shape ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☒ UNKNOWN ☐ REMOVED

Outlet Armoring ☐ NONE ☐ NOT EXTENSIVE ☐ EXTENSIVE

Outlet Grade (Pick one) ☐ AT STREAM GRADE ☐ FREE FALL ☐ CASCADE ☐ FREE FALL ONTO CASCADE ☐ CLOGGED/COLLAPSED/SUBMERGED ☒ UNKNOWN

Outlet Dimensions A. Width _____ B. Height _____ C. Substrate/Water Width _____ D. Water Depth _____

Outlet Drop to Water Surface _____ Outlet Drop to Stream Bottom _____ E. Abutment Height (Type 7 bridges only) _____

L. Structure Length (Overall length from inlet to outlet) UNKNOWN

INLET

Inlet Shape ☐ 1 ☐ 2 ☐ 3 ☒ 4 ☐ 5 ☐ 6 ☐ 7 ☐ FORD ☐ UNKNOWN ☐ REMOVED

Inlet Type ☐ PROJECTING ☐ HEADWALL ☐ WINGWALLS ☐ HEADWALL & WINGWALLS ☐ MITERED TO SLOPE ☒ OTHER ☐ NONE

Inlet Grade (Pick one) ☒ AT STREAM GRADE ☐ INLET DROP ☐ PERCHED ☐ CLOGGED/COLLAPSED/SUBMERGED ☐ UNKNOWN

Inlet Dimensions A. Width 3.0 B. Height 2.6 C. Substrate/Water Width 1.3 D. Water Depth 0.167

ADDITIONAL CONDITIONS

Slope % (Optional) _____ Slope Confidence ☐ HIGH ☐ LOW

Internal Structures ☒ NONE ☐ BAFFLES/WEIRS ☐ SUPPORTS ☐ OTHER _____

Structure Substrate Matches Stream ☒ NONE ☐ COMPARABLE ☐ CONTRASTING ☐ NOT APPROPRIATE ☐ UNKNOWN

Structure Substrate Type (Pick one) ☐ NONE ☐ SILT ☐ SAND ☒ GRAVEL ☐ COBBLE ☐ BOULDER ☐ BEDROCK ☐ UNKNOWN

Structure Substrate Coverage ☐ NONE ☒ 25% ☐ 50% ☐ 75% ☐ 100% ☐ UNKNOWN

Physical Barriers (Pick all that apply) ☒ NONE ☐ DEBRIS/SEDIMENT/ROCK ☐ DEFORMATION ☐ FREE FALL ☐ FENCING ☐ DRY ☐ OTHER

Severity (Choose carefully based on barrier type(s) above) ☒ NONE ☐ MINOR ☐ MODERATE ☐ SEVERE

Water Depth Matches Stream ☐ YES ☒ NO-SHALLOWER ☐ NO-DEEPER ☐ UNKNOWN ☐ DRY

Water Velocity Matches Stream ☒ YES ☐ NO-FASTER ☐ NO-SLOWER ☐ UNKNOWN ☐ DRY

Dry Passage through Structure? ☐ YES ☒ NO ☐ UNKNOWN Height above Dry Passage _____

Comments

5/26/16

Culvert Assessment Form

CROSSING DATA

For multiple culvert crossings use one sheet per culvert. Go from left to right, standing at inlet looking downstream.

Crossing Code:_____ **Local ID:** (Optional)_____ **Date Observed:** (00/00/0000) 8 / 3 / 202 Lead **Observer:** EH

Number of Culverts: ____ **Culvert** ____ **of** ____ **Stream:**_____ **Road:** CENTRAL STREET

Location: (St.#, Pole#, Etc.)_____ **Town:** BERLIN **County:** WORCESTER **State:** MA

GPS Coordinates: __ __ . __ __ __ __ __ °N Latitude __ __ . __ __ __ __ __ °W Longitude **Time:**_____ **Weather:**_____

Crossing Type: ☐Bridge ☒Culvert ☐Multiple Culvert ☐Ford ☐No Crossing ☐Removed Crossing ☐Buried Stream ☐Inaccessible ☐Partially Inaccessible ☐No Upstream Channel

Culvert Material: ☐Metal ☐Concrete ☐Plastic ☐Wood ☒Rock/Stone ☐Fiberglass ☐Combination **Length of Culvert:** _____

INLET

Appurtenance: ☐Headwall ☐Wingwalls ☒Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Inlet Shape: ☐1 ☐2 ☐3 ☒4 ☐5 ☐6 ☐7 **Inlet Dimensions: A. Width:**____ **B. Height:**____ **C. Substrate/Water Width:**____ **D. Water Depth:**____ **E. Abutment Height:**____

Inlet Grade: ☒At Stream Grade ☐Inlet Drop ☐Perched ☐Clogged/Collapsed/Submerged ☐Unknown

OUTLET

Appurtenance: ☐Headwall ☐Wingwalls ☐Headwall & Wingwalls ☐Mitered To Slope ☐Projecting ☐Flush ☐Recessed ☐Other ☐None

Outlet Shape: ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 **Outlet Dimensions: A. Width:**____ **B. Height:**____ **C. Substrate/Water Width:**____ **D. Water Depth:**____ **E. Abutment Height:**____

Outlet Grade: ☐At Stream Grade ☐Free Fall ☐Cascade ☐Free Fall Onto Cascade ☐Clogged/Collapsed/Submerged ☐Unknown

	INLET *Please check only one level for each item*					OUTLET *Please check only one level for each item*				
	Adequate	Poor	Critical	Unknown	N/A	Adequate	Poor	Critical	Unknown	N/A
Structural (Longitudinal) Alignment	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Channel Alignment	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐
Level of Blockage	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Flared End Section	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐
Invert Deterioration	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Buoyancy or Crushing	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Cross-Section Deformation	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Structural Integrity of Barrel	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐
Joints and Seams	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐
Footings	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Headwall/Wingwalls	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Armoring	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Apron	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐
Embankment Piping	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐

To provide additional feedback on performance problems use the optional second sheet

Performance Problems Requiring Action

Debris/Veg Blockage >1/3 of rise	☐	Local Outlet Scour	☐	Embankment Slope Instability	☐
Sediment Blockage >1/2 the opening	☐	Previous and/or Frequent Overtopping	☐	No Access/Ends Totally Buried/Submerged	☐
Buoyancy or Crushing-Related Inlet Failure	☐	Embankment Piping	☐	Aggressive Abrasion/Corrosion/Chemical	☐
Poor Channel Alignment	☐	Channel Degradation/Headcut	☐	Exposed Footing (Open-Bottom Culvert Only)	☐

Notes:_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Photo #:____ **Description:**_____ **Photo #:**____ **Description:**_____

Appendix B: Route 62 Traffic Volume Counts

Appendix B includes the results from the four (4) traffic counts completed on Route 62 in the town of Berlin. The data shows the 60-minute volumes for each direction at each traffic count location.

Town : Berlin
Street : Route 62
Location : At Clinton TL

Site: 2022265

Weekly Volume

Interval Start	Mon 6/6/2022		Tue 6/7/2022		Wed 6/8/2022		Thu 6/9/2022		Fri 6/10/2022		Sat 6/11/2022		Sun 6/12/2022		Mon - Fri Average		Weekly Average	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	-	-	3	7	6	8	5	14	2	9	-	-	-	-	4.0	9.5	4.0	9.5
1:00 AM	-	-	1	4	3	3	3	8	7	6	-	-	-	-	3.5	5.3	3.5	5.3
2:00 AM	-	-	2	2	4	2	4	2	3	4	-	-	-	-	3.3	2.5	3.3	2.5
3:00 AM	-	-	5	0	2	2	2	0	1	0	-	-	-	-	2.5	0.5	2.5	0.5
4:00 AM	-	-	15	4	14	2	15	6	16	5	-	-	-	-	15.0	4.3	15.0	4.3
5:00 AM	-	-	85	18	73	17	70	17	79	24	-	-	-	-	76.8	19.0	76.8	19.0
6:00 AM	-	-	191	47	175	57	158	51	173	60	-	-	-	-	174.3	53.8	174.3	53.8
7:00 AM	-	-	346	141	392	121	307	103	253	121	-	-	-	-	324.5	121.5	324.5	121.5
8:00 AM	-	-	194	111	390	103	205	84	204	100	-	-	-	-	248.3	99.5	248.3	99.5
9:00 AM	-	-	97	72	204	83	121	68	-	-	-	-	-	-	140.7	74.3	140.7	74.3
10:00 AM	-	-	81	80	182	77	95	84	-	-	-	-	-	-	119.3	80.3	119.3	80.3
11:00 AM	-	-	116	83	206	101	115	79	-	-	-	-	-	-	145.7	87.7	145.7	87.7
12:00 PM	133	91	129	89	203	105	132	90	-	-	-	-	-	-	149.3	93.8	149.3	93.8
1:00 PM	102	113	121	117	196	121	118	122	-	-	-	-	-	-	134.3	118.3	134.3	118.3
2:00 PM	141	142	125	147	237	180	133	122	-	-	-	-	-	-	159.0	147.8	159.0	147.8
3:00 PM	134	213	146	220	142	256	147	200	-	-	-	-	-	-	142.3	222.3	142.3	222.3
4:00 PM	163	257	149	256	147	242	147	243	-	-	-	-	-	-	151.5	249.5	151.5	249.5
5:00 PM	165	254	148	269	170	263	145	258	-	-	-	-	-	-	157.0	261.0	157.0	261.0
6:00 PM	84	164	104	190	137	162	135	151	-	-	-	-	-	-	115.0	166.8	115.0	166.8
7:00 PM	90	118	83	120	89	119	93	119	-	-	-	-	-	-	88.8	119.0	88.8	119.0
8:00 PM	64	81	61	90	55	96	86	112	-	-	-	-	-	-	66.5	94.8	66.5	94.8
9:00 PM	31	48	29	49	34	59	29	53	-	-	-	-	-	-	30.8	52.3	30.8	52.3
10:00 PM	12	37	15	27	13	31	25	40	-	-	-	-	-	-	16.3	33.8	16.3	33.8
11:00 PM	9	13	1	8	6	23	8	22	-	-	-	-	-	-	6.0	16.5	6.0	16.5
Totals	1128	1531	2247	2151	3080	2233	2298	2048	738	329	0	0	0	0	2474.2	2133.6	2474.2	2133.6
Combined	2659		4398		5313		4346		1067		0		0		4607.8		4607.8	
Split (%)	42.4	57.6	51.1	48.9	58.0	42.0	52.9	47.1	69.2	30.8	-	-	-	-	53.7	46.3	53.7	46.3
Peak Hours																		
12:00 AM - 12:00 PM	-	-	7:00 AM	7:00 AM	7:00 AM	7:00 AM	7:00 AM	7:00 AM	7:00 AM	7:00 AM	-	-	-	-	7:00 AM	7:00 AM	7:00 AM	7:00 AM
Volume	-	-	346	141	392	121	307	103	253	121	-	-	-	-	324.5	121.5	324.5	121.5
12:00 PM - 12:00 AM	5:00 PM	4:00 PM	4:00 PM	5:00 PM	2:00 PM	5:00 PM	3:00 PM	5:00 PM	-	-	-	-	-	-	2:00 PM	5:00 PM	2:00 PM	5:00 PM
Volume	165	257	149	269	237	263	147	258	-	-	-	-	-	-	159.0	261.0	159.0	261.0

Town : Berlin
Street : Route 62
Location : East of Derby Road

Site: 2022266

Weekly Volume

Interval Start	Mon 6/6/2022		Tue 6/7/2022		Wed 6/8/2022		Thu 6/9/2022		Fri 6/10/2022		Sat 6/11/2022		Sun 6/12/2022		Mon - Fri Average		Weekly Average	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	-	-	10	32	14	38	15	46	9	38	-	-	-	-	12.0	38.5	12.0	38.5
1:00 AM	-	-	5	19	3	15	6	32	6	20	-	-	-	-	5.0	21.5	5.0	21.5
2:00 AM	-	-	7	5	8	10	10	11	9	12	-	-	-	-	8.5	9.5	8.5	9.5
3:00 AM	-	-	29	3	17	1	19	4	17	4	-	-	-	-	20.5	3.0	20.5	3.0
4:00 AM	-	-	97	14	88	4	74	14	80	15	-	-	-	-	84.8	11.8	84.8	11.8
5:00 AM	-	-	299	43	249	28	230	34	259	44	-	-	-	-	259.3	37.3	259.3	37.3
6:00 AM	-	-	554	120	520	134	482	116	488	119	-	-	-	-	511.0	122.3	511.0	122.3
7:00 AM	-	-	757	167	720	158	693	149	652	172	-	-	-	-	705.5	161.5	705.5	161.5
8:00 AM	-	-	497	202	568	184	507	163	504	198	-	-	-	-	519.0	186.8	519.0	186.8
9:00 AM	-	-	314	175	311	200	322	174	312	227	-	-	-	-	314.8	194.0	314.8	194.0
10:00 AM	-	-	238	184	256	195	269	178	-	-	-	-	-	-	254.3	185.7	254.3	185.7
11:00 AM	288	199	251	232	279	225	301	232	-	-	-	-	-	-	279.8	222.0	279.8	222.0
12:00 PM	307	246	269	247	301	240	285	234	-	-	-	-	-	-	290.5	241.8	290.5	241.8
1:00 PM	268	312	285	296	274	308	276	270	-	-	-	-	-	-	275.8	296.5	275.8	296.5
2:00 PM	264	358	280	360	316	358	296	355	-	-	-	-	-	-	289.0	357.8	289.0	357.8
3:00 PM	323	501	312	522	302	557	303	502	-	-	-	-	-	-	310.0	520.5	310.0	520.5
4:00 PM	297	618	261	616	292	602	292	543	-	-	-	-	-	-	285.5	594.8	285.5	594.8
5:00 PM	316	502	290	604	253	668	330	527	-	-	-	-	-	-	297.3	575.3	297.3	575.3
6:00 PM	220	426	246	437	281	421	231	421	-	-	-	-	-	-	244.5	426.3	244.5	426.3
7:00 PM	179	352	177	374	194	358	168	361	-	-	-	-	-	-	179.5	361.3	179.5	361.3
8:00 PM	137	264	129	275	137	293	146	301	-	-	-	-	-	-	137.3	283.3	137.3	283.3
9:00 PM	72	190	71	210	88	211	79	196	-	-	-	-	-	-	77.5	201.8	77.5	201.8
10:00 PM	35	129	44	114	39	129	48	127	-	-	-	-	-	-	41.5	124.8	41.5	124.8
11:00 PM	20	73	19	76	23	75	26	84	-	-	-	-	-	-	22.0	77.0	22.0	77.0
Totals	2726	4170	5441	5327	5533	5412	5408	5074	2336	849	0	0	0	0	5424.6	5254.4	5424.6	5254.4
Combined	6896		10768		10945		10482		3185		0		0		10679.0		10679.0	
Split (%)	39.5	60.5	50.5	49.5	50.6	49.4	51.6	48.4	73.3	26.7	-	-	-	-	50.8	49.2	50.8	49.2

Peak Hours

12:00 AM - 12:00 PM	11:00 AM	11:00 AM	7:00 AM	11:00 AM	7:00 AM	11:00 AM	7:00 AM	11:00 AM	7:00 AM	9:00 AM	-	-	-	-	7:00 AM	11:00 AM	7:00 AM	11:00 AM
Volume	288	199	757	232	720	225	693	232	652	227	-	-	-	-	705.5	222.0	705.5	222.0
12:00 PM - 12:00 AM	3:00 PM	4:00 PM	3:00 PM	4:00 PM	2:00 PM	5:00 PM	5:00 PM	4:00 PM	-	-	-	-	-	-	3:00 PM	4:00 PM	3:00 PM	4:00 PM
Volume	323	618	312	616	316	668	330	543	-	-	-	-	-	-	310.0	594.8	310.0	594.8

Town : Berlin
Street : Route 62
Location : East of Pleasant

Site: 2022267

Weekly Volume

Interval Start	Mon 6/6/2022		Tue 6/7/2022		Wed 6/8/2022		Thu 6/9/2022		Fri 6/10/2022		Sat 6/11/2022		Sun 6/12/2022		Mon - Fri Average		Weekly Average	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	-	-	8	22	15	28	19	37	11	33	-	-	-	-	13.3	30.0	13.3	30.0
1:00 AM	-	-	5	13	5	14	6	23	7	13	-	-	-	-	5.8	15.8	5.8	15.8
2:00 AM	-	-	8	3	9	9	11	10	9	8	-	-	-	-	9.3	7.5	9.3	7.5
3:00 AM	-	-	25	5	16	1	20	4	16	5	-	-	-	-	19.3	3.8	19.3	3.8
4:00 AM	-	-	86	17	80	7	69	13	70	14	-	-	-	-	76.3	12.8	76.3	12.8
5:00 AM	-	-	284	40	233	36	206	34	232	44	-	-	-	-	238.8	38.5	238.8	38.5
6:00 AM	-	-	546	135	507	144	459	121	467	131	-	-	-	-	494.8	132.8	494.8	132.8
7:00 AM	-	-	735	148	685	170	646	166	596	211	-	-	-	-	665.5	173.8	665.5	173.8
8:00 AM	-	-	442	227	504	246	523	199	518	192	-	-	-	-	496.8	216.0	496.8	216.0
9:00 AM	-	-	341	192	346	200	343	185	377	245	-	-	-	-	351.8	205.5	351.8	205.5
10:00 AM	-	-	290	230	269	206	302	198	-	-	-	-	-	-	287.0	211.3	287.0	211.3
11:00 AM	308	232	282	254	325	266	305	257	-	-	-	-	-	-	305.0	252.3	305.0	252.3
12:00 PM	329	270	275	272	309	280	330	258	-	-	-	-	-	-	310.8	270.0	310.8	270.0
1:00 PM	305	295	319	275	311	329	322	262	-	-	-	-	-	-	314.3	290.3	314.3	290.3
2:00 PM	303	345	317	334	326	375	341	339	-	-	-	-	-	-	321.8	348.3	321.8	348.3
3:00 PM	302	481	358	433	410	441	334	426	-	-	-	-	-	-	351.0	445.3	351.0	445.3
4:00 PM	314	564	281	541	311	559	333	475	-	-	-	-	-	-	309.8	534.8	309.8	534.8
5:00 PM	321	555	275	588	319	548	282	601	-	-	-	-	-	-	299.3	573.0	299.3	573.0
6:00 PM	246	392	249	493	268	435	252	402	-	-	-	-	-	-	253.8	430.5	253.8	430.5
7:00 PM	185	323	171	338	234	322	152	368	-	-	-	-	-	-	185.5	337.8	185.5	337.8
8:00 PM	137	249	132	288	145	294	179	283	-	-	-	-	-	-	148.3	278.5	148.3	278.5
9:00 PM	64	200	76	198	93	216	86	210	-	-	-	-	-	-	79.8	206.0	79.8	206.0
10:00 PM	27	121	42	95	45	122	48	129	-	-	-	-	-	-	40.5	116.8	40.5	116.8
11:00 PM	19	62	22	72	25	71	24	87	-	-	-	-	-	-	22.5	73.0	22.5	73.0
Totals	2860	4089	5569	5213	5790	5319	5592	5087	2303	896	0	0	0	0	5600.3	5203.8	5600.3	5203.8
Combined	6949		10782		11109		10679		3199		0		0		10804.1		10804.1	
Split (%)	41.2	58.8	51.7	48.3	52.1	47.9	52.4	47.6	72.0	28.0	-	-	-	-	51.8	48.2	51.8	48.2

Peak Hours

12:00 AM - 12:00 PM	11:00 AM	11:00 AM	7:00 AM	11:00 AM	7:00 AM	11:00 AM	7:00 AM	11:00 AM	7:00 AM	9:00 AM	-	-	-	-	7:00 AM	11:00 AM	7:00 AM	11:00 AM
Volume	308	232	735	254	685	266	646	257	596	245	-	-	-	-	665.5	252.3	665.5	252.3
12:00 PM - 12:00 AM	12:00 PM	4:00 PM	3:00 PM	5:00 PM	3:00 PM	4:00 PM	2:00 PM	5:00 PM	-	-	-	-	-	-	3:00 PM	5:00 PM	3:00 PM	5:00 PM
Volume	329	564	358	588	410	559	341	601	-	-	-	-	-	-	351.0	573.0	351.0	573.0

Town : Berlin
Street : Route 62
Location : West of I-495

Site: 2022021

Weekly Volume

Interval Start	Mon 6/13/2022		Tue 6/14/2022		Wed 6/15/2022		Thu 6/16/2022		Fri 6/17/2022		Sat 6/18/2022		Sun 6/19/2022		Mon - Fri Average		Weekly Average	
	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12:00 AM	-	-	-	-	-	-	16	29	9	54	-	-	-	-	12.5	41.5	12.5	41.5
1:00 AM	-	-	-	-	-	-	4	11	7	10	-	-	-	-	5.5	10.5	5.5	10.5
2:00 AM	-	-	-	-	-	-	8	9	11	12	-	-	-	-	9.5	10.5	9.5	10.5
3:00 AM	-	-	-	-	-	-	19	4	21	6	-	-	-	-	20.0	5.0	20.0	5.0
4:00 AM	-	-	-	-	-	-	72	14	66	16	-	-	-	-	69.0	15.0	69.0	15.0
5:00 AM	-	-	-	-	-	-	257	50	241	47	-	-	-	-	249.0	48.5	249.0	48.5
6:00 AM	-	-	-	-	-	-	477	161	449	142	-	-	-	-	463.0	151.5	463.0	151.5
7:00 AM	-	-	-	-	-	-	642	225	550	238	-	-	-	-	596.0	231.5	596.0	231.5
8:00 AM	-	-	-	-	-	-	554	235	474	239	-	-	-	-	514.0	237.0	514.0	237.0
9:00 AM	-	-	-	-	-	-	373	281	370	255	-	-	-	-	371.5	268.0	371.5	268.0
10:00 AM	-	-	-	-	-	-	308	282	325	321	-	-	-	-	316.5	301.5	316.5	301.5
11:00 AM	-	-	-	-	-	-	338	313	328	386	-	-	-	-	333.0	349.5	333.0	349.5
12:00 PM	-	-	-	-	-	-	293	354	359	490	-	-	-	-	326.0	422.0	326.0	422.0
1:00 PM	-	-	-	-	-	-	292	354	-	-	-	-	-	-	292.0	354.0	292.0	354.0
2:00 PM	-	-	-	-	287	429	269	435	-	-	-	-	-	-	278.0	432.0	278.0	432.0
3:00 PM	-	-	-	-	339	520	312	564	-	-	-	-	-	-	325.5	542.0	325.5	542.0
4:00 PM	-	-	-	-	293	659	312	597	-	-	-	-	-	-	302.5	628.0	302.5	628.0
5:00 PM	-	-	-	-	261	756	295	631	-	-	-	-	-	-	278.0	693.5	278.0	693.5
6:00 PM	-	-	-	-	261	524	257	526	-	-	-	-	-	-	259.0	525.0	259.0	525.0
7:00 PM	-	-	-	-	226	390	253	399	-	-	-	-	-	-	239.5	394.5	239.5	394.5
8:00 PM	-	-	-	-	153	321	167	313	-	-	-	-	-	-	160.0	317.0	160.0	317.0
9:00 PM	-	-	-	-	107	229	89	212	-	-	-	-	-	-	98.0	220.5	98.0	220.5
10:00 PM	-	-	-	-	70	115	42	110	-	-	-	-	-	-	56.0	112.5	56.0	112.5
11:00 PM	-	-	-	-	21	67	30	84	-	-	-	-	-	-	25.5	75.5	25.5	75.5
Totals	0	0	0	0	2018	4010	5679	6193	3210	2216	0	0	0	0	5599.5	6386.5	5599.5	6386.5
Combined	0		0		6028		11872		5426		0		0		11986.0		11986.0	
Split (%)	-	-	-	-	33.5	66.5	47.8	52.2	59.2	40.8	-	-	-	-	46.7	53.3	46.7	53.3

Peak Hours

12:00 AM - 12:00 PM	-	-	-	-	-	-	7:00 AM	11:00 AM	7:00 AM	11:00 AM	-	-	-	-	7:00 AM	11:00 AM	7:00 AM	11:00 AM
Volume	-	-	-	-	-	-	642	313	550	386	-	-	-	-	596.0	349.5	596.0	349.5
12:00 PM - 12:00 AM	-	-	-	-	3:00 PM	5:00 PM	3:00 PM	5:00 PM	12:00 PM	12:00 PM	-	-	-	-	12:00 PM	5:00 PM	12:00 PM	5:00 PM
Volume	-	-	-	-	339	756	312	631	359	490	-	-	-	-	326.0	693.5	326.0	693.5

Appendix C: Route 62 Turning Movement Counts (TMCs) and Level of Service (LOS) Analyses

Appendix C includes the results from the six (6) TMCs completed on Route 62 in the town of Berlin. The results contain the full 4-hour count, the AM and PM peak hour data diagram, and the LOS results calculated by the Highway Capacity Software (HCS).

TURNING MOVEMENT COUNT WORKSHEET

CMRPC

MUNICIPALITY: Town of Berlin

DATE: 6/7/2022

LOCATION: Route 62 / West St / Derby Rd / Barnes Rd

DAY OF WEEK: Tuesday

WEATHER: AM: Clear PM: Clear

TECHNICIAN: Camera

Time Period	Route 62 EB				Route 62 WB				Barnes/Derby Rd NB				West St SB				Total	Peak
	L	S	R	HV	L	S	R	HV	L	S	R	HV	L	S	R	HV		
7:00 - 7:15	1	67	1	3	0	27	19	1	1	4	0	0	91	6	1	3	218	
7:15 - 7:30	0	94	3	8	1	35	22	10	3	0	1	0	123	16	0	5	298	
7:30 - 7:45	0	114	4	5	1	21	23	7	1	5	2	0	126	7	2	3	306	
7:45 - 8:00	1	65	5	2	4	19	47	2	1	4	0	0	110	11	4	1	271	1093
8:00 - 8:15	1	54	2	2	0	28	31	7	1	2	3	1	71	5	0	2	198	1073
8:15 - 8:30	1	53	3	0	0	25	39	6	3	4	2	0	93	7	4	2	234	1009
8:30 - 8:45	2	43	1	5	1	21	30	1	2	0	3	0	76	6	0	2	185	888
8:45 - 9:00	2	42	2	12	2	25	25	5	2	2	0	0	75	8	1	4	186	803
TOTAL	8	532	21	37	9	201	236	39	14	21	11	1	765	66	12	22	1896	
		EBPct	32.0			**WBPct**	21.6			**NBPct**	2.1			**SBPct**	44.3			
Peak Sums:	**2**	**327**	**14**	**17**	**6**	**103**	**123**	**26**	**6**	**11**	**6**	**1**	**430**	**39**	**6**	**11**	**1073**	
Total Trucks	55					**TrkPct**	5.13			**PHF**	0.88							

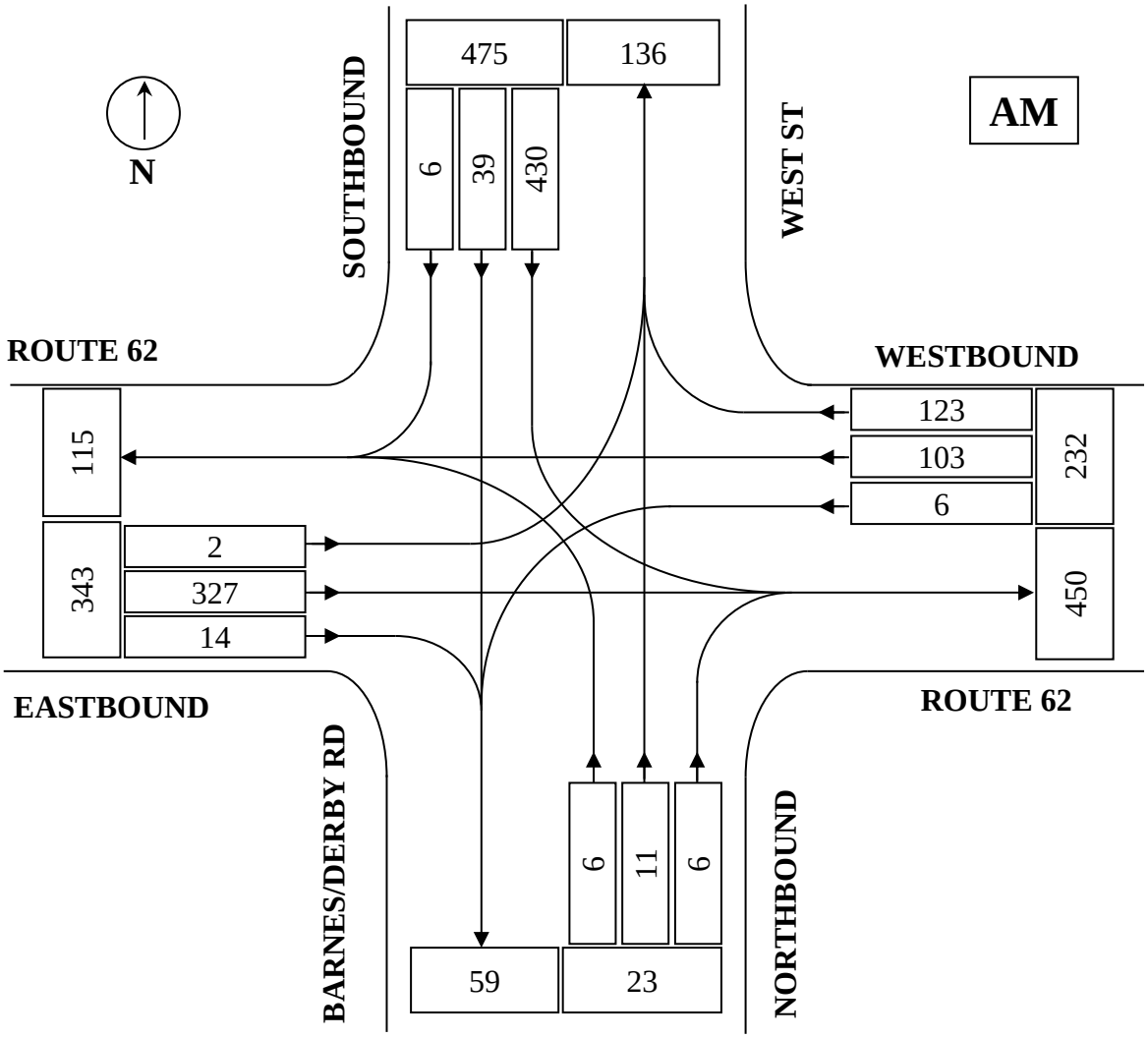
Time Period	Route 62 EB				Route 62 WB				Barnes/Derby Rd NB				West St SB				Total	Peak
	L	S	R	HV	L	S	R	HV	L	S	R	HV	L	S	R	HV		
4:00 - 4:15	0	33	2	1	2	48	113	4	4	6	3	0	50	1	0	1	262	
4:15 - 4:30	0	23	1	2	2	59	121	7	0	10	0	0	46	3	1	1	266	
4:30 - 4:45	1	19	2	0	0	69	121	6	2	7	1	2	49	6	0	2	277	
4:45 - 5:00	0	33	2	2	3	80	112	5	2	12	3	2	46	3	0	3	296	1101
5:00 - 5:15	2	33	0	2	2	64	114	5	3	6	0	0	57	7	0	1	288	1127
5:15 - 5:30	3	40	4	0	4	72	129	4	2	11	0	0	41	3	0	4	309	1170
5:30 - 5:45	1	33	2	1	5	59	122	1	1	10	0	0	53	8	0	0	294	1187
5:45 - 6:00	0	23	1	1	1	62	102	5	2	5	1	1	42	5	1	1	245	1136
TOTAL	7	237	14	9	19	513	934	37	16	67	8	5	384	36	2	13	2237	
		EBPct	12.9			**WBPct**	64.5			**NBPct**	4.2			**SBPct**	18.4			
Peak Sums:	**6**	**139**	**8**	**5**	**14**	**275**	**477**	**15**	**8**	**39**	**3**	**2**	**197**	**21**	**0**	**8**	**1187**	
Total Trucks	30					**TrkPct**	2.53			**PHF**	0.96							

CMRPC

INTERSECTION TURNING MOVEMENT COUNT

CITY: Berlin **DATE:** 6/7/22 **DAY OF WEEK:** Tuesday

INTERSECTION: Route 62 / West St / Derby Rd / Barnes Rd



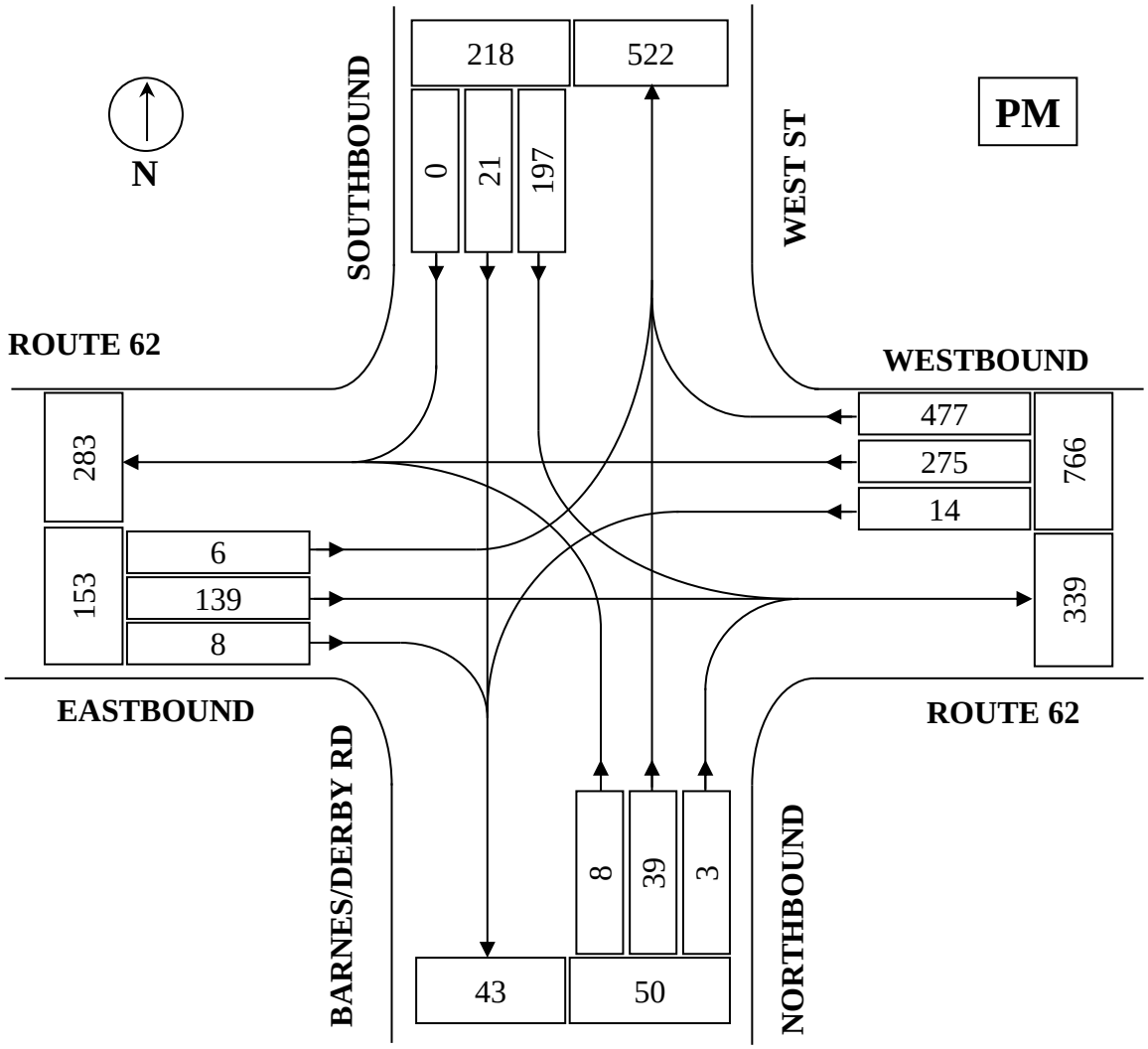
STREET	ENTERING VOLUMES	PERCENT OF FLOW	TIME OF COUNT
Route 62 EB	343	32.0%	7:15 - 8:15 AM
Route 62 WB	232	21.6%	PHF = .88
Barnes/Derby Rd NB	23	2.1%	**VEHICLES COUNTED**
West St SB	475	44.3%	**ALL VEHICLES:** 1073
TOTAL	1073	100.0%	**TRUCKS:** 55
			PERCENT TRUCKS: 5.13%

CMRPC

INTERSECTION TURNING MOVEMENT COUNT

CITY: Berlin **DATE:** 6/7/22 **DAY OF WEEK:** Tuesday

INTERSECTION: Route 62 / West St / Derby Rd / Barnes Rd



STREET	ENTERING VOLUMES	PERCENT OF FLOW	TIME OF COUNT
Route 62 EB	153	12.9%	4:45 - 5:45 PM
Route 62 WB	766	64.5%	PHF = .96
Barnes/Derby Rd NB	50	4.2%	**VEHICLES COUNTED**
West St SB	218	18.4%	**ALL VEHICLES:** 1187
TOTAL	1187	100.0%	**TRUCKS:** 30
			PERCENT TRUCKS: 2.53%

HCS Two-Way Stop-Control Report

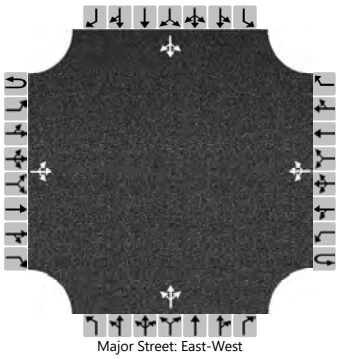
General Information

Analyst	KK
Agency/Co.	CMRPC
Date Performed	6/29/2022
Analysis Year	2022
Time Analyzed	7:15 - 8:15 AM
Intersection Orientation	East-West
Project Description	Route 62 CP

Site Information

Intersection	Route 62/West St/Barnes Rd/Derby Rd
Jurisdiction	Berlin
East/West Street	Route 62
North/South Street	West St/Barnes Rd/Derby Rd
Peak Hour Factor	0.88
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		2	327	14		6	103	123		6	11	6		430	39	6
Percent Heavy Vehicles (%)		5				5				1	1	1		5	5	5
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized																
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.15				4.15				7.11	6.51	6.21		7.15	6.55	6.25
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.25				2.25				3.51	4.01	3.31		3.55	4.05	3.35

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		2				7					26				540	
Capacity, c (veh/h)		1288				1155					437				403	
v/c Ratio		0.00				0.01					0.06				1.34	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.2				25.1	
Control Delay (s/veh)		7.8	0.0	0.0		8.1	0.1	0.1			13.8				195.6	
Level of Service (LOS)		A	A	A		A	A	A			B				F	
Approach Delay (s/veh)	0.1				0.3				13.8				195.6			
Approach LOS	A				A				B				F			

HCS Two-Way Stop-Control Report

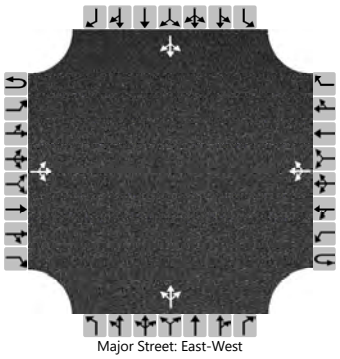
General Information

Analyst	KK
Agency/Co.	CMRPC
Date Performed	6/29/2022
Analysis Year	2022
Time Analyzed	4:45 - 5:45 PM
Intersection Orientation	East-West
Project Description	Route 62 CP

Site Information

Intersection	Route 62/West St/Barnes Rd/Derby Rd
Jurisdiction	Berlin
East/West Street	Route 62
North/South Street	West St/Barnes Rd/Derby Rd
Peak Hour Factor	0.96
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	0
Configuration			LTR				LTR				LTR				LTR	
Volume (veh/h)		6	139	8		14	275	477		8	39	3		197	21	0
Percent Heavy Vehicles (%)		1				3				1	1	1		2	2	2
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.11				4.13				7.11	6.51	6.21		7.12	6.52	6.22
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.21				2.23				3.51	4.01	3.31		3.52	4.02	3.32

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		6				15					52				227	
Capacity, c (veh/h)		839				1419					277				274	
v/c Ratio		0.01				0.01					0.19				0.83	
95% Queue Length, Q_{95} (veh)		0.0				0.0					0.7				6.8	
Control Delay (s/veh)		9.3	0.1	0.1		7.6	0.2	0.2			21.0				59.5	
Level of Service (LOS)		A	A	A		A	A	A			C				F	
Approach Delay (s/veh)	0.4				0.3				21.0				59.5			
Approach LOS	A				A				C				F			

TURNING MOVEMENT COUNT WORKSHEET

CMRPC

MUNICIPALITY: Town of Berlin

DATE: 6/7/2022

LOCATION: Route 62 / Linden Street

DAY OF WEEK: Tuesday

WEATHER: AM: Clear PM: Clear

TECHNICIAN: Camera

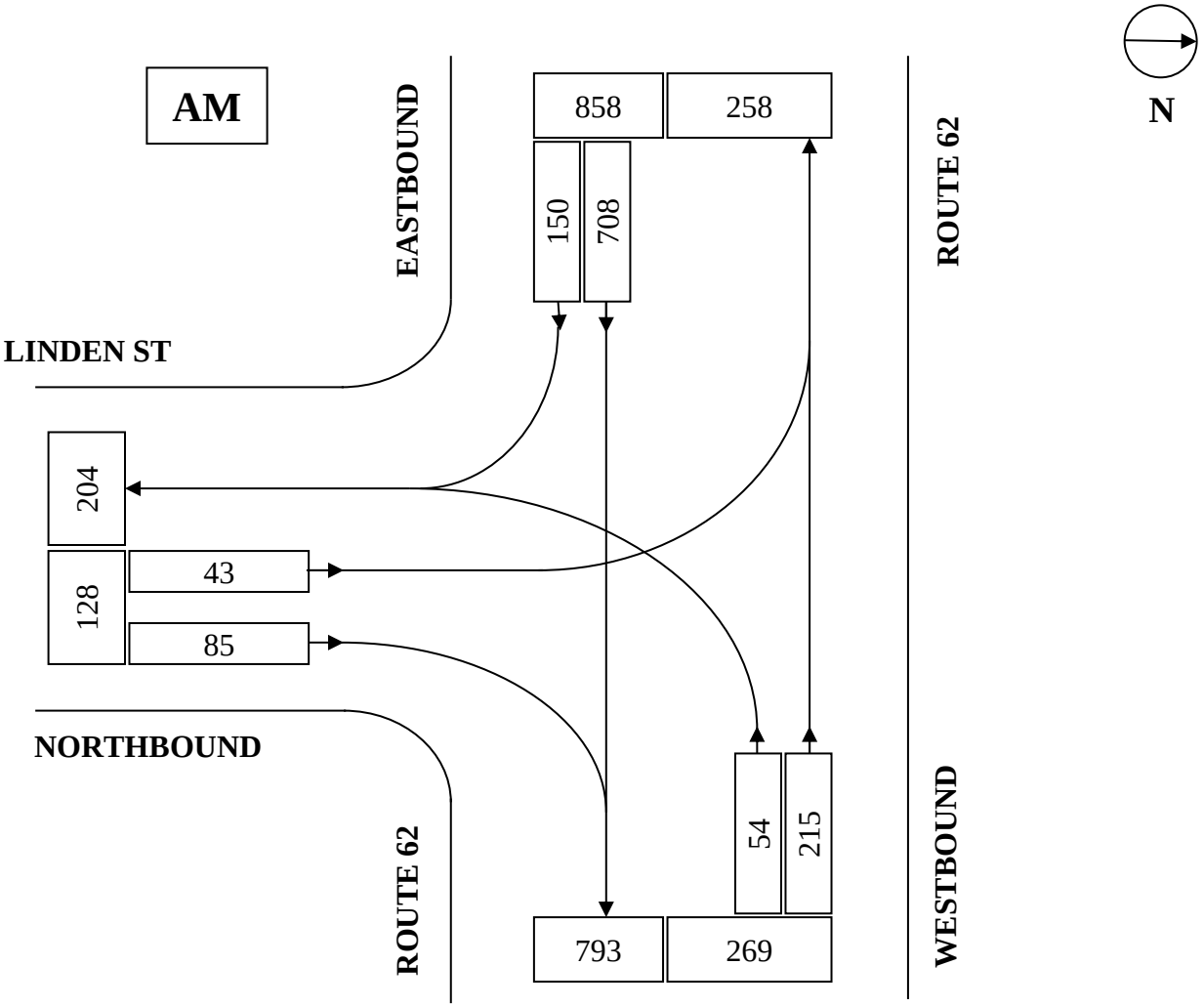
Time Period	Route 62 EB				Route 62 WB				Linden Street NB								Total	Peak
	L	S	R	HV	L	S	R	HV	L	S	R	HV	L	S	R	HV		
7:00 - 7:15	0	154	19	5	2	41	0	2	12	0	11	1					239	
7:15 - 7:30	0	219	22	10	7	58	0	11	12	0	19	3					337	
7:30 - 7:45	0	178	45	5	6	44	0	4	10	0	26	1					309	
7:45 - 8:00	0	176	46	6	21	51	0	1	12	0	16	0					322	1207
8:00 - 8:15	0	135	37	5	20	62	0	7	9	0	24	2					287	1255
8:15 - 8:30	0	136	27	1	18	50	0	5	20	0	27	0					278	1196
8:30 - 8:45	0	109	30	5	16	52	0	4	10	0	19	0					236	1123
8:45 - 9:00	0	115	13	8	10	52	0	11	12	0	14	1					216	1017
TOTAL	0	1222	239	45	100	410	0	45	97	0	156	8	0	0	0	0	2224	
		EBPct	68.4			**WBPct**	21.4			**NBPct**	10.2			**SBPct**	0.0			
Peak Sums:	**0**	**708**	**150**	**26**	**54**	**215**	**0**	**23**	**43**	**0**	**85**	**6**	**0**	**0**	**0**	**0**	**1255**	
Total Trucks	55					**TrkPct**	4.38			**PHF**	0.93							

Time Period	Route 62 EB				Route 62 WB				Linden Street NB								Total	Peak
	L	S	R	HV	L	S	R	HV	L	S	R	HV	L	S	R	HV		
4:00 - 4:15	0	78	12	4	16	165	0	5	20	0	9	3					300	
4:15 - 4:30	0	77	14	2	17	178	0	6	25	0	16	1					327	
4:30 - 4:45	0	66	10	1	22	174	0	3	33	0	14	0					319	
4:45 - 5:00	0	91	5	5	25	185	0	1	29	0	20	0					355	1301
5:00 - 5:15	0	76	18	1	23	171	0	4	28	0	18	0					334	1335
5:15 - 5:30	0	80	8	3	25	182	0	4	29	0	15	0					339	1347
5:30 - 5:45	0	68	14	1	24	175	0	4	22	0	4	0					307	1335
5:45 - 6:00	0	69	12	1	25	147	0	2	24	0	12	0					289	1269
TOTAL	0	605	93	18	177	1377	0	29	210	0	108	4	0	0	0	0	2570	
		EBPct	26.3			**WBPct**	59.9			**NBPct**	13.8			**SBPct**	0.0			
Peak Sums:	**0**	**313**	**41**	**10**	**95**	**712**	**0**	**12**	**119**	**0**	**67**	**0**	**0**	**0**	**0**	**0**	**1347**	
Total Trucks	22					**TrkPct**	1.63			**PHF**	0.95							

CMRPC

INTERSECTION TURNING MOVEMENT COUNT

CITY: Berlin **DATE:** 6/7/22 **DAY OF WEEK:** Tuesday
INTERSECTION: Route 62 / Linden Street

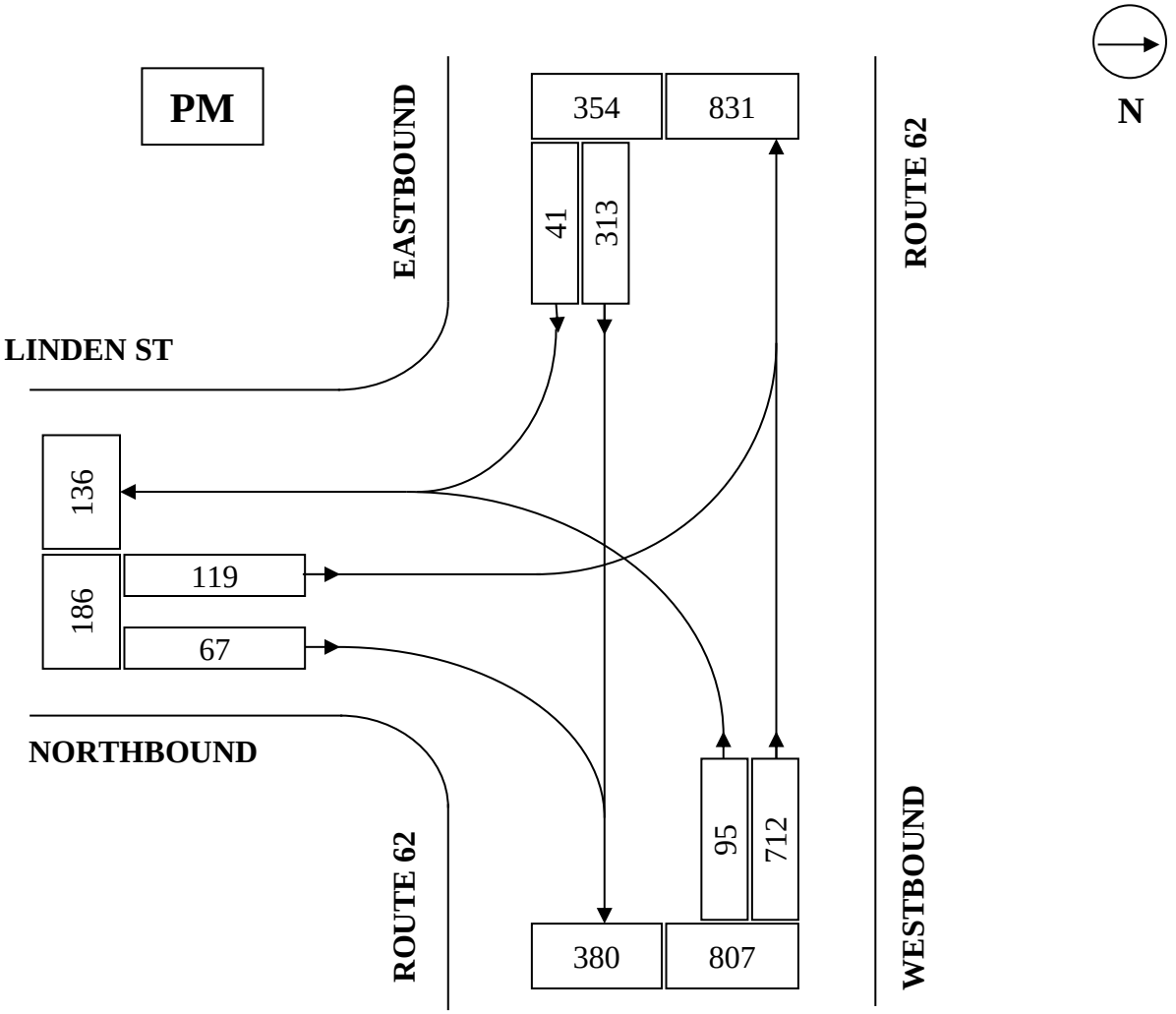


STREET	ENTERING VOLUMES	PERCENT OF FLOW	TIME OF COUNT
			7:15 - 8:15 AM
Route 62 EB	858	68.4%	
			PHF = .93
Route 62 WB	269	21.4%	
			VEHICLES COUNTED
Linden St NB	128	10.2%	
			ALL VEHICLES: 1255
TOTAL	1255	100.0%	**TRUCKS:** 55
			PERCENT TRUCKS: 4.38%

CMRPC

INTERSECTION TURNING MOVEMENT COUNT

CITY: Berlin **DATE:** 6/7/22 **DAY OF WEEK:** Tuesday
INTERSECTION: Route 62 / Linden Street



STREET	ENTERING VOLUMES	PERCENT OF FLOW	TIME OF COUNT
			4:30 - 5:30 PM
Route 62 EB	354	26.3%	
			PHF = .95
Route 62 WB	807	59.9%	
			VEHICLES COUNTED
Linden St NB	186	13.8%	
			ALL VEHICLES: 1347
TOTAL	1347	100.0%	**TRUCKS:** 22
			PERCENT TRUCKS: 1.63%

HCS Two-Way Stop-Control Report

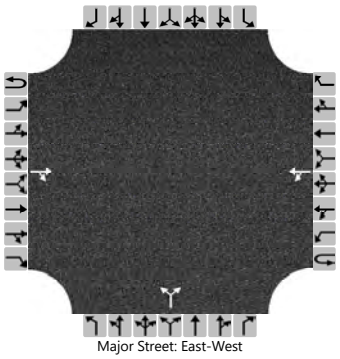
General Information

Analyst	KK
Agency/Co.	CMRPC
Date Performed	6/7/2022
Analysis Year	2022
Time Analyzed	7:15 - 8:15 AM
Intersection Orientation	East-West
Project Description	Route 62 CP

Site Information

Intersection	Route 62 / Linden St
Jurisdiction	Berlin
East/West Street	Route 62
North/South Street	Linden St
Peak Hour Factor	0.93
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			708	150		54	215			43		85				
Percent Heavy Vehicles (%)						4				4		4				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.14				6.44		6.24				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.24				3.54		3.34				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						58					138					
Capacity, c (veh/h)						732					275					
v/c Ratio						0.08					0.50					
95% Queue Length, Q_{95} (veh)						0.3					2.6					
Control Delay (s/veh)						10.3	0.9				30.5					
Level of Service (LOS)						B	A				D					
Approach Delay (s/veh)					2.8				30.5							
Approach LOS					A				D							

HCS Two-Way Stop-Control Report

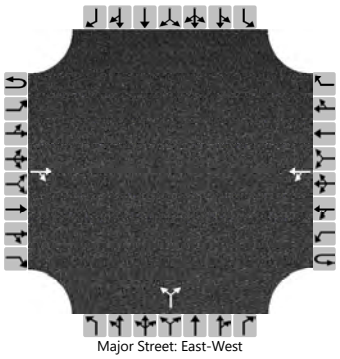
General Information

Analyst	KK
Agency/Co.	CMRPC
Date Performed	6/7/2022
Analysis Year	2022
Time Analyzed	4:30 - 5:30 PM
Intersection Orientation	East-West
Project Description	Route 62 CP

Site Information

Intersection	Route 62 / Linden St
Jurisdiction	Berlin
East/West Street	Route 62
North/South Street	Linden St
Peak Hour Factor	0.95
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	0	0
Configuration				TR		LT					LR					
Volume (veh/h)			313	41		95	712			119		67				
Percent Heavy Vehicles (%)						2				2		2				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized																
Median Type | Storage						Undivided										

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.12				6.42		6.22				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.22				3.52		3.32				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						100					196					
Capacity, c (veh/h)						1184					210					
v/c Ratio						0.08					0.93					
95% Queue Length, Q_{95} (veh)						0.3					7.7					
Control Delay (s/veh)						8.3	1.2				93.6					
Level of Service (LOS)						A	A				F					
Approach Delay (s/veh)					2.0				93.6							
Approach LOS					A				F							

TURNING MOVEMENT COUNT WORKSHEET

CMRPC

MUNICIPALITY: Town of Berlin

DATE: 5/17/2022

LOCATION: Route 62 / Pleasant Street

DAY OF WEEK: Tuesday

WEATHER: AM: Clear PM: Clear

TECHNICIAN: Camera

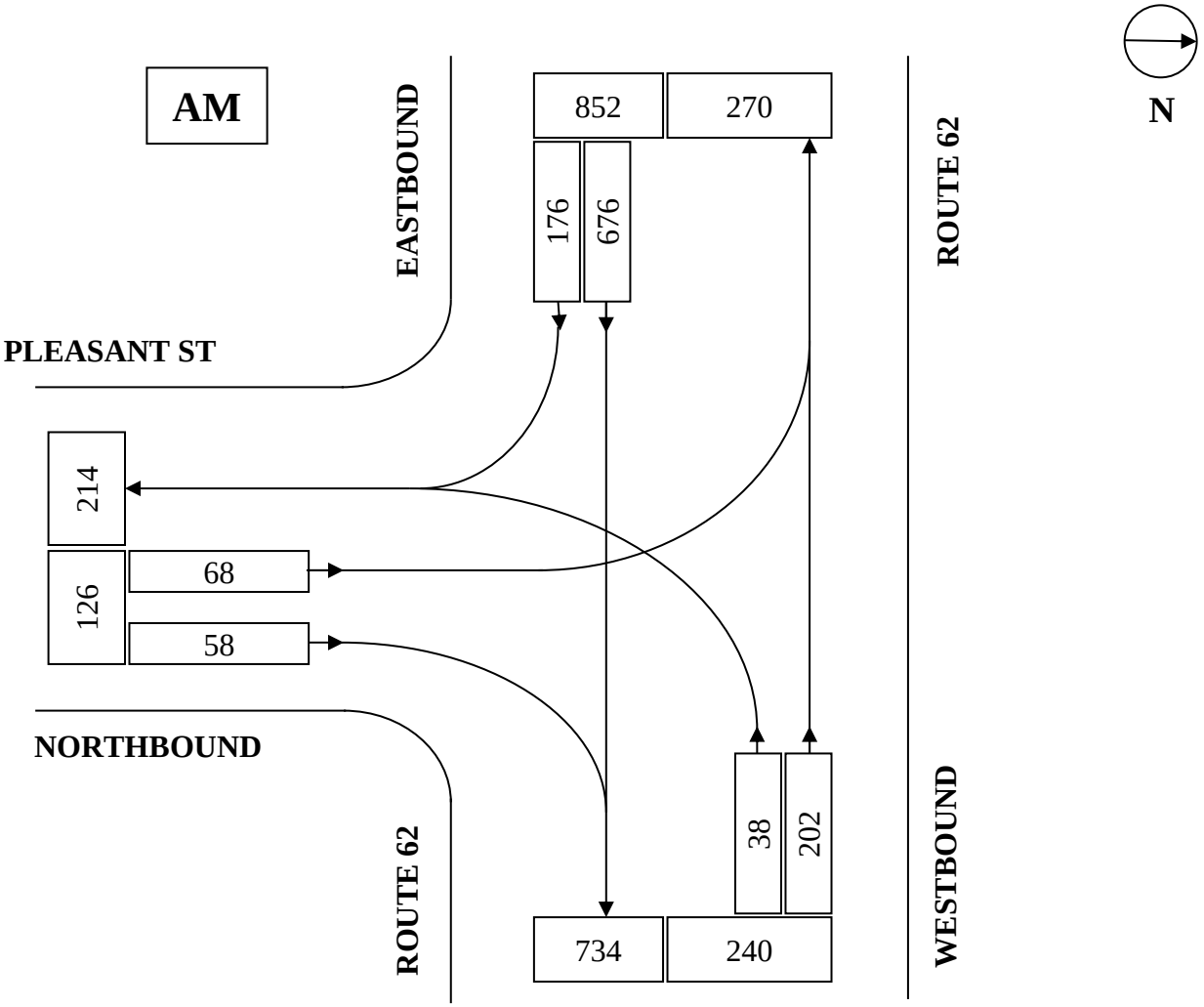
Time Period	Route 62 EB				Route 62 WB				Pleasant Street NB								Total	Peak
	L	S	R	HV	L	S	R	HV	L	S	R	HV	L	S	R	HV		
7:00 - 7:15	0	151	26	4	11	51	0	7	18	0	17	4					274	
7:15 - 7:30	0	193	42	9	10	50	0	3	12	0	14	2					321	
7:30 - 7:45	0	178	38	3	10	37	0	2	20	0	10	2					293	
7:45 - 8:00	0	166	52	6	12	52	0	5	17	0	15	5					314	1202
8:00 - 8:15	0	139	44	7	6	63	0	7	19	0	19	4					290	1218
8:15 - 8:30	0	157	41	7	10	42	0	8	15	0	21	8					286	1183
8:30 - 8:45	0	133	23	5	13	44	0	2	18	0	5	1					236	1126
8:45 - 9:00	0	106	23	7	9	60	0	2	18	0	21	4					237	1049
TOTAL	0	1223	289	48	81	399	0	36	137	0	122	30	0	0	0	0	2251	
		EBPct	70.0			**WBPct**	19.7			**NBPct**	10.3			**SBPct**	0.0			
Peak Sums:	**0**	**676**	**176**	**25**	**38**	**202**	**0**	**17**	**68**	**0**	**58**	**13**	**0**	**0**	**0**	**0**	**1218**	
Total Trucks	55					**TrkPct**	4.52			**PHF**	0.95							

Time Period	Route 62 EB				Route 62 WB				Pleasant Street NB								Total	Peak
	L	S	R	HV	L	S	R	HV	L	S	R	HV	L	S	R	HV		
4:00 - 4:15	0	77	24	5	17	163	0	5	46	0	6	2					333	
4:15 - 4:30	0	99	24	7	15	186	0	4	34	0	13	2					371	
4:30 - 4:45	0	82	33	4	24	167	0	10	41	0	7	2					354	
4:45 - 5:00	0	82	30	3	17	201	0	9	43	0	11	1					384	1442
5:00 - 5:15	0	65	26	2	14	167	0	4	55	0	16	0					343	1452
5:15 - 5:30	0	80	9	2	11	155	0	4	44	0	16	0					315	1396
5:30 - 5:45	0	61	23	3	16	180	0	1	43	0	10	2					333	1375
5:45 - 6:00	0	69	19	2	13	143	0	1	39	0	11	0					294	1285
TOTAL	0	615	188	28	127	1362	0	38	345	0	90	9	0	0	0	0	2727	
		EBPct	30.4			**WBPct**	54.5			**NBPct**	15.2			**SBPct**	0.0			
Peak Sums:	**0**	**328**	**113**	**16**	**70**	**721**	**0**	**27**	**173**	**0**	**47**	**5**	**0**	**0**	**0**	**0**	**1452**	
Total Trucks	48					**TrkPct**	3.31			**PHF**	0.95							

CMRPC

INTERSECTION TURNING MOVEMENT COUNT

CITY: Berlin **DATE:** 5/17/22 **DAY OF WEEK:** Tuesday
INTERSECTION: Route 62 / Pleasant Street

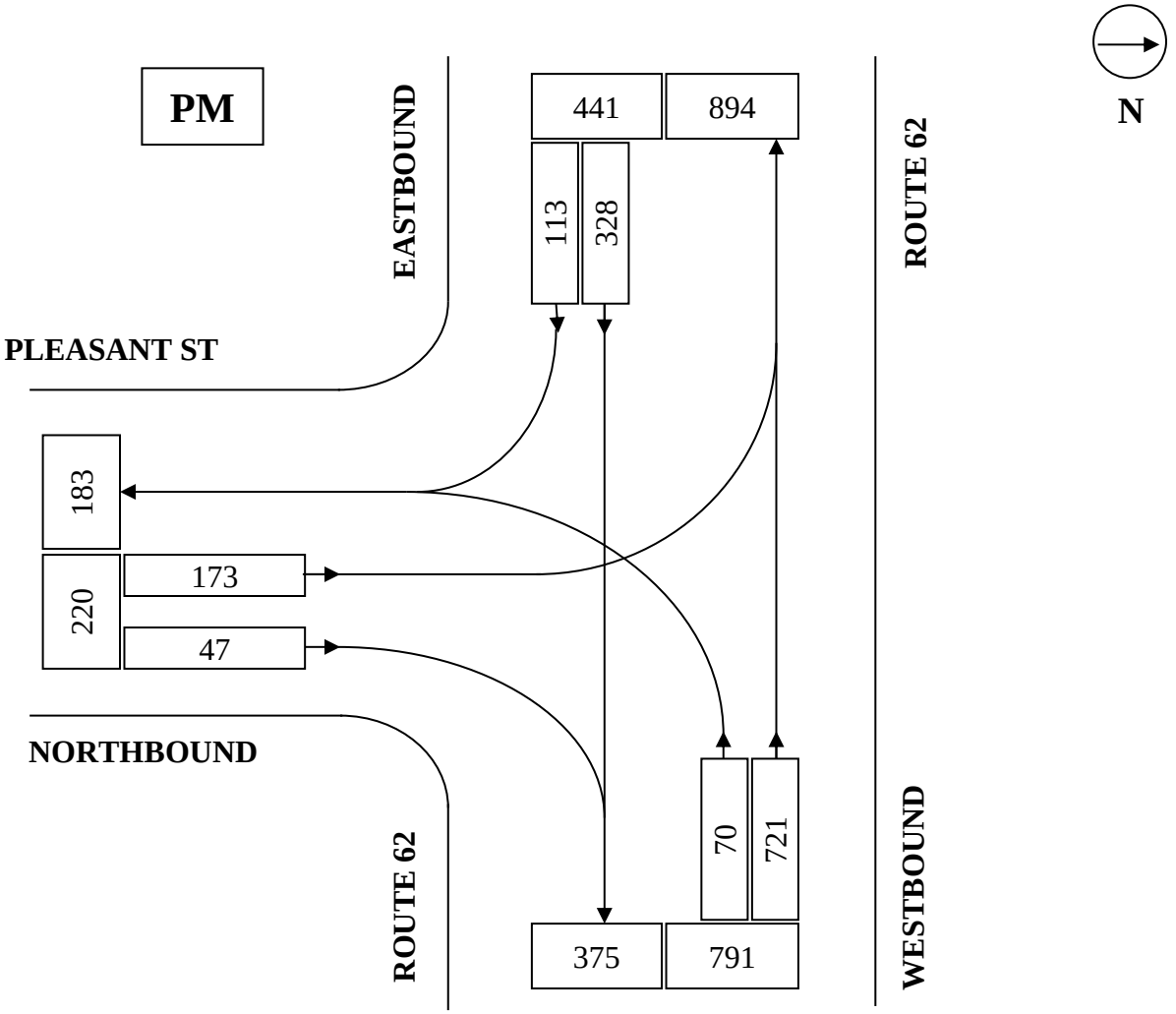


STREET	ENTERING VOLUMES	PERCENT OF FLOW	TIME OF COUNT
			7:15 - 8:15 AM
Route 62 EB	852	70.0%	
			PHF = .95
Route 62 WB	240	19.7%	
			VEHICLES COUNTED
Pleasant St NB	126	10.3%	
			ALL VEHICLES: 1218
TOTAL	1218	100.0%	**TRUCKS:** 55
			PERCENT TRUCKS: 4.52%

CMRPC

INTERSECTION TURNING MOVEMENT COUNT

CITY: Berlin **DATE:** 5/17/22 **DAY OF WEEK:** Tuesday
INTERSECTION: Route 62 / Pleasant Street



STREET	ENTERING VOLUMES	PERCENT OF FLOW	TIME OF COUNT
			4:15 - 5:15 PM
Route 62 EB	441	30.4%	
			PHF = .95
Route 62 WB	791	54.4%	
			VEHICLES COUNTED
Pleasant St NB	220	15.2%	
			ALL VEHICLES: 1452
TOTAL	1452	100.0%	**TRUCKS:** 48
			PERCENT TRUCKS: 3.31%

HCS Two-Way Stop-Control Report

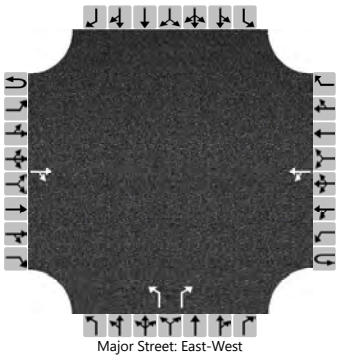
General Information

Analyst	KK
Agency/Co.	CMRPC
Date Performed	5/17/2022
Analysis Year	2022
Time Analyzed	7:15 - 8:15 AM
Intersection Orientation	East-West
Project Description	Route 62 CP

Site Information

Intersection	Route 62 / Pleasant St
Jurisdiction	Berlin
East/West Street	Route 62
North/South Street	Pleasant St
Peak Hour Factor	0.95
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		1	0	1		0	0	0
Configuration				TR		LT				L		R				
Volume (veh/h)			676	176		38	202			68		58				
Percent Heavy Vehicles (%)						4				4		4				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.14				6.44		6.24				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.24				3.54		3.34				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						40				72		61				
Capacity, c (veh/h)						747				219		379				
v/c Ratio						0.05				0.33		0.16				
95% Queue Length, Q_{95} (veh)						0.2				1.4		0.6				
Control Delay (s/veh)						10.1	0.6			29.2		16.3				
Level of Service (LOS)						B	A			D		C				
Approach Delay (s/veh)					2.1				23.3							
Approach LOS					A				C							

HCS Two-Way Stop-Control Report

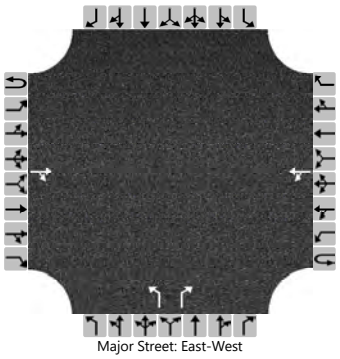
General Information

Analyst	KK
Agency/Co.	CMRPC
Date Performed	5/17/2022
Analysis Year	2022
Time Analyzed	4:15 - 5:15 PM
Intersection Orientation	East-West
Project Description	Route 62 CP

Site Information

Intersection	Route 62 / Pleasant St
Jurisdiction	Berlin
East/West Street	Route 62
North/South Street	Pleasant St
Peak Hour Factor	0.95
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		1	0	1		0	0	0
Configuration				TR		LT				L		R				
Volume (veh/h)			328	113		70	721			173		47				
Percent Heavy Vehicles (%)						3				3		3				
Proportion Time Blocked																
Percent Grade (%)										0						
Right Turn Channelized										No						
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)						4.1				7.1		6.2				
Critical Headway (sec)						4.13				6.43		6.23				
Base Follow-Up Headway (sec)						2.2				3.5		3.3				
Follow-Up Headway (sec)						2.23				3.53		3.33				

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)						74				182		49				
Capacity, c (veh/h)						1092				154		644				
v/c Ratio						0.07				1.18		0.08				
95% Queue Length, Q_{95} (veh)						0.2				10.2		0.2				
Control Delay (s/veh)						8.5	1.0			188.3		11.1				
Level of Service (LOS)						A	A			F		B				
Approach Delay (s/veh)					1.7				150.4							
Approach LOS					A				F							

TURNING MOVEMENT COUNT WORKSHEET

CMRPC

MUNICIPALITY: Town of Berlin

DATE: 6/1/2022

LOCATION: Route 62 / I-495 SB Ramps

DAY OF WEEK: Wednesday

WEATHER: AM: Clear PM: Clear

TECHNICIAN: Camera

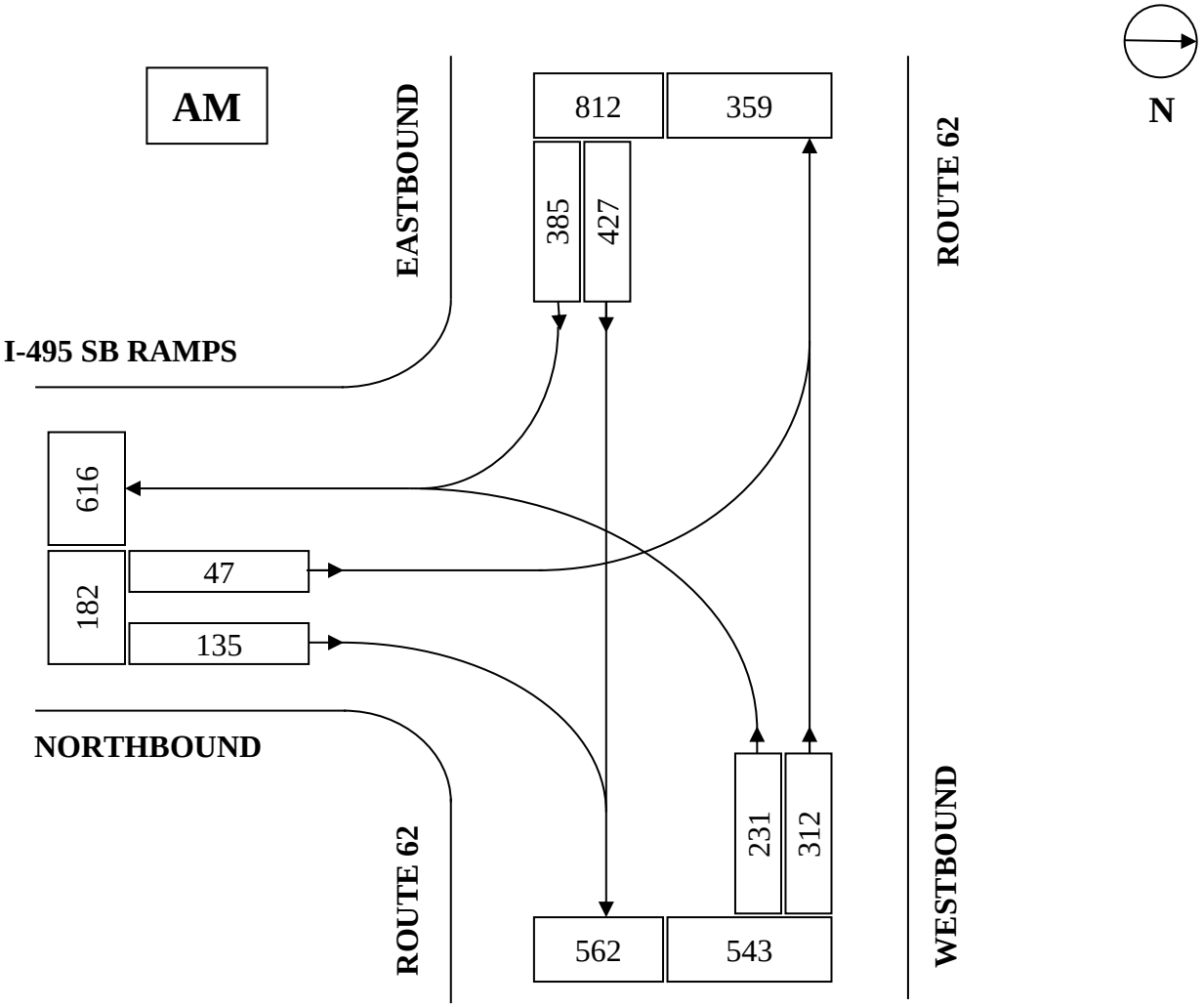
Time Period	Route 62 EB				Route 62 WB				I-495 SB Ramps NB								Total	Peak
	L	S	R	HV	L	S	R	HV	L	S	R	HV	L	S	R	HV		
7:00 - 7:15	0	103	97	7	48	54	0	8	19	0	26	3					347	
7:15 - 7:30	0	94	95	7	68	60	0	10	14	0	30	3					361	
7:30 - 7:45	0	105	125	11	63	74	0	11	14	0	31	1					412	
7:45 - 8:00	0	111	114	9	57	65	0	5	13	0	35	3					395	1515
8:00 - 8:15	0	100	73	11	56	89	0	9	9	0	37	3					364	1532
8:15 - 8:30	0	111	73	16	55	84	0	9	11	0	32	3					366	1537
8:30 - 8:45	0	73	73	8	49	40	0	3	14	0	40	1					289	1414
8:45 - 9:00	0	73	67	13	42	68	0	8	15	0	38	5					303	1322
TOTAL	0	770	717	82	438	534	0	63	109	0	269	22	0	0	0	0	2837	
		EBPct	52.8			**WBPct**	35.3			**NBPct**	11.8			**SBPct**	0.0			
Peak Sums:	**0**	**427**	**385**	**47**	**231**	**312**	**0**	**34**	**47**	**0**	**135**	**10**	**0**	**0**	**0**	**0**	**1537**	
Total Trucks	91					**TrkPct**	5.92			**PHF**	0.93							

Time Period	Route 62 EB				Route 62 WB				I-495 SB Ramps NB								Total	Peak
	L	S	R	HV	L	S	R	HV	L	S	R	HV	L	S	R	HV		
4:00 - 4:15	0	87	23	5	67	175	0	13	29	0	55	1					436	
4:15 - 4:30	0	76	28	5	64	190	0	4	39	0	61	5					458	
4:30 - 4:45	0	62	25	2	72	207	0	15	27	0	54	3					447	
4:45 - 5:00	0	104	34	6	73	177	0	4	30	0	57	4					475	1816
5:00 - 5:15	0	84	26	5	73	174	0	7	28	0	52	0					437	1817
5:15 - 5:30	0	81	29	3	66	195	0	5	43	0	65	0					479	1838
5:30 - 5:45	0	75	24	6	68	190	0	9	64	0	76	4					497	1888
5:45 - 6:00	0	83	27	1	51	142	0	9	42	0	79	4					424	1837
TOTAL	0	652	216	33	534	1450	0	66	302	0	499	21	0	0	0	0	3653	
		EBPct	24.2			**WBPct**	53.8			**NBPct**	22.0			**SBPct**	0.0			
Peak Sums:	**0**	**344**	**113**	**20**	**280**	**736**	**0**	**25**	**165**	**0**	**250**	**8**	**0**	**0**	**0**	**0**	**1888**	
Total Trucks	53					**TrkPct**	2.81			**PHF**	0.95							

CMRPC

INTERSECTION TURNING MOVEMENT COUNT

CITY: Berlin **DATE:** 6/1/22 **DAY OF WEEK:** **Wednesday**
INTERSECTION: Route 62 / I-495 SB Ramps

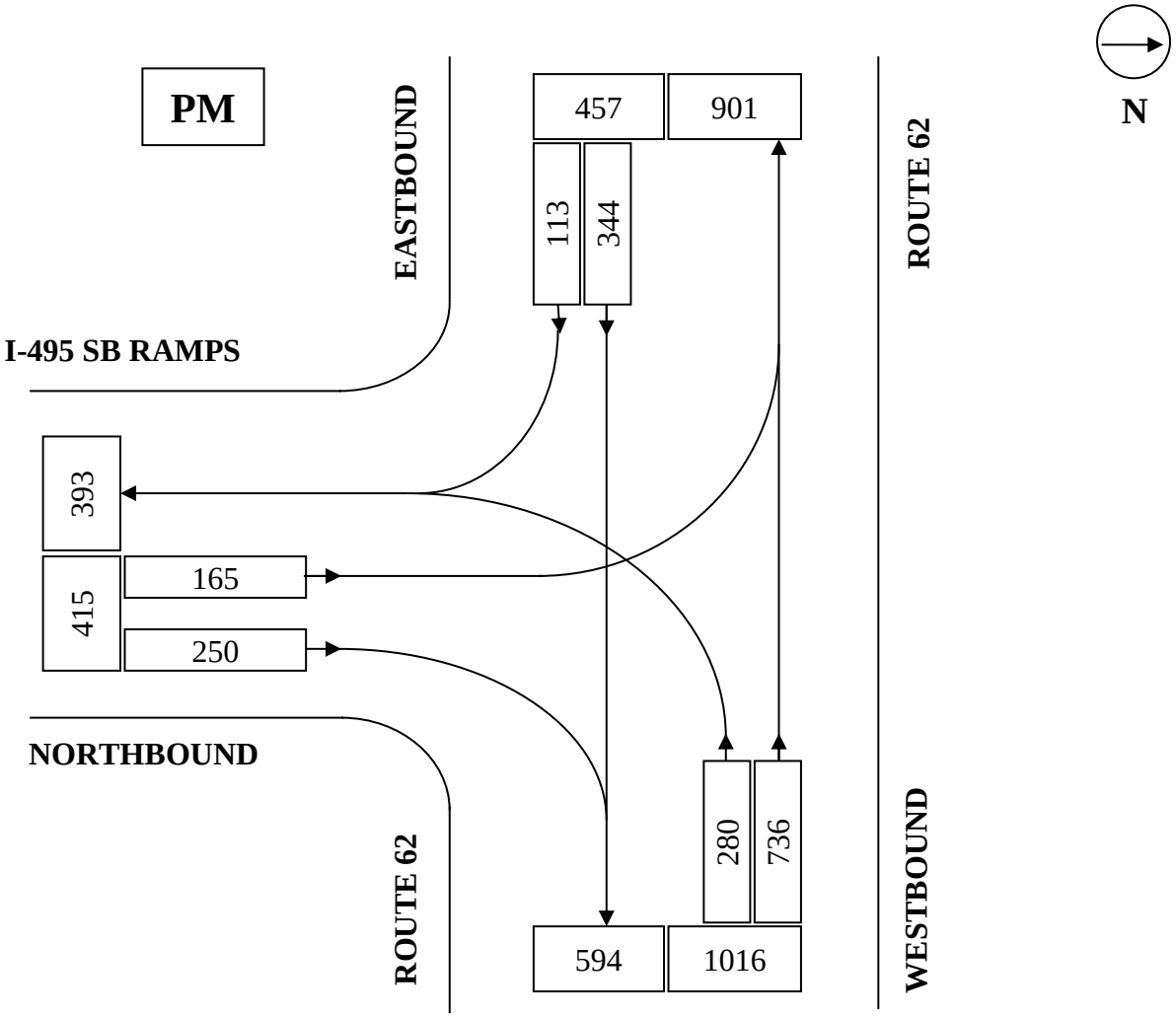


STREET	ENTERING VOLUMES	PERCENT OF FLOW	TIME OF COUNT
			7:30 - 8:30 AM
Route 62 EB	812	52.9%	
			PHF = .93
Route 62 WB	543	35.3%	
			VEHICLES COUNTED
I-495 SB Ramps NB	182	11.8%	
			ALL VEHICLES: 1537
TOTAL	1537	100.0%	**TRUCKS:** 91
			PERCENT TRUCKS: 5.92%

CMRPC

INTERSECTION TURNING MOVEMENT COUNT

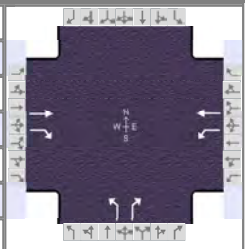
CITY: Berlin **DATE:** 6/1/22 **DAY OF WEEK:** Wednesday
INTERSECTION: Route 62 / I-495 SB Ramps



STREET	ENTERING VOLUMES	PERCENT OF FLOW	TIME OF COUNT
			4:45 - 5:45 PM
Route 62 EB	457	24.2%	
			PHF = .95
Route 62 WB	1016	53.8%	
			VEHICLES COUNTED
I-495 SB Ramps NB	415	22.0%	
			ALL VEHICLES: 1888
TOTAL	1888	100.0%	**TRUCKS:** 53
			PERCENT TRUCKS: 2.81%

HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMRPC			Duration, h	0.250
Analyst	KK	Analysis Date	Jul 6, 2022	Area Type	Other
Jurisdiction	Berlin	Time Period	7:30 - 8:30 AM	PHF	0.93
Urban Street	Route 62	Analysis Year	2022	Analysis Period	1> 7:30
Intersection	Route 62/495 SB Ramps	File Name	22_Route 62 & 495 SB Ramps_AM.xus		
Project Description	Route 62 CP				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		427	385	231	312		47		135			

Signal Information			
Cycle, s	42.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Float	Simult. Gap N/S	On

								1	2	3	4	
Green	6.0	16.0	5.0	0.0	0.0	0.0						
Yellow	3.0	3.0	3.0	0.0	0.0	0.0		5	6	7	8	
Red	2.0	2.0	2.0	0.0	0.0	0.0						

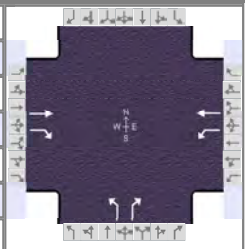
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		7.3	2.0	4.0		9.0		
Phase Duration, s		21.0	11.0	32.0		10.0		
Change Period, ($Y+R_c$), s		5.0	5.0	5.0		5.0		
Max Allow Headway (*MAH*), s		3.1	3.1	3.1		3.3		
Queue Clearance Time (g_s), s		10.8	8.0	5.4		5.6		
Green Extension Time (g_e), s		1.2	0.0	1.7		0.0		
Phase Call Probability		1.00	1.00	1.00		1.00		
Max Out Probability		0.49	1.00	0.07		1.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate (*v*), veh/h		459	199	248	335		51		145			
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1811	1535	1725	1811		1853		1648			
Queue Service Time (g_s), s		8.8	3.9	6.0	3.4		1.0		3.6			
Cycle Queue Clearance Time (g_c), s		8.8	3.9	6.0	3.4		1.0		3.6			
Green Ratio (*g/C*)		0.38	0.38	2.17	0.64		0.12		0.12			
Capacity (*c*), veh/h		690	585	246	1164		221		196			
Volume-to-Capacity Ratio (*X*)		0.665	0.340	1.008	0.288		0.229		0.740			
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)		5.2	1.7	10.1	0.8		0.7		3.3			
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00		0.00		0.00			
Uniform Delay (d_1), s/veh		10.8	9.2	18.0	3.3		16.8		17.9			
Incremental Delay (d_2), s/veh		2.0	0.1	59.4	0.1		0.2		12.3			
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0		0.0			
Control Delay (*d*), s/veh		12.8	9.4	77.4	3.3		16.9		30.2			
Level of Service (LOS)		B	A	F	A		B		C			
Approach Delay, s/veh / LOS	11.7	B		34.8	C		26.8	C		0.0		
Intersection Delay, s/veh / LOS	23.2						C					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.88	B	0.64	A	1.92	B	2.20	B
Bicycle LOS Score / LOS	1.57	B	1.45	A		F		

HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMRPC			Duration, h	0.250
Analyst	KK	Analysis Date	Jul 6, 2022	Area Type	Other
Jurisdiction	Berlin	Time Period	4:45 - 5:45 PM	PHF	0.95
Urban Street	Route 62	Analysis Year	2022	Analysis Period	1> 4:45
Intersection	Route 62/495 SB Ramps	File Name	22_Route 62 & 495 SB Ramps_PM.xus		
Project Description	Route 62 CP				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		344	113	280	736		165		250			

Signal Information			
Cycle, s	64.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Float	Simult. Gap N/S	On

Green	14.0	20.0	15.0	0.0	0.0	0.0	1	2	3	4		
Yellow	3.0	3.0	3.0	0.0	0.0	0.0						
Red	2.0	2.0	2.0	0.0	0.0	0.0	5	6	7	8		

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		7.3	2.0	4.0		9.0		
Phase Duration, s		25.0	19.0	44.0		20.0		
Change Period, ($Y+R_c$), s		5.0	5.0	5.0		5.0		
Max Allow Headway (*MAH*), s		3.0	3.1	3.0		3.3		
Queue Clearance Time (g_s), s		12.7	12.0	19.9		11.5		
Green Extension Time (g_e), s		1.9	0.1	0.0		0.4		
Phase Call Probability		1.00	1.00	1.00		1.00		
Max Out Probability		0.31	1.00	1.00		0.89		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate (*v*), veh/h		362	66	295	775		174		263			
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1856	1539	1767	1856		1867		1620			
Queue Service Time (g_s), s		10.7	2.0	10.0	17.9		5.0		9.5			
Cycle Queue Clearance Time (g_c), s		10.7	2.0	10.0	17.9		5.0		9.5			
Green Ratio (*g/C*)		0.31	0.31	0.22	0.61		0.23		0.23			
Capacity (*c*), veh/h		580	481	387	1131		438		380			
Volume-to-Capacity Ratio (*X*)		0.624	0.138	0.762	0.685		0.397		0.693			
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)		7.8	1.1	8.2	9.4		3.7		6.8			
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00		0.00		0.00			
Uniform Delay (d_1), s/veh		18.8	15.8	23.4	8.4		20.7		22.4			
Incremental Delay (d_2), s/veh		1.6	0.0	7.8	1.4		0.2		4.5			
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0		0.0			
Control Delay (*d*), s/veh		20.4	15.9	31.3	9.8		20.9		26.9			
Level of Service (LOS)		C	B	C	A		C		C			
Approach Delay, s/veh / LOS	19.7	B		15.7	B		24.5	C		0.0		
Intersection Delay, s/veh / LOS	18.6						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.91	B	0.66	A	1.94	B	2.01	B
Bicycle LOS Score / LOS	1.19	A	2.25	B		F		

TURNING MOVEMENT COUNT WORKSHEET

CMRPC

MUNICIPALITY: Town of Berlin

DATE: 5/4/2022

LOCATION: Route 62 / I-495 NB Ramps

DAY OF WEEK: Wednesday

WEATHER: AM: Clear PM: Clear

TECHNICIAN: Camera

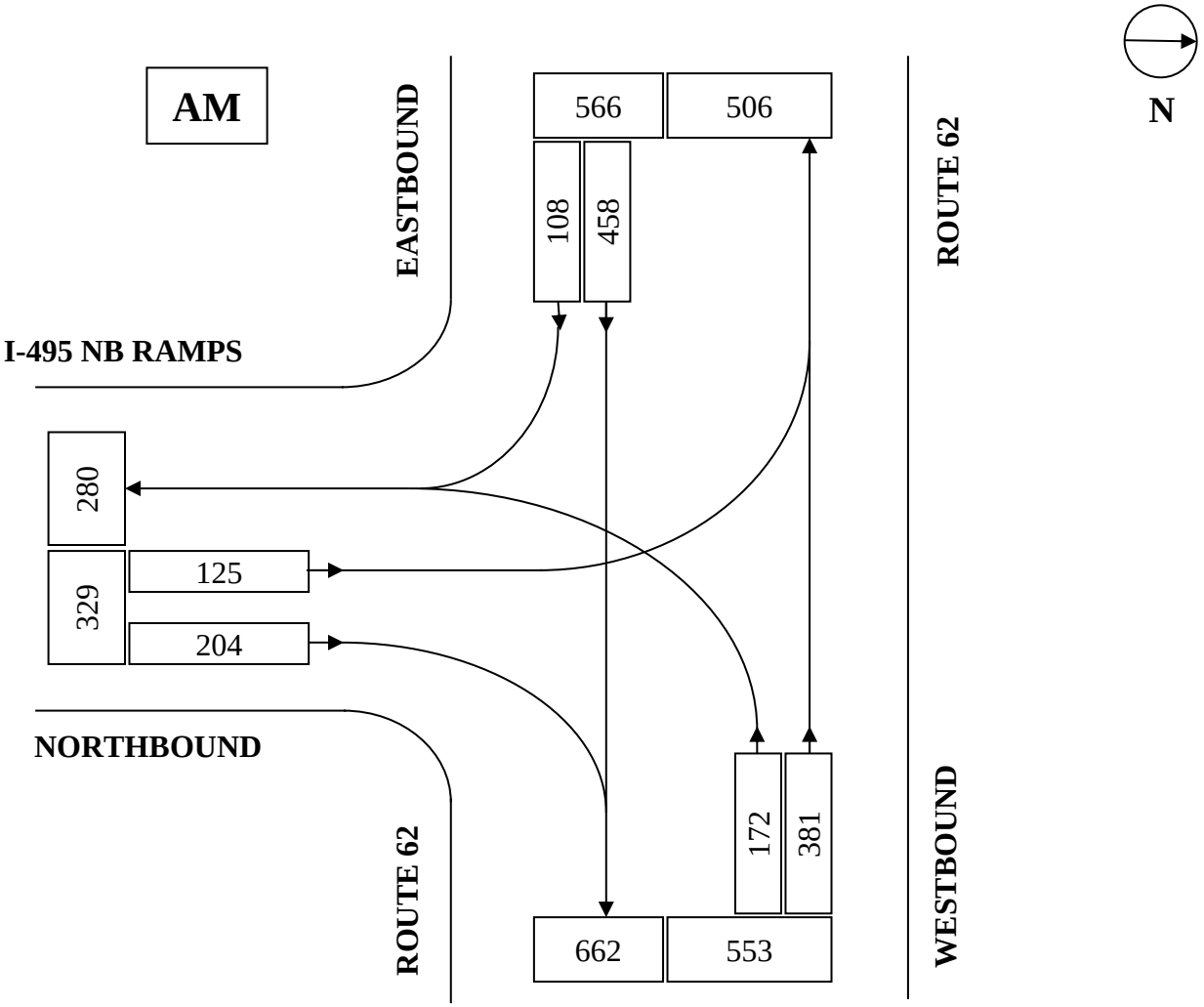
Time Period	Route 62 EB				Route 62 WB				I-495 SB Ramps NB								Total	Peak
	L	S	R	HV	L	S	R	HV	L	S	R	HV	L	S	R	HV		
7:00 - 7:15	0	81	21	4	28	71	0	6	20	0	47	7					268	
7:15 - 7:30	0	111	40	10	51	91	0	7	22	0	31	7					346	
7:30 - 7:45	0	110	25	5	45	103	0	14	29	0	40	7					352	
7:45 - 8:00	0	120	31	7	48	84	0	6	35	0	60	5					378	1344
8:00 - 8:15	0	120	24	18	27	98	0	7	28	0	51	6					348	1424
8:15 - 8:30	0	108	28	11	52	96	0	8	33	0	53	6					370	1448
8:30 - 8:45	0	98	12	2	33	89	0	6	24	0	46	6					302	1398
8:45 - 9:00	0	120	12	9	23	86	0	9	24	0	52	3					317	1337
TOTAL	0	868	193	66	307	718	0	63	215	0	380	47	0	0	0	0	2681	
		EBPct	39.1			**WBPct**	38.2			**NBPct**	22.7			**SBPct**	0.0			
Peak Sums:	**0**	**458**	**108**	**41**	**172**	**381**	**0**	**35**	**125**	**0**	**204**	**24**	**0**	**0**	**0**	**0**	**1448**	
Total Trucks	100					**TrkPct**	6.91			**PHF**	0.96							

Time Period	Route 62 EB				Route 62 WB				I-495 SB Ramps NB								Total	Peak
	L	S	R	HV	L	S	R	HV	L	S	R	HV	L	S	R	HV		
4:00 - 4:15	0	106	9	6	44	139	0	10	79	0	83	5					460	
4:15 - 4:30	0	123	6	6	49	148	0	12	87	0	72	5					485	
4:30 - 4:45	0	108	10	0	56	158	0	8	64	0	80	4					476	
4:45 - 5:00	0	123	9	5	43	135	0	1	77	0	86	0					473	1894
5:00 - 5:15	0	107	8	2	52	159	0	7	81	0	84	5					491	1925
5:15 - 5:30	0	119	10	6	47	149	0	7	75	0	92	1					492	1932
5:30 - 5:45	0	141	7	6	50	150	0	3	68	0	87	2					503	1959
5:45 - 6:00	0	119	4	4	45	141	0	5	63	0	85	4					457	1943
TOTAL	0	946	63	35	386	1179	0	53	594	0	669	26	0	0	0	0	3837	
		EBPct	26.7			**WBPct**	40.1			**NBPct**	33.2			**SBPct**	0.0			
Peak Sums:	**0**	**490**	**34**	**19**	**192**	**593**	**0**	**18**	**301**	**0**	**349**	**8**	**0**	**0**	**0**	**0**	**1959**	
Total Trucks	45					**TrkPct**	2.30			**PHF**	0.97							

CMRPC

INTERSECTION TURNING MOVEMENT COUNT

CITY: Berlin **DATE:** 5/4/22 **DAY OF WEEK:** **Wednesday**
INTERSECTION: Route 62 / I-495 NB Ramps

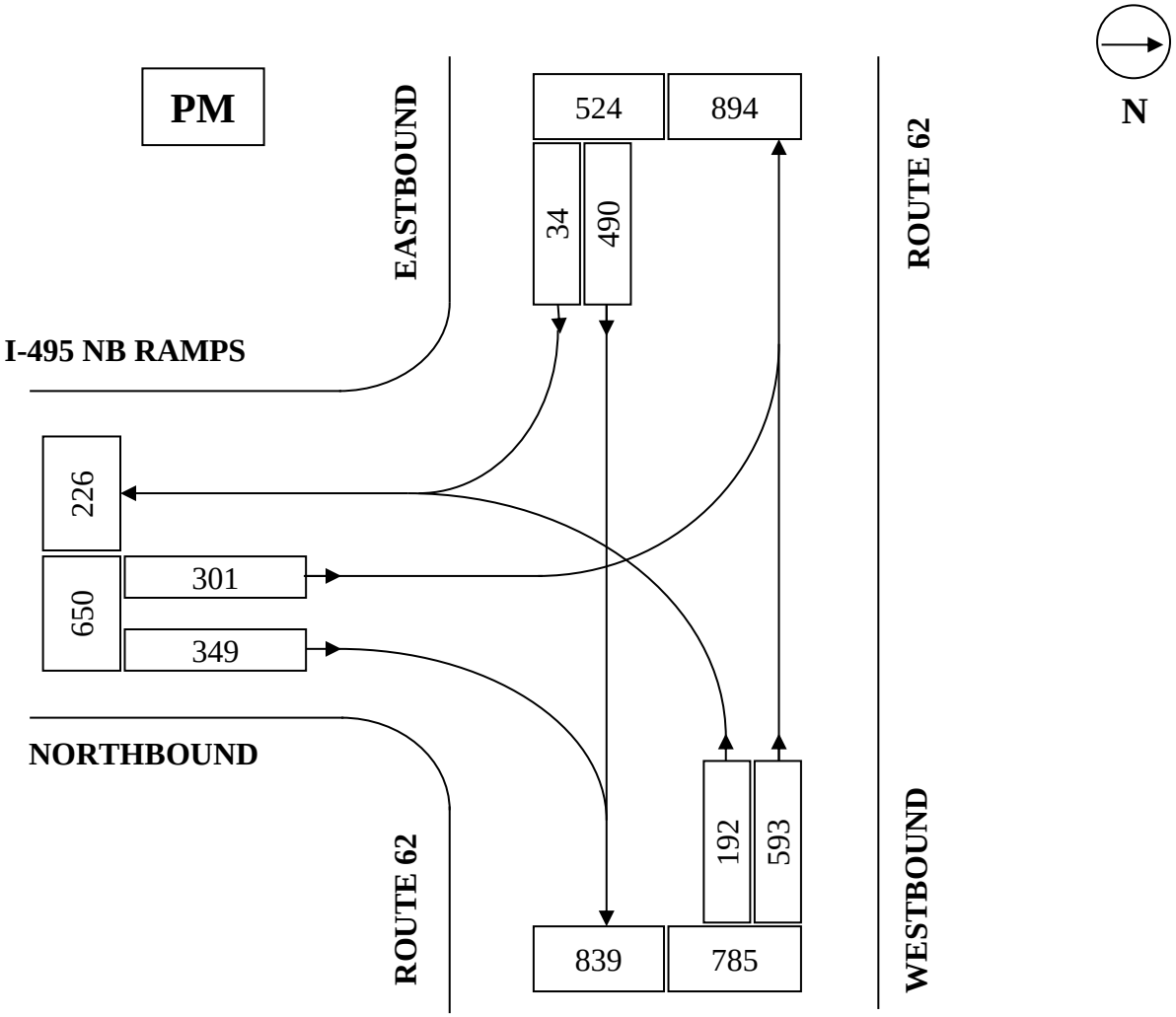


STREET	ENTERING VOLUMES	PERCENT OF FLOW	TIME OF COUNT
			7:30 - 8:30 AM
Route 62 EB	566	39.1%	
			PHF = .96
Route 62 WB	553	38.2%	
			VEHICLES COUNTED
I-495 NB Ramps NB	329	22.7%	
			ALL VEHICLES: 1448
TOTAL	1448	100.0%	**TRUCKS:** 100
			PERCENT TRUCKS: 6.91%

CMRPC

INTERSECTION TURNING MOVEMENT COUNT

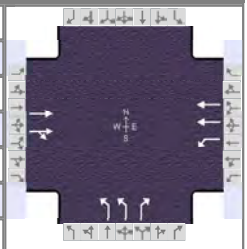
CITY: Berlin **DATE:** 5/4/22 **DAY OF WEEK:** Wednesday
INTERSECTION: Route 62 / I-495 NB Ramps



STREET	ENTERING VOLUMES	PERCENT OF FLOW	TIME OF COUNT
			4:45 - 5:45 PM
Route 62 EB	524	26.7%	
			PHF = .97
Route 62 WB	785	40.1%	
			VEHICLES COUNTED
I-495 NB Ramps NB	650	33.2%	
			ALL VEHICLES: 1959
TOTAL	1959	100.0%	**TRUCKS:** 45
			PERCENT TRUCKS: 2.30%

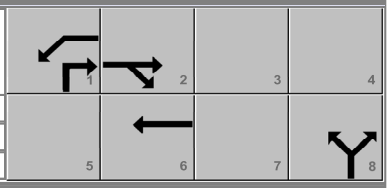
HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	CMRPC			Duration, h	0.250
Analyst	KK	Analysis Date	Jul 6, 2022	Area Type	Other
Jurisdiction	Berlin	Time Period	7:30 - 8:30 AM	PHF	0.96
Urban Street	Route 62	Analysis Year	2022	Analysis Period	1> 7:30
Intersection	Route 62/495 NB Ramps	File Name	22_Route 62 & 495 NB Ramps_AM.xus		
Project Description	Route 62 CP				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		458	108	172	381		125		204			

Signal Information												
Cycle, s	41.0	Reference Phase	2									
Offset, s	0	Reference Point	End									
Uncoordinated	Yes	Simult. Gap E/W	On	Green	5.0	15.0	6.0	0.0	0.0	0.0		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow	3.0	3.0	3.0	0.0	0.0	0.0		
				Red	2.0	2.0	2.0	0.0	0.0	0.0		



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	2.0	4.0		9.0		
Phase Duration, s		20.0	10.0	30.0		11.0		
Change Period, ($Y+R_c$), s		5.0	5.0	5.0		5.0		
Max Allow Headway (*MAH*), s		3.1	3.1	3.1		3.3		
Queue Clearance Time (g_s), s		7.1	6.2	4.1		6.9		
Green Extension Time (g_e), s		1.5	0.0	1.7		0.0		
Phase Call Probability		1.00	1.00	1.00		1.00		
Max Out Probability		0.15	1.00	0.05		1.00		

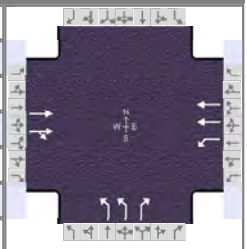
Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate (*v*), veh/h		291	278	179	397		130		213			
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1796	1695	1711	1710		1661		1522			
Queue Service Time (g_s), s		5.0	5.1	4.2	2.1		1.4		4.9			
Cycle Queue Clearance Time (g_c), s		5.0	5.1	4.2	2.1		1.4		4.9			
Green Ratio (*g/C*)		0.37	0.37	0.12	0.61		0.15		0.27			
Capacity (*c*), veh/h		657	620	209	2085		486		408			
Volume-to-Capacity Ratio (*X*)		0.443	0.447	0.859	0.190		0.268		0.520			
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)		2.6	2.5	5.3	0.6		0.8		2.4			
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00		0.00		0.00			
Uniform Delay (d_1), s/veh		9.8	9.9	17.7	3.5		15.5		12.8			
Incremental Delay (d_2), s/veh		0.2	0.2	27.2	0.0		0.1		0.6			
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0		0.0			
Control Delay (*d*), s/veh		10.0	10.0	44.9	3.5		15.7		13.3			
Level of Service (LOS)		B	B	D	A		B		B			
Approach Delay, s/veh / LOS	10.0	B		16.4	B		14.2	B		0.0		
Intersection Delay, s/veh / LOS	13.5						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.07	B	0.65	A	2.28	B	2.14	B
Bicycle LOS Score / LOS	0.96	A	0.96	A		F		

 HCS™ Streets Version 2022 Generated: 7/6/2022 10:33:17 AM

HCS Signalized Intersection Results Summary

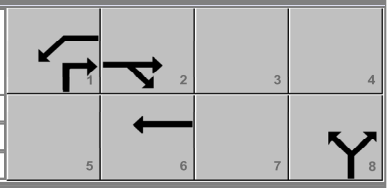
General Information				Intersection Information	
Agency	CMRPC			Duration, h	0.250
Analyst	KK	Analysis Date	Jul 6, 2022	Area Type	Other
Jurisdiction	Berlin	Time Period	4:45 - 5:45 PM	PHF	0.97
Urban Street	Route 62	Analysis Year	2022	Analysis Period	1> 4:45
Intersection	Route 62/495 NB Ramps	File Name	22_Route 62 & 495 NB Ramps_PM.xus		
Project Description	Route 62 CP				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h		490	34	192	593		301		349			

Signal Information			
Cycle, s	53.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On

Green	7.0	19.0	12.0	0.0	0.0	0.0	
Yellow	3.0	3.0	3.0	0.0	0.0	0.0	
Red	2.0	2.0	2.0	0.0	0.0	0.0	



Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase		2	1	6		8		
Case Number		8.3	2.0	4.0		9.0		
Phase Duration, s		24.0	12.0	36.0		17.0		
Change Period, ($Y+R_c$), s		5.0	5.0	5.0		5.0		
Max Allow Headway (*MAH*), s		3.0	3.1	3.0		3.3		
Queue Clearance Time (g_s), s		7.7	7.8	6.6		11.9		
Green Extension Time (g_e), s		2.2	0.0	2.2		0.0		
Phase Call Probability		1.00	1.00	1.00		1.00		
Max Out Probability		0.06	1.00	0.04		1.00		

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement		2	12	1	6		3		18			
Adjusted Flow Rate (*v*), veh/h		267	263	198	611		310		360			
Adjusted Saturation Flow Rate (*s*), veh/h/ln		1870	1839	1781	1781		1743		1598			
Queue Service Time (g_s), s		5.7	5.7	5.8	4.6		4.0		9.9			
Cycle Queue Clearance Time (g_c), s		5.7	5.7	5.8	4.6		4.0		9.9			
Green Ratio (*g/C*)		0.36	0.36	0.13	0.58		0.23		0.36			
Capacity (*c*), veh/h		671	659	235	2083		789		573			
Volume-to-Capacity Ratio (*X*)		0.398	0.399	0.841	0.294		0.393		0.628			
Back of Queue (*Q*), ft/ln (95 th percentile)												
Back of Queue (*Q*), veh/ln (95 th percentile)		3.6	3.5	6.5	2.0		2.6		5.8			
Queue Storage Ratio (*RQ*) (95 th percentile)		0.00	0.00	0.00	0.00		0.00		0.00			
Uniform Delay (d_1), s/veh		12.7	12.7	22.5	5.5		17.4		14.1			
Incremental Delay (d_2), s/veh		0.1	0.1	22.0	0.0		0.1		1.7			
Initial Queue Delay (d_3), s/veh		0.0	0.0	0.0	0.0		0.0		0.0			
Control Delay (*d*), s/veh		12.9	12.9	44.4	5.5		17.5		15.7			
Level of Service (LOS)		B	B	D	A		B		B			
Approach Delay, s/veh / LOS	12.9	B		15.1	B		16.6	B		0.0		
Intersection Delay, s/veh / LOS	15.0						B					

Multimodal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	2.08	B	0.66	A	2.29	B	2.13	B
Bicycle LOS Score / LOS	0.92	A	1.16	A		F		

TURNING MOVEMENT COUNT WORKSHEET

CMRPC

MUNICIPALITY: Town of Berlin

DATE: 5/24/2022

LOCATION: Route 62 / Gates Pond Road

DAY OF WEEK: Thursday

WEATHER: AM: Clear PM: Clear

TECHNICIAN: Camera

Time Period	Route 62 EB				Route 62 WB				Gates Pond Rd NB				Gates Pond Rd SB				Total	Peak
	L	S	R	HV	L	S	R	HV	L	S	R	HV	L	S	R	HV		
7:00 - 7:15	15	97	8	2	5	60	2	0	8	1	7	1	3	2	19	1	227	
7:15 - 7:30	18	124	14	7	8	101	4	7	18	1	6	0	0	1	34	3	329	
7:30 - 7:45	16	108	8	5	4	101	0	7	15	1	12	0	5	1	32	5	303	
7:45 - 8:00	13	128	6	1	8	76	3	6	11	1	3	0	5	0	23	2	277	1136
8:00 - 8:15	15	134	8	8	5	103	2	12	16	2	7	1	1	2	19	0	314	1223
8:15 - 8:30	7	113	11	9	8	96	5	4	13	0	12	1	5	0	24	1	294	1188
8:30 - 8:45	15	135	9	11	6	98	6	1	12	0	9	1	4	1	19	0	314	1199
8:45 - 9:00	16	156	8	11	4	92	4	7	9	1	9	0	2	0	14	0	315	1237
TOTAL	115	995	72	54	48	727	26	44	102	7	65	4	25	7	184	12	2373	
		EBPct	50.7			**WBPct**	34.7			**NBPct**	7.3			**SBPct**	7.4			
Peak Sums:	**53**	**538**	**36**	**39**	**23**	**389**	**17**	**24**	**50**	**3**	**37**	**3**	**12**	**3**	**76**	**1**	**1237**	
Total Trucks	67					**TrkPct**	5.42			**PHF**	0.98							

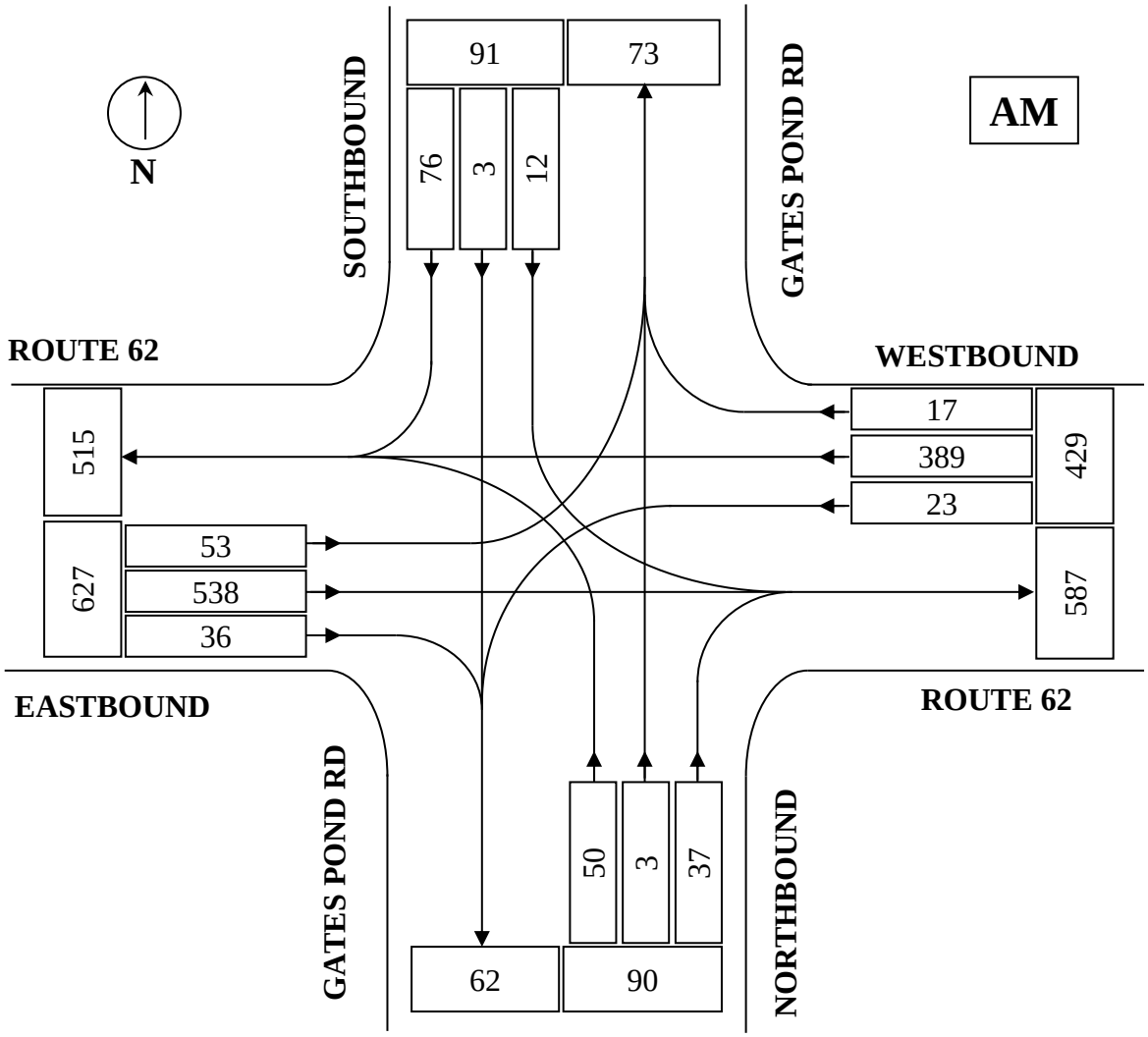
Time Period	Route 62 EB				Route 62 WB				Gates Pond Rd NB				Gates Pond Rd SB				Total	Peak
	L	S	R	HV	L	S	R	HV	L	S	R	HV	L	S	R	HV		
4:00 - 4:15	14	161	12	1	14	189	6	3	10	4	22	1	6	2	19	0	459	
4:15 - 4:30	24	184	20	3	10	192	11	3	10	1	13	0	4	0	11	0	480	
4:30 - 4:45	21	182	18	6	27	168	10	5	14	1	23	0	4	2	14	0	484	
4:45 - 5:00	20	166	20	3	13	183	4	2	6	1	13	0	1	3	18	1	448	1871
5:00 - 5:15	20	170	11	1	15	197	8	3	11	1	26	0	4	3	31	1	497	1909
5:15 - 5:30	25	172	11	3	25	176	16	4	9	1	18	0	4	3	13	0	473	1902
5:30 - 5:45	10	159	12	2	16	183	13	2	12	3	16	0	4	0	14	0	442	1860
5:45 - 6:00	22	149	25	2	16	176	11	2	3	0	11	1	7	1	14	0	435	1847
TOTAL	156	1343	129	21	136	1464	79	24	75	12	142	2	34	14	134	2	3718	
		EBPct	44.8			**WBPct**	43.9			**NBPct**	6.3			**SBPct**	5.0			
Peak Sums:	**85**	**702**	**69**	**13**	**65**	**740**	**33**	**13**	**41**	**4**	**75**	**0**	**13**	**8**	**74**	**2**	**1909**	
Total Trucks	28					**TrkPct**	1.47			**PHF**	0.96							

CMRPC

INTERSECTION TURNING MOVEMENT COUNT

CITY: Berlin **DATE:** 5/24/22 **DAY OF WEEK:** Thursday

INTERSECTION: Route 62 / Gates Pond Road

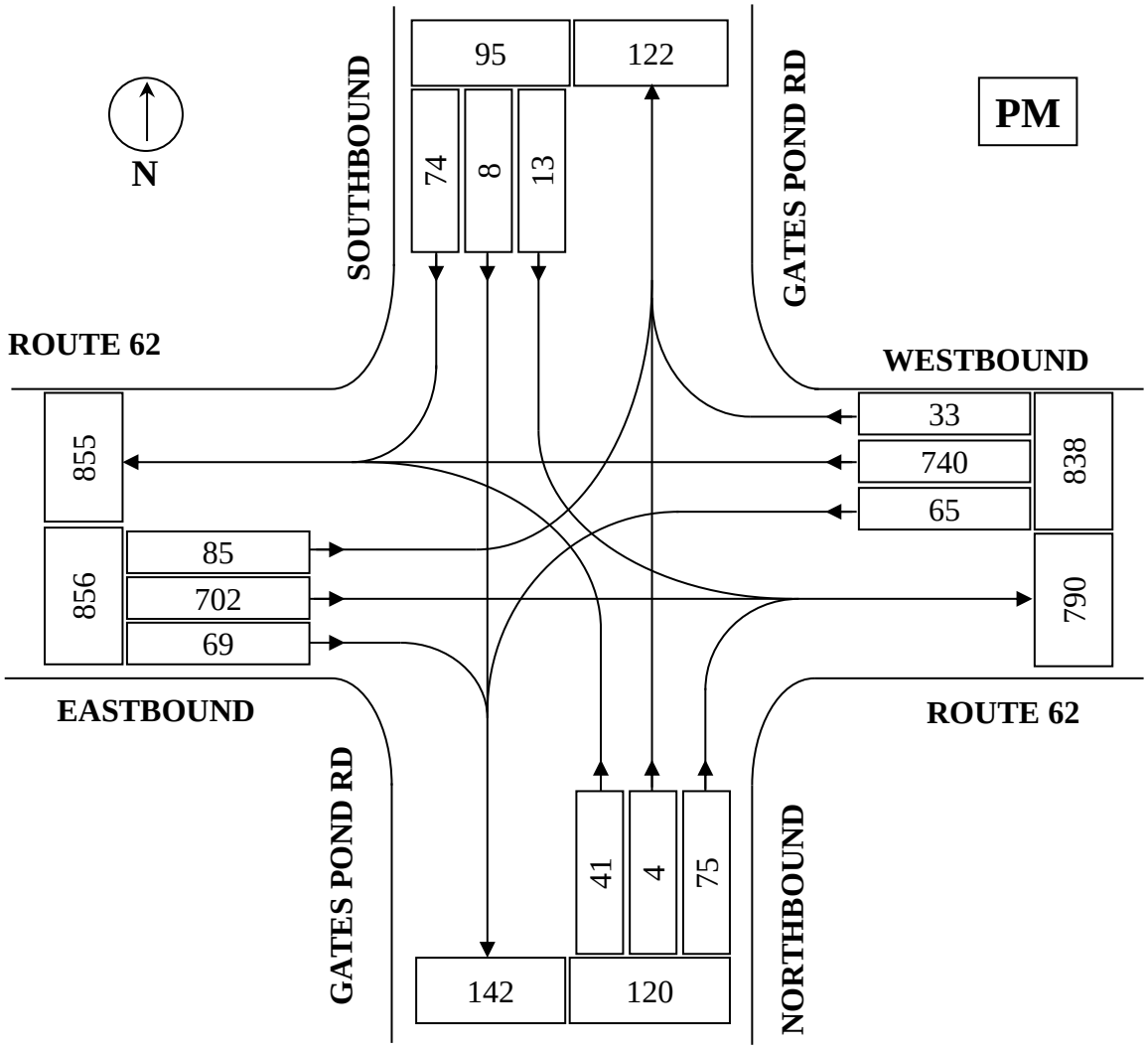


STREET	ENTERING VOLUMES	PERCENT OF FLOW	TIME OF COUNT
Route 62 EB	627	50.7%	8:00 - 9:00 AM
Route 62 WB	429	34.7%	PHF = .98
Gates Pond Rd NB	90	7.3%	**VEHICLES COUNTED**
Gates Pond Rd SB	91	7.3%	**ALL VEHICLES:** 1237
TOTAL	1237	100.0%	**TRUCKS:** 67
			PERCENT TRUCKS: 5.42%

CMRPC

INTERSECTION TURNING MOVEMENT COUNT

CITY: Berlin **DATE:** 5/24/22 **DAY OF WEEK:** Thursday
INTERSECTION: Route 62 / Gates Pond Road



STREET	ENTERING VOLUMES	PERCENT OF FLOW	TIME OF COUNT
Route 62 EB	856	44.8%	4:15 - 5:15 PM
Route 62 WB	838	43.9%	PHF = .96
Gates Pond Rd NB	120	6.3%	**VEHICLES COUNTED**
Gates Pond Rd SB	95	5.0%	**ALL VEHICLES:** 1909
TOTAL	1909	100.0%	**TRUCKS:** 28
			PERCENT TRUCKS: 1.47%

HCS Two-Way Stop-Control Report

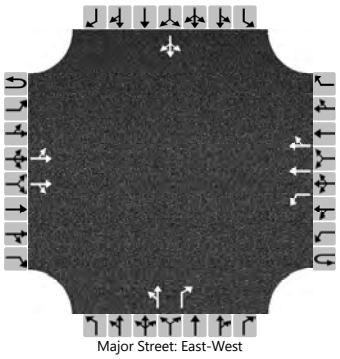
General Information

Analyst	KK
Agency/Co.	CMRPC
Date Performed	6/29/2022
Analysis Year	2022
Time Analyzed	8:00 - 9:00 AM
Intersection Orientation	East-West
Project Description	Route 62 CP

Site Information

Intersection	Route 62 / Gates Pond Rd
Jurisdiction	Berlin
East/West Street	Route 62
North/South Street	Gates Pond Rd
Peak Hour Factor	0.98
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	2	0		0	1	1		0	1	0
Configuration		LT		TR		L	T	TR		LT		R			LTR	
Volume (veh/h)		53	538	36	0	23	389	17		50	3	37		12	3	76
Percent Heavy Vehicles (%)		5			0	5				1	1	1		1	1	1
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized										No						
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.20				4.20				7.52	6.52	6.92		7.52	6.52	6.92
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.25				2.25				3.51	4.01	3.31		3.51	4.01	3.31

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		54				23				54		38			93	
Capacity, c (veh/h)		1120				965				185		707			552	
v/c Ratio		0.05				0.02				0.29		0.05			0.17	
95% Queue Length, Q_{95} (veh)		0.2				0.1				1.2		0.2			0.6	
Control Delay (s/veh)		8.4	0.4			8.8				32.3		10.4			12.8	
Level of Service (LOS)		A	A			A				D		B			B	
Approach Delay (s/veh)	1.1				0.5				23.3				12.8			
Approach LOS	A				A				C				B			

HCS Two-Way Stop-Control Report

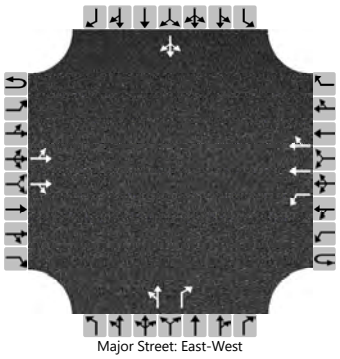
General Information

Analyst	KK
Agency/Co.	CMRPC
Date Performed	6/29/2022
Analysis Year	2022
Time Analyzed	4:15 - 5:15 PM
Intersection Orientation	East-West
Project Description	Route 62 CP

Site Information

Intersection	Route 62 / Gates Pond Rd
Jurisdiction	Berlin
East/West Street	Route 62
North/South Street	Gates Pond Rd
Peak Hour Factor	0.96
Analysis Time Period (hrs)	0.25

Lanes


Major Street: East-West

Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	2	0	0	1	2	0		0	1	1		0	1	0
Configuration		LT		TR		L	T	TR		LT		R			LTR	
Volume (veh/h)		85	702	69	0	65	740	33		41	4	75		13	8	74
Percent Heavy Vehicles (%)		1			0	1				1	1	1		1	1	1
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized										No						
Median Type | Storage		Undivided														

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.5	6.5	6.9		7.5	6.5	6.9
Critical Headway (sec)		4.12				4.12				7.52	6.52	6.92		7.52	6.52	6.92
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.21				2.21				3.51	4.01	3.31		3.51	4.01	3.31

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		89				68				47		78			99	
Capacity, c (veh/h)		819				822				54		600			191	
v/c Ratio		0.11				0.08				0.87		0.13			0.52	
95% Queue Length, Q_{95} (veh)		0.4				0.3				3.8		0.4			2.6	
Control Delay (s/veh)		9.9	1.1			9.8				206.7		11.9			42.5	
Level of Service (LOS)		A	A			A				F		B			E	
Approach Delay (s/veh)	1.9				0.8				85.0				42.5			
Approach LOS	A				A				F				E			

Central Massachusetts Regional Planning Commission

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East Brookfield
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Holden
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Millbury
Millville
New Braintree
North Brookfield
Northborough
Northbridge
Oakham
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Westborough
Worcester

Central Mass Regional Planning Commission

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